Catalyst 2918 Switch Command Reference

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Preface

The Catalyst 2918 switch is supported by a software image that provides enterprise-class intelligent services such as access control lists (ACLs) and quality of service (QoS) features.

This guide provides information about the Layer 2 commands that have been created or changed for use with the Catalyst 2918 switches. For information about the standard Cisco IOS Release 12.4 commands, see the Cisco IOS documentation set available on Cisco.com.

This guide does not provide procedures for configuring your switch. For detailed configuration procedures, see the software configuration guide for this release.

This guide does not describe system messages you might encounter. For more information, see the system message guide for this release.

For documentation updates, see the release notes for this release.

Conventions

This publication uses these conventions to convey instructions and information:

Command descriptions use these conventions:

- Commands and keywords are in **boldface** text.
- Arguments for which you supply values are in *italic*.
- Square brackets ([ ]) means optional elements.
- Braces ({}) group required choices, and vertical bars (|) separate the alternative elements.
- Braces and vertical bars within square brackets ([{ | }]) mean a required choice within an optional element.

Interactive examples use these conventions:

- Terminal sessions and system displays are in `screen` font.
- Information you enter is in **`boldface screen`** font.
- Nonprinting characters, such as passwords or tabs, are in angle brackets (< >).

Notes, cautions, and warnings use these conventions and symbols:

Note Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Filtering show Command Output

The **show** commands have optional output modifiers to filter the command output.

- **| begin**—Display begins with the line that matches the *expression*.
- **| exclude**—Display excludes with the line that matches the *expression*.
- **| include**—Display includes with the line that matches the *expression*.
- *expression*—Expression in the output to use as a reference point.

Expressions are case sensitive. If you enter **| exclude output**, the lines that contain *output* are not displayed, but the lines that contain *Output* are displayed.

Related Publications

These documents provide complete information about the switch and are available from Cisco.com.

http://www.cisco.com/web/CN/products/products_netsol/switches/products/ca2928/index.html

- *Release Notes for the Catalyst 2918 Switch*

  Note Before installing, configuring, or upgrading the switch, refer to the release notes on Cisco.com for the latest information.

- *Catalyst 2918 Switch Software Configuration Guide*
- *Catalyst 2918 Switch Command Reference*
- *Catalyst 2918 Switch System Message Guide*
- *Auto Smartports Configuration Guide*
- *Catalyst 2918 Switch Getting Started Guide*
- *Regulatory Compliance and Safety Information for the Catalyst 2918 Switch*
- *Cisco Small Form-Factor Pluggable Modules Installation Notes*

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CHAPTER 1

Using the Command-Line Interface

The Catalyst switch is supported by Cisco IOS software. This chapter describes how to use the switch CLI to configure software features.

- For a complete description of the commands that support these features, see Chapter 2, "Catalyst 2918 Switch Cisco IOS Commands."
- For information on the bootloader commands, see Appendix A, "Catalyst 2918 Switch Bootloader Commands."
- For information on the **debug** commands, see Appendix B, "Catalyst 2918 Switch Debug Commands."
- For information on the **show platform** commands, see Appendix C, "Catalyst 2918 Switch Show Platform Commands."
- For more information on Cisco IOS Release 12.4, see the *Cisco IOS Release 12.4 Command Summary*.
- For task-oriented configuration steps, see the software configuration guide for this release.

In this document, IP refers to IP version 4 (IPv4).

CLI Command Modes

This section describes the CLI command mode structure. Command modes support specific Cisco IOS commands. For example, the **interface** *interface-id* command only works when entered in global configuration mode.

These are the main command modes for the switch:

- User EXEC
- Privileged EXEC
- Global configuration
- Interface configuration
- VLAN configuration
- Line configuration

Table 1-1 lists the main command modes, how to access each mode, the prompt you see in that mode, and how to exit that mode. The prompts listed use the default name *Switch*.

Table 1-1 Command Modes Summary

Command Mode	Access Method	Prompt	Exit or Access Next Mode
User EXEC	This is the first level of access. (For the switch) Change terminal settings, perform basic tasks, and list system information.	`Switch>`	Enter the **logout** command. To enter privileged EXEC mode, enter the **enable** command.
Privileged EXEC	From user EXEC mode, enter the **enable** command.	`Switch#`	To exit to user EXEC mode, enter the **disable** command. To enter global configuration mode, enter the **configure** command.
Global configuration	From privileged EXEC mode, enter the **configure** command.	`Switch(config)#`	To exit to privileged EXEC mode, enter the **exit** or **end** command, or press **Ctrl-Z**. To enter interface configuration mode, enter the **interface** configuration command.
Interface configuration	From global configuration mode, specify an interface by entering the **interface** command followed by an interface identification.	`Switch(config-if)#`	To exit to privileged EXEC mode, enter the **end** command, or press **Ctrl-Z**. To exit to global configuration mode, enter the **exit** command.
VLAN configuration	In global configuration mode, enter the **vlan** *vlan-id* command.	`Switch(config-vlan)#`	To exit to global configuration mode, enter the **exit** command. To return to privileged EXEC mode, enter the **end** command, or press **Ctrl-Z**.
Line configuration	From global configuration mode, specify a line by entering the **line** command.	`Switch(config-line)#`	To exit to global configuration mode, enter the **exit** command. To return to privileged EXEC mode, enter the **end** command, or press **Ctrl-Z**.

User EXEC Mode

After you access the device, you are automatically in user EXEC command mode. The EXEC commands available at the user level are a subset of those available at the privileged level. In general, use the user EXEC commands to temporarily change terminal settings, perform basic tests, and list system information.

The supported commands can vary depending on the version of software in use. To display a comprehensive list of commands, enter a question mark (**?**) at the prompt.

```
Switch> ?
```

Privileged EXEC Mode

Because many of the privileged commands configure operating parameters, you should password-protect privileged access to prevent unauthorized use. The privileged command set includes those commands contained in user EXEC mode, as well as the **configure** privileged EXEC command through which you access the remaining command modes.

If your system administrator has set a password, you are prompted to enter it before being granted access to privileged EXEC mode. The password does not appear on the screen and is case sensitive.

The privileged EXEC mode prompt is the device name followed by the pound sign (#).

```
Switch#
```

Enter the **enable** command to access privileged EXEC mode:

```
Switch> enable
Switch#
```

The supported commands can vary depending on the version of software in use. To display a comprehensive list of commands, enter a question mark (**?**) at the prompt.

```
Switch# ?
```

To return to user EXEC mode, enter the **disable** privileged EXEC command.

Global Configuration Mode

Global configuration commands apply to features that affect the device as a whole. Use the **configure** privileged EXEC command to enter global configuration mode. The default is to enter commands from the management console.

When you enter the **configure** command, a message prompts you for the source of the configuration commands:

```
Switch# configure
Configuring from terminal, memory, or network [terminal]?
```

You can specify either the terminal or NVRAM as the source of configuration commands.

This example shows you how to access global configuration mode:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
```

The supported commands can vary depending on the version of software in use. To display a comprehensive list of commands, enter a question mark (**?**) at the prompt.

```
Switch(config)# ?
```

To exit global configuration command mode and to return to privileged EXEC mode, enter the **end** or **exit** command, or press **Ctrl-Z**.

Interface Configuration Mode

Interface configuration commands modify the operation of the interface. Interface configuration commands always follow a global configuration command, which defines the interface type.

Use the **interface** *interface-id* command to access interface configuration mode. The new prompt means interface configuration mode.

```
Switch(config-if)#
```

The supported commands can vary depending on the version of software in use. To display a comprehensive list of commands, enter a question mark (**?**) at the prompt.

```
Switch(config-if)# ?
```

To exit interface configuration mode and to return to global configuration mode, enter the **exit** command. To exit interface configuration mode and to return to privileged EXEC mode, enter the **end** command, or press **Ctrl-Z**.

VLAN Configuration Mode

Use this mode to configure normal-range VLANs (VLAN IDs 1 to 1005) or, when VTP mode is transparent, to configure extended-range VLANs (VLAN IDs 1006 to 4094). When VTP mode is transparent, the VLAN and VTP configuration is saved in the running configuration file, and you can save it to the switch startup configuration file by using the **copy running-config startup-config** privileged EXEC command. The configurations of VLAN IDs 1 to 1005 are saved in the VLAN database if VTP is in transparent or server mode. The extended-range VLAN configurations are not saved in the VLAN database.

Enter the **vlan** *vlan-id* global configuration command to access config-vlan mode:

```
Switch(config)# vlan 2000
Switch(config-vlan)#
```

The supported keywords can vary but are similar to the commands available in VLAN configuration mode. To display a comprehensive list of commands, enter a question mark (**?**) at the prompt.

```
Switch(config-vlan)# ?
```

For extended-range VLANs, all characteristics except the MTU size must remain at the default setting.

To return to global configuration mode, enter **exit**; to return to privileged EXEC mode, enter **end**. All the commands except **shutdown** take effect when you exit config-vlan mode.

Line Configuration Mode

Line configuration commands modify the operation of a terminal line. Line configuration commands always follow a line command, which defines a line number. Use these commands to change terminal parameter settings line-by-line or for a range of lines.

Use the **line vty** *line_number* [*ending_line_number*] command to enter line configuration mode. The new prompt means line configuration mode. The following example shows how to enter line configuration mode for virtual terminal line 7:

```
Switch(config)# line vty 0 7
```

The supported commands can vary depending on the version of software in use. To display a comprehensive list of commands, enter a question mark (**?**) at the prompt.

```
Switch(config-line)# ?
```

To exit line configuration mode and to return to global configuration mode, use the **exit** command. To exit line configuration mode and to return to privileged EXEC mode, enter the **end** command, or press **Ctrl-Z**.

CHAPTER 2

Catalyst 2918 Switch Cisco IOS Commands

aaa accounting dot1x

Use the **aaa accounting dot1x** global configuration command to enable authentication, authorization, and accounting (AAA) accounting and to create method lists defining specific accounting methods on a per-line or per-interface basis for IEEE 802.1x sessions. Use the **no** form of this command to disable IEEE 802.1x accounting.

aaa accounting dot1x {*name* | **default**} **start-stop** {**broadcast group** {*name* | **radius** | **tacacs+**} [**group** {*name* | **radius** | **tacacs+**} **...**] | **group** {*name* | **radius** | **tacacs+**} [**group** {*name* | **radius** | **tacacs+**} ...]}

no aaa accounting dot1x {*name* | **default**}

Syntax Description

name	Name of a server group. This is optional when you enter it after the **broadcast group** and **group** keywords.
default	Use the accounting methods that follow as the default list for accounting services.
start-stop	Send a start accounting notice at the beginning of a process and a stop accounting notice at the end of a process. The start accounting record is sent in the background. The requested-user process begins regardless of whether or not the start accounting notice was received by the accounting server.
broadcast	Enable accounting records to be sent to multiple AAA servers and send accounting records to the first server in each group. If the first server is unavailable, the switch uses the list of backup servers to identify the first server.
group	Specify the server group to be used for accounting services. These are valid server group names: • *name*—Name of a server group. • **radius**—List of all RADIUS hosts. • **tacacs+**—List of all TACACS+ hosts. The **group** keyword is optional when you enter it after the **broadcast group** and **group** keywords. You can enter more than optional **group** keyword.
radius	(Optional) Enable RADIUS authorization.
tacacs+	(Optional) Enable TACACS+ accounting.

Defaults

AAA accounting is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command requires access to a RADIUS server.

We recommend that you enter the **dot1x reauthentication** interface configuration command before configuring IEEE 802.1x RADIUS accounting on an interface.

Examples

This example shows how to configure IEEE 802.1x accounting:

```
Switch(config)# aaa new-model
Switch(config)# aaa accounting dot1x default start-stop group radius
```

Note The RADIUS authentication server must be properly configured to accept and log update or watchdog packets from the AAA client.

Related Commands

Command	Description
aaa authentication dot1x	Specifies one or more AAA methods for use on interfaces running IEEE 802.1x.
aaa new-model	Enables the AAA access control model.
dot1x reauthentication	Enables or disables periodic reauthentication.
dot1x timeout reauth-period	Sets the number of seconds between re-authentication attempts.

aaa authentication dot1x

Use the **aaa authentication dot1x** global configuration command to specify the authentication, authorization, and accounting (AAA) method to use on ports complying with the IEEE 802.1x authentication. Use the **no** form of this command to disable authentication.

aaa authentication dot1x {**default**} *method1*

no aaa authentication dot1x {**default**}

Syntax Description

default	Use the listed authentication method that follows this argument as the default method when a user logs in.
method1	Enter the **group radius** keywords to use the list of all RADIUS servers for authentication.

Note Though other keywords are visible in the command-line help strings, only the **default** and **group radius** keywords are supported.

Defaults

No authentication is performed.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The *method* argument identifies the method that the authentication algorithm tries in the given sequence to validate the password provided by the client. The only method that is truly IEEE 802.1x-compliant is the **group radius** method, in which the client data is validated against a RADIUS authentication server.

If you specify **group radius**, you must configure the RADIUS server by entering the **radius-server host** global configuration command.

Use the **show running-config** privileged EXEC command to display the configured lists of authentication methods.

Examples

This example shows how to enable AAA and how to create an IEEE 802.1x-compliant authentication list. This authentication first tries to contact a RADIUS server. If this action returns an error, the user is not allowed access to the network.

```
Switch(config)# aaa new-model
Switch(config)# aaa authentication dot1x default group radius
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
aaa new-model	Enables the AAA access control model.
show running-config	Displays the current operating configuration.

aaa authorization network

Use the **aaa authorization network** global configuration command to the configure the switch to use user-RADIUS authorization for all network-related service requests, such as IEEE 802.1x VLAN assignment. Use the **no** form of this command to disable RADIUS user authorization.

aaa authorization network default group radius

no aaa authorization network default

Syntax Description

default group radius	Use the list of all RADIUS hosts in the server group as the default authorization list.

Defaults

Authorization is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use the **aaa authorization network default group radius** global configuration command to allow the switch to download IEEE 802.1x authorization parameters from the RADIUS servers in the default authorization list. The authorization parameters are used by features such as VLAN assignment to get parameters from the RADIUS servers.

Use the **show running-config** privileged EXEC command to display the configured lists of authorization methods.

Examples

This example shows how to configure the switch for user RADIUS authorization for all network-related service requests:

```
Switch(config)# aaa authorization network default group radius
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the current operating configuration.

archive download-sw

Use the **archive download-sw** privileged EXEC command to download a new image from a TFTP server to the switch and to overwrite or keep the existing image.

archive download-sw {**/force-reload** | **/imageonly** | **/leave-old-sw** | **/no-set-boot** | **/overwrite** | **/reload** | **/safe**} *source-url*

Syntax Description

/force-reload	Unconditionally force a system reload after successfully downloading the software image.
/imageonly	Download only the software image but not the HTML files associated with the embedded device manager. The HTML files for the existing version are deleted only if the existing version is being overwritten or removed.
/leave-old-sw	Keep the old software version after a successful download.
/no-set-boot	Do not alter the setting of the BOOT environment variable to point to the new software image after it is successfully downloaded.
/overwrite	Overwrite the software image in flash memory with the downloaded one.
/reload	Reload the system after successfully downloading the image unless the configuration has been changed and not been saved.
/safe	Keep the current software image; do not delete it to make room for the new software image before the new image is downloaded. The current image is deleted after the download.
source-url	The source URL alias for a local or network file system. These options are supported: • The syntax for the local flash file system: **flash:** • The syntax for the FTP: **ftp:**[[**//***username*[**:***password*]@*location*]*/directory*]**/***image-name***.tar** • The syntax for an HTTP server: **http://**[[*username***:***password*]@]{*hostname* | *host-ip*}[*/directory*]**/***image-name***.tar** • The syntax for a secure HTTP server: **https://**[[*username***:***password*]@]{*hostname* | *host-ip*}[*/directory*]**/***image-name***.tar** • The syntax for the Remote Copy Protocol (RCP): **rcp:**[[**//***username*@*location*]*/directory*]**/***image-name***.tar** • The syntax for the TFTP: **tftp:**[[**//***location*]*/directory*]**/***image-name***.tar** The *image-name***.tar** is the software image to download and install on the switch.

Defaults

The current software image is not overwritten with the downloaded image.

Both the software image and HTML files are downloaded.

The new image is downloaded to the flash: file system.

The BOOT environment variable is changed to point to the new software image on the flash: file system.

Image names are case sensitive; the image file is provided in tar format.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **/imageonly** option removes the HTML files for the existing image if the existing image is being removed or replaced. Only the Cisco IOS image (without the HTML files) is downloaded.

Using the **/safe** or **/leave-old-sw** option can cause the new image download to fail if there is insufficient flash memory. If leaving the software in place prevents the new image from fitting in flash memory due to space constraints, an error results.

If you used the **/leave-old-sw** option and did not overwrite the old image when you downloaded the new one, you can remove the old image by using the **delete** privileged EXEC command. For more information, see the "delete" section on page 2-58.

Use the **/overwrite** option to overwrite the image on the flash device with the downloaded one.

If you specify the command *without* the **/overwrite** option, the download algorithm verifies that the new image is not the same as the one on the switch flash device. If the images are the same, the download does not occur. If the images are different, the old image is deleted, and the new one is downloaded.

After downloading a new image, enter the **reload** privileged EXEC command to begin using the new image, or specify the **/reload** or **/force-reload** option in the **archive download-sw** command.

Examples

This example shows how to download a new image from a TFTP server at 172.20.129.10 and to overwrite the image on the switch:

```
Switch# archive download-sw /overwrite tftp://172.20.129.10/test-image.tar
```

This example shows how to download only the software image from a TFTP server at 172.20.129.10 to the switch:

```
Switch# archive download-sw /imageonly tftp://172.20.129.10/test-image.tar
```

This example shows how to keep the old software version after a successful download:

```
Switch# archive download-sw /leave-old-sw tftp://172.20.129.10/test-image.tar
```

Related Commands

Command	Description
archive tar	Creates a tar file, lists the files in a tar file, or extracts the files from a tar file.
archive upload-sw	Uploads an existing image on the switch to a server.
delete	Deletes a file or directory on the flash memory device.

archive tar

Use the **archive tar** privileged EXEC command to create a tar file, list files in a tar file, or extract the files from a tar file.

archive tar {**/create** *destination-url* **flash:/***file-url*} | {**/table** *source-url*} | {**/xtract** *source-url* **flash:/***file-url* [*dir/file...*]}

Syntax Description

/create *destination-url* **flash:/***file-url*	Create a new tar file on the local or network file system. For *destination-url, specify t*he destination URL alias for the local or network file system and the name of the tar file to create. These options are supported: • The syntax for the local flash filesystem: **flash:** • The syntax for the FTP: **ftp:**[[**//***username*[**:***password*]**@***location*]**/***directory*]**/***tar-filename***.tar** • The syntax for an HTTP server: **http://**[[*username***:***password*]**@**]{*hostname* | *host-ip*}[**/***directory*]**/***image-name***.tar** • The syntax for a secure HTTP server: **https://**[[*username***:***password*]**@**]{*hostname* | *host-ip*}[**/***directory*]**/***image-name***.tar** • The syntax for the Remote Copy Protocol (RCP) is: **rcp:**[[**//***username***@***location*]**/***directory*]**/***tar-filename***.tar** • The syntax for the TFTP: **tftp:**[[**//***location*]**/***directory*]**/***tar-filename***.tar** The *tar-filename***.tar** is the tar file to be created. For **flash:/***file-url, specify t*he location on the local flash file system from which the new tar file is created. An optional list of files or directories within the source directory can be specified to write to the new tar file. If none are specified, all files and directories at this level are written to the newly created tar file.

/table *source-url*	Display the contents of an existing tar file to the screen. For *source-url*, specify the source URL alias for the local or network file system. These options are supported: • The syntax for the local flash file system: **flash:** • The syntax for the FTP: **ftp:**[[**//***username*[**:***password*]**@***location*]**/***directory*]**/***tar-filename***.tar** • The syntax for an HTTP server: **http://**[[*username***:***password*]**@**]{*hostname* | *host-ip*}[**/***directory*]**/***image-name***.tar** • The syntax for a secure HTTP server: **https://**[[*username***:***password*]**@**]{*hostname* | *host-ip*}[**/***directory*]**/***image-name***.tar** • The syntax for the RCP: **rcp:**[[**//***username***@***location*]**/***directory*]**/***tar-filename***.tar** • The syntax for the TFTP: **tftp:**[[**//***location*]**/***directory*]**/***tar-filename***.tar** The *tar-filename***.tar** is the tar file to display.
/xtract *source-url* **flash:/***file-url* [*dir/file...*]	Extract files from a tar file to the local file system. For *source-url*, specify *t*he source URL alias for the local file system. These options are supported: • The syntax for the local flash file system: **flash:** • The syntax for the FTP: **ftp:**[[**//***username*[**:***password*]**@***location*]**/***directory*]**/***tar-filename***.tar** • The syntax for an HTTP server: **http://**[[*username***:***password*]**@**]{*hostname* | *host-ip*}[**/***directory*]**/***image-name***.tar** • The syntax for a secure HTTP server: **https://**[[*username***:***password*]**@**]{*hostname* | *host-ip*}[**/***directory*]**/***image-name***.tar** • The syntax for the RCP: **rcp:**[[**//***username***@***location*]**/***directory*]**/***tar-filename***.tar** • The syntax for the TFTP: **tftp:**[[**//***location*]**/***directory*]**/***tar-filename***.tar** The *tar-filename***.tar** is the tar file from which to extract. For **flash:/***file-url* [*dir/file...*], specify *t*he location on the local flash file system into which the tar file is extracted. Use the *dir/file...* option to specify an optional list of files or directories within the tar file to be extracted. If none are specified, all files and directories are extracted.

Defaults

There is no default setting.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

Image names are case sensitive.

Examples

This example shows how to create a tar file. The command writes the contents of the *new-configs* directory on the local flash device to a file named *saved.tar* on the TFTP server at 172.20.10.30:

```
Switch# archive tar /create tftp:172.20.10.30/saved.tar flash:/new-configs
```

This example shows how to display the contents of the *2918-lanlite-tar.12-44.FX* file that is in flash memory. The contents of the tar file appear on the screen:

```
Switch# archive tar /table flash:2918-lanlite-tar.12-44.FX.tar
info (219 bytes)

2918-lanlite-mz.12-44.FX/ (directory)
2918-lanlite-mz.12-44.FX (610856 bytes)
2918-lanlite-mz.12-44.FX/info (219 bytes)
info.ver (219 bytes)
```

This example shows how to display only the *2918-lanlite-12-44.FX/html* directory and its contents:

```
Switch# archive tar /table flash:c2918-lanlite-12-44.FX.tar c2918-lanlite-12-44/html
c2918-lanlite-mz.12-44.FX/html/ (directory)
c2918-lanlite-mz.12-44.FX/html/const.htm (556 bytes)
c2918-lanlite-mz.12-44.FX/html/xhome.htm (9373 bytes)
c2918-lanlite-mz.12-44.FX/html/menu.css (1654 bytes)
<output truncated>
```

This example shows how to extract the contents of a tar file on the TFTP server at 172.20.10.30. This command extracts just the *new-configs* directory into the root directory on the local flash file system. The remaining files in the *saved.tar* file are ignored.

```
Switch# archive tar /xtract tftp:/172.20.10.30/saved.tar flash:/ new-configs
```

Related Commands

Command	Description
archive download-sw	Downloads a new image from a TFTP server to the switch.
archive upload-sw	Uploads an existing image on the switch to a server.

archive upload-sw

Use the **archive upload-sw** privileged EXEC command to upload an existing switch image to a server.

archive upload-sw [**/version** *version_string*] **destination-url**

Syntax Description

/version *version_string*	(Optional) Specify the specific version string of the image to be uploaded.
destination-url	The destination URL alias for a local or network file system. These options are supported: • The syntax for the local flash file system: **flash:** • The syntax for the FTP: **ftp:**[[**//***username*[**:***password*]@*location*]/*directory*]/*image-name***.tar** • The syntax for an HTTP server: **http://**[[*username***:***password*]@]{*hostname* | *host-ip*}[/*directory*]/*image-name***.tar** • The syntax for a secure HTTP server: **https://**[[*username***:***password*]@]{*hostname* | *host-ip*}[/*directory*]/*image-name***.tar** • The syntax for the Remote Copy Protocol (RCP): **rcp:**[[**//***username*@*location*]/*directory*]/*image-name***.tar** • The syntax for the TFTP: **tftp:**[[**//***location*]/*directory*]/*image-name***.tar** The *image-name***.tar** is the name of software image to be stored on the server.

Defaults

Uploads the currently running image from the flash: file system.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use the upload feature only if the HTML files associated with the embedded device manager have been installed with the existing image.

The files are uploaded in this sequence: the Cisco IOS image, the HTML files, and info. After these files are uploaded, the software creates the tar file.

Image names are case sensitive.

Examples

This example shows how to upload the currently running image to a TFTP server at 172.20.140.2:

```
Switch# archive upload-sw tftp://172.20.140.2/test-image.tar
```

Related Commands

Command	Description
archive download-sw	Downloads a new image to the switch.
archive tar	Creates a tar file, lists the files in a tar file, or extracts the files from a tar file.

authentication control-direction

Use the **authentication control-direction** interface configuration command to configure the port mode as unidirectional or bidirectional. Use the **no** form of this command to return to the default setting.

authentication control-direction {both | in}

no authentication control-direction

Syntax Description

both	Enable bidirectional control on port. The port cannot receive packets from or send packets to the host.
in	Enable unidirectional control on port. The port can send packets to the host but cannot receive packets from the host.

Defaults

The port is in bidirectional mode.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(50)SE	This command was introduced.

Usage Guidelines

Use the **both** keyword or the **no** form of this command to return to the default setting (bidirectional mode).

Examples

This example shows how to enable bidirectional mode:

```
Switch(config-if)# authentication control-direction both
```

This example shows how to enable unidirectional mode:

```
Switch(config-if)# authentication control-direction in
```

You can verify your settings by entering the **show authentication** privileged EXEC command.

Related Commands

Command	Description
authentication event	Sets the action for specific authentication events.
authentication fallback	Configures a port to use web authentication as a fallback method for clients that do not support IEEE 802.1x authentication.
authentication host-mode	Sets the authorization manager mode on a port.
authentication open	Enables or disables open access on a port.
authentication order	Sets the order of authentication methods used on a port.

Command	Description
authentication periodic	Enable or disables reauthentication on a port.
authentication port-control	Enables manual control of the port authorization state.
authentication priority	Adds an authentication method to the port-priority list.
authentication timer	Configures the timeout and reauthentication parameters for an 802.1x-enabled port.
authentication violation	Configures the violation modes that occur when a new device connects to a port or when a new device connects to a port with the maximum number of devices already connected to that port.
show authentication	Displays information about authentication manager events on the switch.

boot boothlpr

Use the **boot boothlpr** global configuration command to load a special Cisco IOS image, which when loaded into memory, can load a second Cisco IOS image into memory and launch it. This variable is used only for internal development and testing. Use the **no** form of this command to return to the default setting.

boot boothlpr *filesystem*:*/file-url*

no boot boothlpr

Syntax Description

filesystem:	Alias for a flash file system. Use **flash:** for the system board flash device.
/file-url	The path (directory) and name of a bootable helper image.

Defaults

No helper image is loaded.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

This command changes the setting of the BOOTHLPR environment variable. For more information, see Appendix A, "Catalyst 2928 Switch Bootloader Commands."

Related Commands

Command	Description
show arp access-list	Displays the settings of the boot environment variables.

boot config-file

Use the **boot config-file** global configuration command to specify the filename that Cisco IOS uses to read and write a nonvolatile copy of the system configuration. Use the **no** form of this command to return to the default setting.

boot config-file flash:*/file-url*

no boot config-file

Syntax Description

flash:*/file-url*	The path (directory) and name of the configuration file.

Defaults

The default configuration file is flash:config.text.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

This command changes the setting of the CONFIG_FILE environment variable. For more information, see Appendix A, "Catalyst 2928 Switch Bootloader Commands."

Related Commands

Command	Description
show arp access-list	Displays the settings of the boot environment variables.

boot enable-break

Use the **boot enable-break** global configuration command to enable interrupting the automatic boot process. Use the **no** form of this command to return to the default setting.

boot enable-break

no boot enable-break

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled. The automatic boot process cannot be interrupted by pressing the Break key on the console.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you enter this command, you can interrupt the automatic boot process by pressing the Break key on the console after the flash file system is initialized.

Note Despite the setting of this command, you can interrupt the automatic boot process at any time by pressing the MODE button on the switch front panel.

This command changes the setting of the ENABLE_BREAK environment variable. For more information, see Appendix A, "Catalyst 2928 Switch Bootloader Commands."

Related Commands

Command	Description
show arp access-list	Displays the settings of the boot environment variables.

boot helper

Use the **boot helper** global configuration command to dynamically load files during boot loader initialization to extend or patch the functionality of the boot loader. Use the **no** form of this command to return to the default.

boot helper *filesystem*:*/file-url* ...

no boot helper

Syntax Description

filesystem:	Alias for a flash file system. Use **flash:** for the system board flash device.
/file-url	The path (directory) and a list of loadable files to dynamically load during loader initialization. Separate each image name with a semicolon.

Defaults

No helper files are loaded.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This variable is used only for internal development and testing.

Filenames and directory names are case sensitive.

This command changes the setting of the HELPER environment variable. For more information, see Appendix A, "Catalyst 2928 Switch Bootloader Commands."

Related Commands

Command	Description
show arp access-list	Displays the settings of the boot environment variables.

boot helper-config-file

Use the **boot helper-config-file** global configuration command to specify the name of the configuration file to be used by the Cisco IOS helper image. If this is not set, the file specified by the CONFIG_FILE environment variable is used by all versions of Cisco IOS that are loaded. Use the **no** form of this command to return to the default setting.

boot helper-config-file *filesystem*:*/file-url*

no boot helper-config file

Syntax Description

filesystem:	Alias for a flash file system. Use **flash:** for the system board flash device.
/file-url	The path (directory) and helper configuration file to load.

Defaults

No helper configuration file is specified.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This variable is used only for internal development and testing.

Filenames and directory names are case sensitive.

This command changes the setting of the HELPER_CONFIG_FILE environment variable. For more information, see Appendix A, "Catalyst 2928 Switch Bootloader Commands."

Related Commands

Command	Description
show arp access-list	Displays the settings of the boot environment variables.

boot manual

Use the **boot manual** global configuration command to enable manually booting the switch during the next boot cycle. Use the **no** form of this command to return to the default setting.

boot manual

no boot manual

Syntax Description

This command has no arguments or keywords.

Defaults

Manual booting is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The next time you reboot the system, the switch is in boot loader mode, which is shown by the *switch:* prompt. To boot up the system, use the **boot** boot loader command, and specify the name of the bootable image.

This command changes the setting of the MANUAL_BOOT environment variable. For more information, see Appendix A, "Catalyst 2928 Switch Bootloader Commands."

Related Commands

Command	Description
show arp access-list	Displays the settings of the boot environment variables.

boot private-config-file

Use the **boot private-config-file** global configuration command to specify the filename that Cisco IOS uses to read and write a nonvolatile copy of the private configuration. Use the **no** form of this command to return to the default setting.

boot private-config-file *filename*

no boot private-config-file

Syntax Description

filename	The name of the private configuration file.

Defaults

The default configuration file is *private-config*.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames are case sensitive.

Examples

This example shows how to specify the name of the private configuration file to be *pconfig*:

```
Switch(config)# boot private-config-file pconfig
```

Related Commands

Command	Description
show arp access-list	Displays the settings of the boot environment variables.

boot system

Use the **boot system** global configuration command to specify the Cisco IOS image to load during the next boot cycle. Use the **no** form of this command to return to the default setting.

boot system *filesystem*:*/file-url* ...

no boot system

Syntax Description

filesystem:	Alias for a flash file system. Use **flash:** for the system board flash device.
/file-url	The path (directory) and name of a bootable image. Separate image names with a semicolon.

Defaults

The switch attempts to automatically boot up the system by using information in the BOOT environment variable. If this variable is not set, the switch attempts to load and execute the first executable image it can by performing a recursive, depth-first search throughout the flash file system. In a depth-first search of a directory, each encountered subdirectory is completely searched before continuing the search in the original directory.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

If you are using the **archive download-sw** privileged EXEC command to maintain system images, you never need to use the **boot system** command. The **boot system** command is automatically manipulated to load the downloaded image.

This command changes the setting of the BOOT environment variable. For more information, see Appendix A, "Catalyst 2928 Switch Bootloader Commands."

Related Commands

Command	Description
show arp access-list	Displays the settings of the boot environment variables.

channel-group

Use the **channel-group** interface configuration command to assign an Ethernet port to an EtherChannel group, to enable an EtherChannel mode, or both. Use the **no** form of this command to remove an Ethernet port from an EtherChannel group.

channel-group *channel-group-number* **mode** {**active** | {**auto** [**non-silent**]} | {**desirable** [**non-silent**]} | **on** | **passive**}

no channel-group

PAgP modes:
channel-group *channel-group-number* **mode {{auto** [**non-silent**]} | {**desirable** [**non-silent}}**

LACP modes:
channel-group *channel-group-number* **mode** {**active** | **passive**}

On mode:
channel-group *channel-group-number* **mode on**

Syntax Description

channel-group-number	Specify the channel group number. The range is 1 to 6.
mode	Specify the EtherChannel mode.
active	Unconditionally enable Link Aggregation Control Protocol (LACP). Active mode places a port into a negotiating state in which the port initiates negotiations with other ports by sending LACP packets. A channel is formed with another port group in either the active or passive mode.
auto	Enable the Port Aggregation Protocol (PAgP) only if a PAgP device is detected. Auto mode places a port into a passive negotiating state in which the port responds to PAgP packets it receives but does not start PAgP packet negotiation. A channel is formed only with another port group in desirable mode. When **auto** is enabled, silent operation is the default.
desirable	Unconditionally enable PAgP. Desirable mode places a port into an active negotiating state in which the port starts negotiations with other ports by sending PAgP packets. An EtherChannel is formed with another port group that is in the desirable or auto mode. When **desirable** is enabled, silent operation is the default.
non-silent	(Optional) Use in PAgP mode with the **auto** or **desirable** keyword when traffic is expected from the other device.
on	Enable **on** mode. In **on** mode, a usable EtherChannel exists only when both connected port groups are in the **on** mode.
passive	Enable LACP only if a LACP device is detected. Passive mode places a port into a negotiating state in which the port responds to received LACP packets but does not initiate LACP packet negotiation. A channel is formed only with another port group in active mode.

Defaults

No channel groups are assigned.

No mode is configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

For Layer 2 EtherChannels, you do not have to create a port-channel interface first by using the **interface port-channel** global configuration command before assigning a physical port to a channel group. Instead, you can use the **channel-group** interface configuration command. It automatically creates the port-channel interface when the channel group gets its first physical port if the logical interface is not already created. If you create the port-channel interface first, the *channel-group-number* can be the same as the *port-channel-number,* or you can use a new number. If you use a new number, the **channel-group** command dynamically creates a new port channel.

After you configure an EtherChannel, configuration changes that you make on the port-channel interface apply to all the physical ports assigned to the port-channel interface. Configuration changes applied to the physical port affect only the port where you apply the configuration. To change the parameters of all ports in an EtherChannel, apply configuration commands to the port-channel interface, for example, spanning-tree commands or commands to configure a Layer 2 EtherChannel as a trunk.

If you do not specify **non-silent** with the **auto** or **desirable** mode, silent is assumed. The silent mode is used when the switch is connected to a device that is not PAgP-capable and seldom, if ever, sends packets. A example of a silent partner is a file server or a packet analyzer that is not generating traffic. In this case, running PAgP on a physical port prevents that port from ever becoming operational. However, it allows PAgP to operate, to attach the port to a channel group, and to use the port for transmission. Both ends of the link cannot be set to silent.

In the **on** mode, an EtherChannel exists only when a port group in the **on** mode is connected to another port group in the **on** mode.

Caution You should use care when using the **on** mode. This is a manual configuration, and ports on both ends of the EtherChannel must have the same configuration. If the group is misconfigured, packet loss or spanning-tree loops can occur.

Do not configure an EtherChannel in both the PAgP and LACP modes. EtherChannel groups running PAgP and LACP can coexist on the same switch. Individual EtherChannel groups can run either PAgP or LACP, but they cannot interoperate.

If you set the protocol by using the **channel-protocol** interface configuration command, the setting is not overridden by the **channel-group** interface configuration command.

Do not configure a port that is an active or a not-yet-active member of an EtherChannel as an IEEE 802.1x port. If you try to enable IEEE 802.1x authentication on an EtherChannel port, an error message appears, and IEEE 802.1x authentication is not enabled.

Do not configure a secure port as part of an EtherChannel or an EtherChannel port as a secure port.

For a complete list of configuration guidelines, see the "Configuring EtherChannels" chapter in the software configuration guide for this release.

Examples

This example shows how to configure an EtherChannel. It assigns two static-access ports in VLAN 10 to channel 5 with the PAgP mode **desirable**:

```
Switch# configure terminal
Switch(config)# interface range gigabitethernet0/1 -2
Switch(config-if-range)# switchport mode access
Switch(config-if-range)# switchport access vlan 10
Switch(config-if-range)# channel-group 5 mode desirable
Switch(config-if-range)# end
```

This example shows how to configure an EtherChannel. It assigns two static-access ports in VLAN 10 to channel 5 with the LACP mode **active**:

```
Switch# configure terminal
Switch(config)# interface range gigabitethernet0/1 -2
Switch(config-if-range)# switchport mode access
Switch(config-if-range)# switchport access vlan 10
Switch(config-if-range)# channel-group 5 mode active
Switch(config-if-range)# end
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
channel-protocol	Restricts the protocol used on a port to manage channeling.
interface port-channel	Accesses or creates the port channel.
show etherchannel	Displays EtherChannel information for a channel.
show lacp	Displays LACP channel-group information.
show pagp	Displays PAgP channel-group information.
show running-config	Displays the current operating configuration.

channel-protocol

Use the **channel-protocol** interface configuration command to restrict the protocol used on a port to manage channeling. Use the **no** form of this command to return to the default setting.

channel-protocol {**lacp** | **pagp**}

no channel-protocol

Syntax Description

lacp	Configure an EtherChannel with the Link Aggregation Control Protocol (LACP).
pagp	Configure an EtherChannel with the Port Aggregation Protocol (PAgP).

Defaults

No protocol is assigned to the EtherChannel.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use the **channel-protocol** command only to restrict a channel to LACP or PAgP. If you set the protocol by using the **channel-protocol** command, the setting is not overridden by the **channel-group** interface configuration command.

You must use the **channel-group** interface configuration command to configure the EtherChannel parameters. The **channel-group** command also can set the mode for the EtherChannel.

You cannot enable both the PAgP and LACP modes on an EtherChannel group.

PAgP and LACP are not compatible; both ends of a channel must use the same protocol.

Examples

This example shows how to specify LACP as the protocol that manages the EtherChannel:

```
Switch(config-if)# channel-protocol lacp
```

You can verify your settings by entering the **show etherchannel** [*channel-group-number*] **protocol** privileged EXEC command.

Related Commands

Command	Description
channel-group	Assigns an Ethernet port to an EtherChannel group.
show etherchannel protocol	Displays protocol information the EtherChannel.

clear dot1x

Use the **clear dot1x** privileged EXEC command to clear IEEE 802.1x information for the switch or for the specified port.

clear dot1x {**all** | **interface** *interface-id*}

Syntax Description

all	Clear all IEEE 802.1x information for the switch.
interface *interface-id*	Clear IEEE 802.1x information for the specified interface.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can clear all the information by using the **clear dot1x all** command, or you can clear only the information for the specified interface by using the **clear dot1x interface** *interface-id* command.

Examples

This example shows how to clear all IEEE 8021.x information:

```
Switch# clear dot1x all
```

This example shows how to clear IEEE 8021.x information for the specified interface:

```
Switch# clear dot1x interface gigabithethernet0/1
```

You can verify that the information was deleted by entering the **show dot1x** privileged EXEC command.

Related Commands

Command	Description
show dot1x	Displays IEEE 802.1x statistics, administrative status, and operational status for the switch or for the specified port.

clear eap sessions

Use the **clear eap sessions** privileged EXEC command to clear Extensible Authentication Protocol (EAP) session information for the switch or for the specified port.

clear eap sessions [**credentials** *name* [**interface** *interface-id*] | **interface** *interface-id*| **method** *name* | **transport** *name*] [**credentials** *name* | **interface** *interface-id* | **transport** *name*] ...

Syntax Description

credentials name	Clear EAP credential information for the specified profile.
interface *interface-id*	Clear EAP information for the specified interface.
method name	Clear EAP information for the specified method.
transport name	Clear EAP transport information for the specified lower level.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can clear all counters by using the **clear eap sessions** command, or you can clear only the specific information by using the keywords.

Examples

This example shows how to clear all EAP information:

```
Switch# clear eap
```

This example shows how to clear EAP-session credential information for the specified profile:

```
Switch# clear eap sessions credential type1
```

You can verify that the information was deleted by entering the **show dot1x** privileged EXEC command.

Related Commands

Command	Description
show eap	Displays EAP registration and session information for the switch or for the specified port

clear errdisable interface

Use the **clear errdisable interface** privileged EXEC command to re-enable a VLAN that was error disabled.

clear errdisable interface *interface-id* **vlan** [*vlan-list*]

Syntax Description

vlan list	(Optional) Specify a list of VLANs to be re-enabled. If a vlan-list is not specified, then all VLANs are re-enabled.

Command Default

No default is defined

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can re-enable a port by using the **shutdown** and **no shutdown** interface configuration commands, or you can clear error disable for VLANs by using the **clear errdisable interface** command.

Examples

This example shows how to re-enable all VLANs that were error-disabled on port Gi0/2.

```
Switch# clear errdisable interface GigabitEthernet0/2 vlan
```

Related Commands

Command	Description
errdisable detect cause	Enables error-disabled detection for a specific cause or all causes.
errdisable recovery	Configures the recovery mechanism variables.
show errdisable detect	Displays error-disabled detection status.
show errdisable recovery	Display error-disabled recovery timer information.
show interfaces status err-disabled	Displays interface status of a list of interfaces in error-disabled state.

clear ip dhcp snooping

Use the **clear ip dhcp snooping** privileged EXEC command to clear the DHCP snooping binding database, the DHCP snooping binding database agent statistics, or the DHCP snooping statistics counters.

clear ip dhcp snooping {**binding** {***** | *ip-address* | **interface** *interface-id* | **vlan** *vlan-id*} | **database statistics** | **statistics**}

Syntax Description

binding	Clear the DHCP snooping binding database.
*****	Clear all automatic bindings.
ip-address	Clear the binding entry IP address.
interface *interface-id*	Clear the binding input interface.
vlan *vlan-id*	Clear the binding entry VLAN.
database statistics	Clear the DHCP snooping binding database agent statistics.
statistics	Clear the DHCP snooping statistics counter.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you enter the **clear ip dhcp snooping database statistics** command, the switch does not update the entries in the binding database and in the binding file before clearing the statistics.

Examples

This example shows how to clear the DHCP snooping binding database agent statistics:

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

You can verify that the statistics were cleared by entering the **show ip dhcp snooping database** privileged EXEC command.

This example shows how to clear the DHCP snooping statistics counters:

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

You can verify that the statistics were cleared by entering the **show ip dhcp snooping statistics** user EXEC command.

Related Commands

Command	Description
ip dhcp snooping	Enables DHCP snooping on a VLAN.
ip dhcp snooping database	Configures the DHCP snooping binding database agent or the binding file.
show ip dhcp snooping binding	Displays the status of DHCP snooping database agent.
show ip dhcp snooping database	Displays the DHCP snooping binding database agent statistics.
show ip dhcp snooping statistics	Displays the DHCP snooping statistics.

clear lacp

Use the **clear lacp** privileged EXEC command to clear Link Aggregation Control Protocol (LACP) channel-group counters.

clear lacp {*channel-group-number* **counters** | **counters**}

Syntax Description

channel-group-number	(Optional) Channel group number. The range is 1 to 6.
counters	Clear traffic counters.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can clear all counters by using the **clear lacp counters** command, or you can clear only the counters for the specified channel group by using the **clear lacp** *channel-group-number* **counters** command.

Examples

This example shows how to clear all channel-group information:

```
Switch# clear lacp counters
```

This example shows how to clear LACP traffic counters for group 4:

```
Switch# clear lacp 4 counters
```

You can verify that the information was deleted by entering the **show lacp counters** or the **show lacp 4 counters** privileged EXEC command.

Related Commands

Command	Description
show lacp	Displays LACP channel-group information.

clear mac address-table

Use the **clear mac address-table** privileged EXEC command to delete from the MAC address table a specific dynamic address, all dynamic addresses on a particular interface, or all dynamic addresses on a particular VLAN. This command also clears the MAC address notification global counters.

clear mac address-table {**dynamic** [**address** *mac-addr* | **interface** *interface-id* | **vlan** *vlan-id*] | **notification**}

Syntax Description

dynamic	Delete all dynamic MAC addresses.
dynamic address *mac-addr*	(Optional) Delete the specified dynamic MAC address.
dynamic interface *interface-id*	(Optional) Delete all dynamic MAC addresses on the specified physical port or port channel.
dynamic vlan *vlan-id*	(Optional) Delete all dynamic MAC addresses for the specified VLAN. The range is 1 to 4094.
notification	Clear the notifications in the history table and reset the counters.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to remove a specific MAC address from the dynamic address table:

```
Switch# clear mac address-table dynamic address 0008.0070.0007
```

You can verify that the information was deleted by entering the **show mac address-table** privileged EXEC command.

Related Commands

Command	Description
mac address-table notification	Enables the MAC address notification feature.
show mac address-table notification	Displays the MAC address notification settings for all interfaces or the specified interface.
snmp trap mac-notification	Enables the Simple Network Management Protocol (SNMP) MAC address notification trap on a specific interface.

clear pagp

Use the **clear pagp** privileged EXEC command to clear Port Aggregation Protocol (PAgP) channel-group information.

clear pagp {*channel-group-number* **counters** | **counters**}

Syntax Description

channel-group-number	(Optional) Channel group number. The range is 1 to 6.
counters	Clear traffic counters.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can clear all counters by using the **clear pagp counters** command, or you can clear only the counters for the specified channel group by using the **clear pagp** *channel-group-number* **counters** command.

Examples

This example shows how to clear all channel-group information:

```
Switch# clear pagp counters
```

This example shows how to clear PAgP traffic counters for group 10:

```
Switch# clear pagp 10 counters
```

You can verify that information was deleted by entering the **show pagp** privileged EXEC command.

Related Commands

Command	Description
show pagp	Displays PAgP channel-group information.

clear port-security

Use the **clear port-security** privileged EXEC command to delete from the MAC address table all secure addresses or all secure addresses of a specific type (configured, dynamic, or sticky) on the switch or on an interface.

clear port-security {**all** | **configured** | **dynamic** | **sticky**} [[**address** *mac-addr* | **interface** *interface-id*] [**vlan** {*vlan-id* | {**access** | **voice**}}]]

Syntax Description

all	Delete all secure MAC addresses.
configured	Delete configured secure MAC addresses.
dynamic	Delete secure MAC addresses auto-learned by hardware.
sticky	Delete secure MAC addresses, either auto-learned or configured.
address *mac-addr*	(Optional) Delete the specified dynamic secure MAC address.
interface *interface-id*	(Optional) Delete all the dynamic secure MAC addresses on the specified physical port or VLAN.
vlan	(Optional) Delete the specified secure MAC address from the specified VLAN. Enter one of these options after you enter the **vlan** keyword: • *vlan-id*—On a trunk port, specify the VLAN ID of the VLAN on which this address should be cleared. • **access**—On an access port, clear the specified secure MAC address on the access VLAN. • **voice**—On an access port, clear the specified secure MAC address on the voice VLAN. **Note** The **voice** keyword is available only if voice VLAN is configured on a port and if that port is not the access VLAN.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to clear all secure addresses from the MAC address table:

```
Switch# clear port-security all
```

This example shows how to remove a specific configured secure address from the MAC address table:

```
Switch# clear port-security configured address 0008.0070.0007
```

This example shows how to remove all the dynamic secure addresses learned on a specific interface:

```
Switch# clear port-security dynamic interface gigabitethernet0/1
```

This example shows how to remove all the dynamic secure addresses from the address table:

```
Switch# clear port-security dynamic
```

You can verify that the information was deleted by entering the **show port-security** privileged EXEC command.

Related Commands

Command	Description
switchport port-security	Enables port security on an interface.
switchport port-security mac-address *mac-address*	Configures secure MAC addresses.
switchport port-security maximum *value*	Configures a maximum number of secure MAC addresses on a secure interface.
show port-security	Displays the port security settings defined for an interface or for the switch.

clear psp counter

To clear the protocol storm protection counter of packets dropped for all protocols, use the **clear psp counter** privileged EXEC command.

clear psp counter [**arp** | **igmp** | **dhcp**]

Syntax Description

arp	(Optional) Clear the counter of dropped packets for ARP and ARP snooping.
dhcp	(Optional) Clear the counter of dropped packets for DHCP and DHCP snooping.
igmp	(Optional) Clear the counter of dropped packets for IGMP and IGMP snooping.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Examples

In this example, the protocol storm protection counter for DHCP is cleared.

```
Switch# clear psp counter dhcp
Switch#
```

Related Commands

Command	Description
psp {**arp** | **dhcp** | **igmp**} **pps** *value*	Configures protocol storm protection for ARP, DHCP, or IGMP.
show psp config	Displays the protocol storm protection configuration
show psp statistics	Displays the number of dropped packets.

clear spanning-tree counters

Use the **clear spanning-tree counters** privileged EXEC command to clear the spanning-tree counters.

clear spanning-tree counters [**interface** *interface-id*]

Syntax Description

interface *interface-id*	(Optional) Clear all spanning-tree counters on the specified interface. Valid interfaces include physical ports, VLANs, and port channels. The VLAN range is 1 to 4094. The port-channel range is 1 to 6.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If the *interface-id* is not specified, spanning-tree counters are cleared for all interfaces.

Examples

This example shows how to clear spanning-tree counters for all interfaces:

```
Switch# clear spanning-tree counters
```

Related Commands

Command	Description
show spanning-tree	Displays spanning-tree state information.

clear spanning-tree detected-protocols

Use the **clear spanning-tree detected-protocols** privileged EXEC command to restart the protocol migration process (force the renegotiation with neighboring switches) on all interfaces or on the specified interface.

clear spanning-tree detected-protocols [**interface** *interface-id*]

Syntax Description

interface *interface-id*	(Optional) Restart the protocol migration process on the specified interface. Valid interfaces include physical ports, VLANs, and port channels. The VLAN range is 1 to 4094. The port-channel range is 1 to 6.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

A switch running the rapid per-VLAN spanning-tree plus (rapid-PVST+) protocol or the Multiple Spanning Tree Protocol (MSTP) supports a built-in protocol migration mechanism that enables it to interoperate with legacy IEEE 802.1D switches. If a rapid-PVST+ switch or an MSTP switch receives a legacy IEEE 802.1D configuration bridge protocol data unit (BPDU) with the protocol version set to 0, it sends only IEEE 802.1D BPDUs on that port. A multiple spanning-tree (MST) switch can also detect that a port is at the boundary of a region when it receives a legacy BPDU, an MST BPDU (Version 3) associated with a different region, or a rapid spanning-tree (RST) BPDU (Version 2).

However, the switch does not automatically revert to the rapid-PVST+ or the MSTP mode if it no longer receives IEEE 802.1D BPDUs because it cannot learn whether the legacy switch has been removed from the link unless the legacy switch is the designated switch. Use the **clear spanning-tree detected-protocols** command in this situation.

Examples

This example shows how to restart the protocol migration process on a port:

```
Switch# clear spanning-tree detected-protocols interface gigabitethernet0/1
```

Related Commands

Command	Description
show spanning-tree	Displays spanning-tree state information.
spanning-tree link-type	Overrides the default link-type setting and enables rapid spanning-tree changes to the forwarding state.

clear vmps statistics

Use the **clear vmps statistics** privileged EXEC command to clear the statistics maintained by the VLAN Query Protocol (VQP) client.

clear vmps statistics

Syntax Description

This command has no arguments or keywords.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to clear VLAN Membership Policy Server (VMPS) statistics:

```
Switch# clear vmps statistics
```

You can verify that information was deleted by entering the **show vmps statistics** privileged EXEC command.

Related Commands

Command	Description
show vmps	Displays the VQP version, reconfirmation interval, retry count, VMPS IP addresses, and the current and primary servers.

clear vtp counters

Use the **clear vtp counters** privileged EXEC command to clear the VLAN Trunking Protocol (VTP) and pruning counters.

clear vtp counters

Syntax Description

This command has no arguments or keywords.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to clear the VTP counters:

```
Switch# clear vtp counters
```

You can verify that information was deleted by entering the **show vtp counters** privileged EXEC command.

Related Commands

Command	Description
show vtp	Displays general information about the VTP management domain, status, and counters.

cluster commander-address

You do not need to enter this command from a standalone cluster member switch. The cluster command switch automatically provides its MAC address to cluster member switches when these switches join the cluster. The cluster member switch adds this information and other cluster information to its running configuration file. Use the **no** form of this global configuration command from the cluster member switch console port to remove the switch from a cluster only during debugging or recovery procedures.

cluster commander-address *mac-address* [**member** *number* **name** *name*]

no cluster commander-address

Syntax Description

mac-address	MAC address of the cluster command switch.
member *number*	(Optional) Number of a configured cluster member switch. The range is 0 to 15.
name *name*	(Optional) Name of the configured cluster up to 31 characters.

Defaults

The switch is not a member of any cluster.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command is available only on the cluster command switch.

A cluster member can have only one cluster command switch.

The cluster member switch retains the identity of the cluster command switch during a system reload by using the *mac-address* parameter.

You can enter the **no** form on a cluster member switch to remove it from the cluster during debugging or recovery procedures. You would normally use this command from the cluster member switch console port only when the member has lost communication with the cluster command switch. With normal switch configuration, we recommend that you remove cluster member switches only by entering the **no cluster member** *n* global configuration command on the cluster command switch.

When a standby cluster command switch becomes active (becomes the cluster command switch), it removes the cluster commander address line from its configuration.

Examples

This is partial sample output from the running configuration of a cluster member.

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

<output truncated>

cluster commander-address 00e0.9bc0.a500 member 4 name my_cluster

<output truncated>
```

This example shows how to remove a member from the cluster by using the cluster member console.

```
Switch # configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# no cluster commander-address
```

You can verify your settings by entering the **show cluster** privileged EXEC command.

Related Commands

Command	Description
debug cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.

cluster discovery hop-count

Use the **cluster discovery hop-count** global configuration command on the cluster command switch to set the hop-count limit for extended discovery of candidate switches. Use the **no** form of this command to return to the default setting.

cluster discovery hop-count *number*

no cluster discovery hop-count

Syntax Description

number	Number of hops from the cluster edge that the cluster command switch limits the discovery of candidates. The range is 1 to 7.

Defaults

The hop count is set to 3.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command is available only on the cluster command switch. This command does not operate on cluster member switches.

If the hop count is set to 1, it disables extended discovery. The cluster command switch discovers only candidates that are one hop from the edge of the cluster. The edge of the cluster is the point between the last discovered cluster member switch and the first discovered candidate switch.

Examples

This example shows how to set hop count limit to 4. This command is executed on the cluster command switch.

```
Switch(config)# cluster discovery hop-count 4
```

You can verify your setting by entering the **show cluster** privileged EXEC command.

Related Commands

Command	Description
show cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.
show cluster candidates	Displays a list of candidate switches.

cluster enable

Use the **cluster enable** global configuration command on a command-capable switch to enable it as the cluster command switch, assign a cluster name, and to optionally assign a member number to it. Use the **no** form of the command to remove all members and to make the cluster command switch a candidate switch.

cluster enable *name* [*command-switch-member-number*]

no cluster enable

Syntax Description

name	Name of the cluster up to 31 characters. Valid characters include only alphanumerics, dashes, and underscores.
command-switch-member-number	(Optional) Assign a member number to the cluster command switch of the cluster. The range is 0 to 15.

Defaults

The switch is not a cluster command switch.

No cluster name is defined.

The member number is 0 when the switch is the cluster command switch.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Enter this command on any command-capable switch that is not part of any cluster. This command fails if a device is already configured as a member of the cluster.

You must name the cluster when you enable the cluster command switch. If the switch is already configured as the cluster command switch, this command changes the cluster name if it is different from the previous cluster name.

Examples

This example shows how to enable the cluster command switch, name the cluster, and set the cluster command switch member number to 4.

```
Switch(config)# cluster enable Engineering-IDF4 4
```

You can verify your setting by entering the **show cluster** privileged EXEC command on the cluster command switch.

Related Commands

Command	Description
show cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.

cluster holdtime

Use the **cluster holdtime** global configuration command to set the duration in seconds before a switch (either the command or cluster member switch) declares the other switch down after not receiving heartbeat messages. Use the **no** form of this command to set the duration to the default value.

cluster holdtime *holdtime-in-secs*

no cluster holdtime

Syntax Description

holdtime-in-secs	Duration in seconds before a switch (either a command or cluster member switch) declares the other switch down. The range is 1 to 300 seconds.

Defaults

The default holdtime is 80 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Enter this command with the **cluster timer** global configuration command only on the cluster command switch. The cluster command switch propagates the values to all its cluster members so that the setting is consistent among all switches in the cluster.

The holdtime is typically set as a multiple of the interval timer (**cluster timer**). For example, it takes (holdtime-in-secs divided by the interval-in-secs) number of heartbeat messages to be missed in a row to declare a switch down.

Examples

This example shows how to change the interval timer and the duration on the cluster command switch.

```
Switch(config)# cluster timer 3
Switch(config)# cluster holdtime 30
```

You can verify your settings by entering the **show cluster** privileged EXEC command.

Related Commands

Command	Description
show cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.

cluster member

Use the **cluster member** global configuration command on the cluster command switch to add candidates to a cluster. Use the **no** form of the command to remove members from the cluster.

cluster member [*n*] **mac-address** *H.H.H* [**password** *enable-password*] [**vlan** *vlan-id*]

no cluster member *n*

Syntax Description

n	The number that identifies a cluster member. The range is 0 to 15.
mac-address *H.H.H*	MAC address of the cluster member switch in hexadecimal format.
password *enable-password*	Enable password of the candidate switch. The password is not required if there is no password on the candidate switch.
vlan *vlan-id*	(Optional) VLAN ID through which the candidate is added to the cluster by the cluster command switch. The range is 1 to 4094.

Defaults

A newly enabled cluster command switch has no associated cluster members.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Enter this command only on the cluster command switch to add a candidate to or remove a member from the cluster. If you enter this command on a switch other than the cluster command switch, the switch rejects the command and displays an error message.

You must enter a member number to remove a switch from the cluster. However, you do not need to enter a member number to add a switch to the cluster. The cluster command switch selects the next available member number and assigns it to the switch that is joining the cluster.

You must enter the enable password of the candidate switch for authentication when it joins the cluster. The password is not saved in the running or startup configuration. After a candidate switch becomes a member of the cluster, its password becomes the same as the cluster command-switch password.

If a switch does not have a configured hostname, the cluster command switch appends a member number to the cluster command-switch hostname and assigns it to the cluster member switch.

If you do not specify a VLAN ID, the cluster command switch automatically chooses a VLAN and adds the candidate to the cluster.

Examples

This example shows how to add a switch as member 2 with MAC address 00E0.1E00.2222 and the password *key* to a cluster. The cluster command switch adds the candidate to the cluster through VLAN 3.

```
Switch(config)# cluster member 2 mac-address 00E0.1E00.2222 password key vlan 3
```

This example shows how to add a switch with MAC address 00E0.1E00.3333 to the cluster. This switch does not have a password. The cluster command switch selects the next available member number and assigns it to the switch that is joining the cluster.

```
Switch(config)# cluster member mac-address 00E0.1E00.3333
```

You can verify your settings by entering the **show cluster members** privileged EXEC command on the cluster command switch.

Related Commands

Command	Description
show cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.
show cluster candidates	Displays a list of candidate switches.
show cluster members	Displays information about the cluster members.

cluster outside-interface

Use the **cluster outside-interface** global configuration command to configure the outside interface for cluster Network Address Translation (NAT) so that a member without an IP address can communicate with devices outside the cluster. Use the **no** form of this command to return to the default setting.

cluster outside-interface *interface-id*

no cluster outside-interface

Syntax Description

interface-id	Interface to serve as the outside interface. Valid interfaces include physical interfaces, port-channels, or VLANs. The port-channel range is 1 to 6. The VLAN range is 1 to 4094.

Defaults

The default outside interface is automatically selected by the cluster command switch.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Enter this command only on the cluster command switch. If you enter this command on a cluster member switch, an error message appears.

Examples

This example shows how to set the outside interface to VLAN 1:

```
Switch(config)# cluster outside-interface vlan 1
```

You can verify your setting by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the current operating configuration.

cluster run

Use the **cluster run** global configuration command to enable clustering on a switch. Use the **no** form of this command to disable clustering on a switch.

cluster run

no cluster run

Syntax Description

This command has no arguments or keywords.

Defaults

Clustering is enabled on all switches.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you enter the **no cluster run** command on a cluster command switch, the cluster command switch is disabled. Clustering is disabled, and the switch cannot become a candidate switch.

When you enter the **no cluster run** command on a cluster member switch, it is removed from the cluster. Clustering is disabled, and the switch cannot become a candidate switch.

When you enter the **no cluster run** command on a switch that is not part of a cluster, clustering is disabled on this switch. This switch cannot then become a candidate switch.

Examples

This example shows how to disable clustering on the cluster command switch:

```
Switch(config)# no cluster run
```

You can verify your setting by entering the **show cluster** privileged EXEC command.

Related Commands

Command	Description
show cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.

cluster standby-group

Use the **cluster standby-group** global configuration command to enable cluster command-switch redundancy by binding the cluster to an existing Hot Standby Router Protocol (HSRP). Entering the routing-redundancy keyword enables the same HSRP group to be used for cluster command-switch redundancy and routing redundancy. Use the **no** form of this command to return to the default setting.

cluster standby-group *HSRP-group-name* [**routing-redundancy**]

no cluster standby-group

Syntax Description

HSRP-group-name	Name of the HSRP group that is bound to the cluster. The group name is limited to 32 characters.
routing-redundancy	(Optional) Enable the same HSRP standby group to be used for cluster command-switch redundancy and routing redundancy.

Defaults

The cluster is not bound to any HSRP group.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Enter this command only on the cluster command switch. If you enter it on a cluster member switch, an error message appears.

The cluster command switch propagates the cluster-HSRP binding information to all cluster-HSRP capable members. Each cluster member switch stores the binding information in its NVRAM. The HSRP group name must be a valid standby group; otherwise, the command exits with an error.

The same group name should be used on all members of the HSRP standby group that is to be bound to the cluster. The same HSRP group name should also be used on all cluster-HSRP capable members for the HSRP group that is to be bound. (When not binding a cluster to an HSRP group, you can use different names on the cluster commander and the members.)

Examples

This example shows how to bind the HSRP group named *my_hsrp* to the cluster. This command is executed on the cluster command switch.

```
Switch(config)# cluster standby-group my_hsrp
```

This example shows how to use the same HSRP group named *my_hsrp* for routing redundancy and cluster redundancy.

```
Switch(config)# cluster standby-group my_hsrp routing-redundancy
```

This example shows the error message when this command is executed on a cluster command switch and the specified HSRP standby group does not exist:

```
Switch(config)# cluster standby-group my_hsrp
%ERROR: Standby (my_hsrp) group does not exist
```

This example shows the error message when this command is executed on a cluster member switch:

```
Switch(config)# cluster standby-group my_hsrp routing-redundancy
%ERROR: This command runs on a cluster command switch
```

You can verify your settings by entering the **show cluster** privileged EXEC command. The output shows whether redundancy is enabled in the cluster.

Related Commands

Command	Description
standby ip	Enables HSRP on the interface.
show cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.
show standby	Displays standby group information.

cluster timer

Use the **cluster timer** global configuration command to set the interval in seconds between heartbeat messages. Use the **no** form of this command to set the interval to the default value.

cluster timer *interval-in-secs*

no cluster timer

Syntax Description

interval-in-secs	Interval in seconds between heartbeat messages. The range is 1 to 300 seconds.

Defaults

The interval is 8 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Enter this command with the **cluster holdtime** global configuration command only on the cluster command switch. The cluster command switch propagates the values to all its cluster members so that the setting is consistent among all switches in the cluster.

The holdtime is typically set as a multiple of the heartbeat interval timer (**cluster timer**). For example, it takes (holdtime-in-secs divided by the interval-in-secs) number of heartbeat messages to be missed in a row to declare a switch down.

Examples

This example shows how to change the heartbeat interval timer and the duration on the cluster command switch:

```
Switch(config)# cluster timer 3
Switch(config)# cluster holdtime 30
```

You can verify your settings by entering the **show cluster** privileged EXEC command.

Related Commands

Command	Description
show cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.

define interface-range

Use the **define interface-range** global configuration command to create an interface-range macro. Use the **no** form of this command to delete the defined macro.

define interface-range *macro-name interface-range*

no define interface-range *macro-name interface-range*

Syntax Description

macro-name	Name of the interface-range macro; up to 32 characters.
interface-range	Interface range; for valid values for interface ranges, see "Usage Guidelines."

Defaults

This command has no default setting.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The macro name is a 32-character maximum character string.

A macro can contain up to five ranges.

All interfaces in a range must be the same type; that is, all Fast Ethernet ports, all Gigabit Ethernet ports, all EtherChannel ports, or all VLANs, but you can combine multiple interface types in a macro.

When entering the *interface-range*, use this format:

- *type* {*first-interface*} - {*last-interface*}
- You must add a space between the first interface number and the hyphen when entering an *interface-range*. For example, **gigabitethernet 0/1 - 2** is a valid range; **gigabitethernet 0/1-2** is not a valid range

Valid values for *type* and *interface*:

- **vlan** *vlan-id*, where the VLAN ID is 1 to 4094

Note Though options exist in the command-line interface to set multiple VLAN IDs, it is not supported.

VLAN interfaces must have been configured with the **interface vlan** command (the **show running-config** privileged EXEC command displays the configured VLAN interfaces). VLAN interfaces not displayed by the **show running-config** command cannot be used in *interface-ranges.*

- **port-channel** *port-channel-number*, where *port-channel-number* is from 1 to 6
- **fastethernet** module/{*first port*} - {*last port*}
- **gigabitethernet** module/{*first port*} - {*last port*}

For physical interfaces:

- module is always 0.
- the range is *type* **0/***number* - *number* (for example, **gigabitethernet 0/1 - 2**).

When you define a range, you must enter a space before the hyphen (-), for example:

gigabitethernet0/1 - 2

You can also enter multiple ranges. When you define multiple ranges, you must enter a space after the first entry before the comma (,). The space after the comma is optional, for example:

fastethernet0/3, gigabitethernet0/1 - 2

fastethernet0/3 -4, gigabitethernet0/1 - 2

Examples

This example shows how to create a multiple-interface macro:

```
Switch(config)# define interface-range macro1 fastethernet0/1 - 2, gigabitethernet0/1 - 2
```

Related Commands

Command	Description
interface range	Executes a command on multiple ports at the same time.
show running-config	Displays the current operating configuration, including defined macros.

delete

Use the **delete** privileged EXEC command to delete a file or directory on the flash memory device.

delete [**/force**] [**/recursive**] *filesystem***:/***file-url*

Syntax Description

/force	(Optional) Suppress the prompt that confirms the deletion.
/recursive	(Optional) Delete the named directory and all subdirectories and the files contained in it.
*filesystem***:**	Alias for a flash file system. The syntax for the local flash file system: **flash:**
/file-url	The path (directory) and filename to delete.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you use the **/force** keyword, you are prompted once at the beginning of the deletion process to confirm the deletion.

If you use the **/recursive** keyword without the **/force** keyword, you are prompted to confirm the deletion of every file.

The prompting behavior depends on the setting of the **file prompt** global configuration command. By default, the switch prompts for confirmation on destructive file operations. For more information about this command, see the *Cisco IOS Command Reference for Release 12.1*.

Examples

This example shows how to remove the directory that contains the old software image after a successful download of a new image:

```
Switch# delete /force /recursive flash:/old-image
```

You can verify that the directory was removed by entering the **dir** *filesystem***:** privileged EXEC command.

Related Commands

Command	Description
archive download-sw	Downloads a new image to the switch and overwrites or keeps the existing image.

dot1x

Use the **dot1x** global configuration command to globally enable IEEE 802.1x authentication. Use the **no** form of this command to return to the default setting.

dot1x {**guest-vlan supplicant**} | **system-auth-control**}

no dot1x {**guest-vlan supplicant**} | **system-auth-control**}

Note Though visible in the command-line help strings, the **credentials** *name* keywords are not supported.

Syntax Description

guest-vlan supplicant	Enable optional guest VLAN behavior globally on the switch.
system-auth-control	Enable IEEE 802.1x authentication globally on the switch.

Defaults

IEEE 802.1x authentication is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You must enable authentication, authorization, and accounting (AAA) and specify the authentication method list before globally enabling IEEE 802.1x authentication. A method list describes the sequence and authentication methods to be used to authenticate a user.

Before globally enabling IEEE 802.1x authentication on a switch, remove the EtherChannel configuration from the interfaces on which IEEE 802.1x authentication and EtherChannel are configured.

If you are using a device running the Cisco Access Control Server (ACS) application for IEEE 802.1x authentication with EAP-Transparent LAN Services (TLS) and with EAP-MD5, make sure that the device is running ACS Version 3.2.1 or later.

You can use the **guest-vlan supplicant** keywords to enable the optional IEEE 802.1x guest VLAN behavior globally on the switch. For more information, see the **dot1x guest-vlan** command.

Examples

This example shows how to globally enable IEEE 802.1x authentication on a switch:

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

You can verify your settings by entering the **show dot1x** [**interface** *interface-id*] privileged EXEC command.

Related Commands

Command	Description
dot1x guest-vlan	Enables and specifies an active VLAN as an IEEE 802.1x guest VLAN.
dot1x port-control	Enables manual control of the authorization state of the port.
show dot1x interface	Displays IEEE 802.1x status for the specified port.

dot1x default

Use the **dot1x default** interface configuration command to reset the IEEE 802.1x parameters to their default values.

dot1x default

Syntax Description

This command has no arguments or keywords.

Defaults

These are the default values:

- The per-port IEEE 802.1x protocol enable state is disabled (force-authorized).
- The number of seconds between re-authentication attempts is 3600 seconds.
- The periodic re-authentication is disabled.
- The quiet period is 60 seconds.
- The retransmission time is 30 seconds.
- The maximum retransmission number is 2 times.
- The host mode is single host.
- The client timeout period is 30 seconds.
- The authentication server timeout period is 30 seconds.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to reset the IEEE 802.1x parameters on a port:

```
Switch(config-if)# dot1x default
```

You can verify your settings by entering the **show dot1x** [**interface** *interface-id*] privileged EXEC command.

Related Commands

Command	Description
show dot1x [**interface** *interface-id*]	Displays IEEE 802.1x status for the specified port.

dot1x guest-vlan

Use the **dot1x guest-vlan** interface configuration command to specify an active VLAN as an IEEE 802.1x guest VLAN. Use the **no** form of this command to return to the default setting.

dot1x guest-vlan *vlan-id*

no dot1x guest-vlan

Syntax Description

vlan-id	Specify an active VLAN as an IEEE 802.1x guest VLAN. The range is 1 to 4094.

Defaults

No guest VLAN is configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can configure a guest VLAN on one of these switch ports:

- A static-access port that belongs to a nonprivate VLAN.
- A private-VLAN port that belongs to a secondary private VLAN. All the hosts connected to the switch port are assigned to private VLANs, whether or not the posture validation was successful. The switch determines the primary private VLAN by using the primary- and secondary-private-VLAN associations on the switch.

For each IEEE 802.1x port on the switch, you can configure a guest VLAN to provide limited services to clients (a device or workstation connected to the switch) not running IEEE 802.1x authentication. These users might be upgrading their systems for IEEE 802.1x authentication, and some hosts, such as Windows 98 systems, might not be IEEE 802.1x-capable.

When you enable a guest VLAN on an IEEE 802.1x port, the switch assigns clients to a guest VLAN when it does not receive a response to its Extensible Authentication Protocol over LAN (EAPOL) request/identity frame or when EAPOL packets are not sent by the client.

The switch maintains the EAPOL packet history. If another EAPOL packet is detected on the interface during the lifetime of the link, the guest VLAN feature is disabled. If the port is already in the guest VLAN state, the port returns to the unauthorized state, and authentication restarts. The EAPOL history is reset upon loss of link.

Any number of non-IEEE 802.1x-capable clients are allowed access when the switch port is moved to the guest VLAN. If an IEEE 802.1x-capable client joins the same port on which the guest VLAN is configured, the port is put into the unauthorized state in the RADIUS-configured or user-configured access VLAN, and authentication is restarted.

Guest VLANs are supported on IEEE 802.1x ports in single-host or multiple-hosts mode.

You can configure any active VLAN except a voice VLAN as an IEEE 802.1x guest VLAN. The guest VLAN feature is not supported on trunk ports. It is supported only on access ports.

After you configure a guest VLAN for an IEEE 802.1x port to which a DHCP client is connected, you might need to get a host IP address from a DHCP server. You can change the settings for restarting the IEEE 802.1x authentication process on the switch before the DHCP process on the client times out and tries to get a host IP address from the DHCP server. Decrease the settings for the IEEE 802.1x authentication process (**dot1x timeout quiet-period** and **dot1x timeout tx-period** interface configuration commands). The amount to decrease the settings depends on the connected IEEE 802.1x client type.

The switch supports *MAC authentication bypass* in Cisco IOS Release 12.2(55)EZ. When it is enabled on an IEEE 802.1x port, the switch can authorize clients based on the client MAC address when IEEE 802.1x authentication times out while waiting for an EAPOL message exchange. After detecting a client on an IEEE 802.1x port, the switch waits for an Ethernet packet from the client. The switch sends the authentication server a RADIUS-access/request frame with a username and password based on the MAC address. If authorization succeeds, the switch grants the client access to the network. If authorization fails, the switch assigns the port to the guest VLAN if one is specified. For more information, see the "Using IEEE 802.1x Authentication with MAC Authentication Bypass" section in the "Configuring IEEE 802.1x Port-Based Authentication" chapter of the software configuration guide.

Examples

This example shows how to specify VLAN 5 as an IEEE 802.1x guest VLAN:

```
Switch(config-if)# dot1x guest-vlan 5
```

This example shows how to set 3 as the quiet time on the switch, to set 15 as the number of seconds that the switch waits for a response to an EAP-request/identity frame from the client before resending the request, and to enable VLAN 2 as an IEEE 802.1x guest VLAN when an IEEE 802.1x port is connected to a DHCP client:

```
Switch(config-if)# dot1x timeout quiet-period 3
Switch(config-if)# dot1x timeout tx-period 15
Switch(config-if)# dot1x guest-vlan 2
```

This example shows how to enable the optional guest VLAN behavior and to specify VLAN 5 as an IEEE 802.1x guest VLAN:

```
Switch(config)# dot1x guest-vlan supplicant
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# dot1x guest-vlan 5
```

You can verify your settings by entering the **show dot1x** [**interface** *interface-id*] privileged EXEC command.

Related Commands

Command	Description
deny (IPv6 access-list configuration)	Enables the optional guest VLAN supplicant feature.
show dot1x [**interface** *interface-id*]	Displays IEEE 802.1x status for the specified port.

dot1x host-mode

Use the **dot1x host-mode** interface configuration command to allow a single host (client) or multiple hosts on an IEEE 802.1x-authorized port. Use the **no** form of this command to return to the default setting.

dot1x host-mode {**multi-host** | **single-host**}

no dot1x host-mode [**multi-host** | **single-host**}

Syntax Description

multi-host	Enable multiple-hosts mode on the switch.
single-host	Enable single-host mode on the switch.

Defaults

The default is single-host mode.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this command to limit an IEEE 802.1x-enabled port to a single client or to attach multiple clients to an IEEE 802.1x-enabled port. In multiple-hosts mode, only one of the attached hosts needs to be successfully authorized for all hosts to be granted network access. If the port becomes unauthorized (re-authentication fails or an Extensible Authentication Protocol over LAN [EAPOL]-logoff message is received), all attached clients are denied access to the network.

Before entering this command, make sure that the **dot1x port-control** interface configuration command is set to **auto** for the specified port.

Examples

This example shows how to enable IEEE 802.1x authentication globally, to enable IEEE 802.1x authentication on a port, and to enable multiple-hosts mode:

```
Switch(config)# dot1x system-auth-control
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# dot1x port-control auto
Switch(config-if)# dot1x host-mode multi-host
```

You can verify your settings by entering the **show dot1x** [**interface** *interface-id*] privileged EXEC command.

Related Commands

Command	Description
show dot1x [**interface** *interface-id*]	Displays IEEE 802.1x status for the specified port.

dot1x initialize

Use the **dot1x initialize** privileged EXEC command to manually return the specified 802.1x-enabled port to an unauthorized state before initiating a new authentication session on the port.

dot1x initialize [**interface** *interface-id*]

Syntax Description

interface *interface-id*	(Optional) Port to be initialized.

Defaults

There is no default setting.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this command to initialize the IEEE 802.1x state machines and to set up a fresh environment for authentication. After you enter this command, the port status becomes unauthorized.

There is not a **no** form of this command.

Examples

This example shows how to manually initialize a port:

```
Switch# dot1x initialize interface gigabitethernet0/22
```

You can verify the unauthorized port status by entering the **show dot1x** [**interface** *interface-id*] privileged EXEC command.

Related Commands

Command	Description
show dot1x [**interface** *interface-id*]	Displays IEEE 802.1x status for the specified port.

dot1x mac-auth-bypass

Use the **dot1x mac-auth-bypass** interface configuration command to enable the MAC authentication bypass feature. Use the **no** form of this command to disable MAC authentication bypass feature.

dot1x mac-auth-bypass [**eap** | **timeout activity** {*value*}]

no dot1x mac-auth-bypass

Syntax Description

eap	(Optional) Configure the switch to use Extensible Authentication Protocol (EAP) for authentication.
timeout activity *value*	(Optional) Configure the number of seconds that a connected host can be inactive before it is placed in an unauthorized state. The range is 1 to 65535.

Defaults

MAC authentication bypass is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Unless otherwise stated, the MAC authentication bypass usage guidelines are the same as the IEEE 802.1x authentication guidelines.

If you disable MAC authentication bypass from a port after the port has been authenticated with its MAC address, the port state is not affected.

If the port is in the unauthorized state and the client MAC address is not the authentication-server database, the port remains in the unauthorized state. However, if the client MAC address is added to the database, the switch can use MAC authentication bypass to re-authorize the port.

If the port is in the authorized state, the port remains in this state until re-authorization occurs.

If an EAPOL packet is detected on the interface during the lifetime of the link, the switch determines that the device connected to that interface is an IEEE 802.1x-capable supplicant and uses IEEE 802.1x authentication (not MAC authentication bypass) to authorize the interface.

Clients that were authorized with MAC authentication bypass can be re-authenticated.

You must enable port security before configuring a time out value.

For more information about how MAC authentication bypass and IEEE 802.1x authentication interact, see the “Understanding IEEE 802.1x Authentication with MAC Authentication Bypass” section and the “IEEE 802.1x Authentication Configuration Guidelines” section in the “Configuring IEEE 802.1x Port-Based Authentication” chapter of the software configuration guide.

Examples

This example shows how to enable MAC authentication bypass and to configure the switch to use EAP for authentication:

```
Switch(config-if)# dot1x mac-auth-bypass eap
```

This example shows how to enable MAC authentication bypass and to configure the timeout if the connected host is inactive for 30 seconds:

```
Switch(config-if)# dot1x mac-auth-bypass timeout activity 30
```

You can verify your settings by entering the **show dot1x** [**interface** *interface-id*] privileged EXEC command.

Related Commands

Command	Description
show dot1x [**interface** *interface-id*]	Displays IEEE 802.1x status for the specified port.

dot1x max-reauth-req

Use the **dot1x max-reauth-req** interface configuration command to set the maximum number of times that the switch restarts the authentication process before a port changes to the unauthorized state. Use the **no** form of this command to return to the default setting.

dot1x max-reauth-req *count*

no dot1x max-reauth-req

Syntax Description

count	Number of times that the switch restarts the authentication process before the port changes to the unauthorized state. The range is 0 to 10.

Defaults

The default is 2 times.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should change the default value of this command only to adjust for unusual circumstances such as unreliable links or specific behavioral problems with certain clients and authentication servers.

Examples

This example shows how to set 4 as the number of times that the switch restarts the authentication process before the port changes to the unauthorized state:

```
Switch(config-if)# dot1x max-reauth-req 4
```

You can verify your settings by entering the **show dot1x** [**interface** *interface-id*] privileged EXEC command.

Related Commands

Command	Description
dot1x max-req	Sets the maximum number of times that the switch forwards an EAP frame (assuming that no response is received) to the authentication server before restarting the authentication process.
dot1x timeout tx-period	Sets the number of seconds that the switch waits for a response to an EAP-request/identity frame from the client before resending the request.
show dot1x [**interface** *interface-id*]	Displays IEEE 802.1x status for the specified port.

dot1x max-req

Use the **dot1x max-req** interface configuration command to set the maximum number of times that the switch sends an Extensible Authentication Protocol (EAP) frame from the authentication server (assuming that no response is received) to the client before restarting the authentication process. Use the **no** form of this command to return to the default setting.

dot1x max-req *count*

no dot1x max-req

Syntax Description

count	Number of times that the switch resends an EAP frame from the authentication server before restarting the authentication process. The range is 1 to 10.

Defaults

The default is 2 times.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should change the default value of this command only to adjust for unusual circumstances such as unreliable links or specific behavioral problems with certain clients and authentication servers.

Examples

This example shows how to set 5 as the number of times that the switch sends an EAP frame from the authentication server to the client before restarting the authentication process:

```
Switch(config-if)# dot1x max-req 5
```

You can verify your settings by entering the **show dot1x** [**interface** *interface-id*] privileged EXEC command.

Related Commands

Command	Description
dot1x timeout tx-period	Sets the number of seconds that the switch waits for a response to an EAP-request/identity frame from the client before resending the request.
show dot1x [**interface** *interface-id*]	Displays IEEE 802.1x status for the specified port.

dot1x pae

Use the **dot1x pae** interface configuration command to configure the port as an IEEE 802.1x port access entity (PAE) authenticator. Use the **no** form of this command to disable IEEE 802.1x authentication on the port.

dot1x pae authenticator

no dot1x pae

Syntax Description

This command has no arguments or keywords.

Defaults

The port is not an IEEE 802.1x PAE authenticator, and IEEE 802.1x authentication is disabled on the port.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use the **no dot1x pae** interface configuration command to disable IEEE 802.1x authentication on the port.

When you configure IEEE 802.1x authentication on a port, such as by entering the **dot1x port-control** interface configuration command, the switch automatically configures the port as an EEE 802.1x authenticator. After the **no dot1x pae** interface configuration command is entered, the Authenticator PAE operation is disabled.

Examples

This example shows how to disable IEEE 802.1x authentication on the port:

```
Switch(config-if)# no dot1x pae
```

You can verify your settings by entering the **show dot1x** or **show eap** privileged EXEC command.

Related Commands

Command	Description
show dot1x	Displays IEEE 802.1x statistics, administrative status, and operational status for the switch or for the specified port.
show eap	Displays EAP registration and session information for the switch or for the specified port.

dot1x port-control

Use the **dot1x port-control** interface configuration command to enable manual control of the authorization state of the port. Use the **no** form of this command to return to the default setting.

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

no dot1x port-control

Syntax Description

auto	Enable IEEE 802.1x authentication on the port and cause the port to change to the authorized or unauthorized state based on the IEEE 802.1x authentication exchange between the switch and the client.
force-authorized	Disable IEEE 802.1x authentication on the port and cause the port to transition to the authorized state without an authentication exchange. The port sends and receives normal traffic without IEEE 802.1x-based authentication of the client.
force-unauthorized	Deny all access through this port by forcing the port to change to the unauthorized state, ignoring all attempts by the client to authenticate. The switch cannot provide authentication services to the client through the port.

Defaults

The default is force-authorized.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You must globally enable IEEE 802.1x authentication on the switch by using the **dot1x system-auth-control** global configuration command before enabling IEEE 802.1x authentication on a specific port.

The IEEE 802.1x standard is supported on Layer 2 static-access ports and voice VLAN ports.

You can use the **auto** keyword only if the port is not configured as one of these:

- Trunk port—If you try to enable IEEE 802.1x authentication on a trunk port, an error message appears, and IEEE 802.1x is not enabled. If you try to change the mode of an IEEE 802.1x-enabled port to trunk, an error message appears, and the port mode is not changed.
- Dynamic ports—A port in dynamic mode can negotiate with its neighbor to become a trunk port. If you try to enable IEEE 802.1x authentication on a dynamic port, an error message appears, and IEEE 802.1x authentication is not enabled. If you try to change the mode of an IEEE 802.1x-enabled port to dynamic, an error message appears, and the port mode is not changed.
- Dynamic-access ports—If you try to enable IEEE 802.1x authentication on a dynamic-access (VLAN Query Protocol [VQP]) port, an error message appears, and IEEE 802.1x authentication is not enabled. If you try to change an IEEE 802.1x-enabled port to dynamic VLAN assignment, an error message appears, and the VLAN configuration is not changed.

- EtherChannel port—Do not configure a port that is an active or a not-yet-active member of an EtherChannel as an IEEE 802.1x port. If you try to enable IEEE 802.1x authentication on an EtherChannel port, an error message appears, and IEEE 802.1x authentication is not enabled.
- Switched Port Analyzer (SPAN) destination ports—You can enable IEEE 802.1x authentication on a port that is a SPAN destination port. However, IEEE 802.1x authentication is disabled until the port is removed as a SPAN destination. You can enable IEEE 802.1x authentication on a SPAN source port.

To globally disable IEEE 802.1x authentication on the switch, use the **no dot1x system-auth-control** global configuration command. To disable IEEE 802.1x authentication on a specific port or to return to the default setting, use the **no dot1x port-control** interface configuration command.

Examples

This example shows how to enable IEEE 802.1x authentication on a port:

```
Switch(config)# interface gigabitethernet0/21
Switch(config-if)# dot1x port-control auto
```

You can verify your settings by entering the **show dot1x** [**interface** *interface-id*] privileged EXEC command.

Related Commands

Command	Description
show dot1x [**interface** *interface-id*]	Displays IEEE 802.1x status for the specified port.

dot1x re-authenticate

Use the **dot1x re-authenticate** privileged EXEC command to manually initiate a re-authentication of the specified IEEE 802.1x-enabled port.

dot1x re-authenticate [**interface** *interface-id*]

Syntax Description

interface *interface-id*	(Optional) Module and port number of the interface to re-authenticate.

Defaults

There is no default setting.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can use this command to re-authenticate a client without waiting for the configured number of seconds between re-authentication attempts (re-authperiod) and automatic re-authentication.

Examples

This example shows how to manually re-authenticate the device connected to a port:

```
Switch# dot1x re-authenticate interface gigabitethernet0/21
```

Related Commands

Command	Description
dot1x reauthentication	Enables periodic re-authentication of the client.
dot1x timeout reauth-period	Sets the number of seconds between re-authentication attempts.

dot1x reauthentication

Use the **dot1x reauthentication** interface configuration command to enable periodic re-authentication of the client. Use the **no** form of this command to return to the default setting.

dot1x reauthentication

no dot1x reauthentication

Syntax Description

This command has no arguments or keywords.

Defaults

Periodic re-authentication is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You configure the amount of time between periodic re-authentication attempts by using the **dot1x timeout reauth-period** interface configuration command.

Examples

This example shows how to disable periodic re-authentication of the client:

```
Switch(config-if)# no dot1x reauthentication
```

This example shows how to enable periodic re-authentication and to set the number of seconds between re-authentication attempts to 4000 seconds:

```
Switch(config-if)# dot1x reauthentication
Switch(config-if)# dot1x timeout reauth-period 4000
```

You can verify your settings by entering the **show dot1x** [**interface** *interface-id*] privileged EXEC command.

Related Commands

Command	Description
dot1x re-authenticate	Manually initiates a re-authentication of all IEEE 802.1x-enabled ports.
dot1x timeout reauth-period	Sets the number of seconds between re-authentication attempts.
show dot1x [**interface** *interface-id*]	Displays IEEE 802.1x status for the specified port.

dot1x timeout

Use the **dot1x timeout** interface configuration command to set IEEE 802.1x timers. Use the **no** form of this command to return to the default setting.

dot1x timeout {**quiet-period** *seconds* | **ratelimit-period** *seconds* | **reauth-period** {*seconds* | **server**} | **server-timeout** *seconds* | **supp-timeout** *seconds* | **tx-period** *seconds*}

no dot1x timeout {**quiet-period** | **reauth-period** | **server-timeout** | **supp-timeout** | **tx-period**}

Syntax Description

quiet-period *seconds*	Number of seconds that the switch remains in the quiet state following a failed authentication exchange with the client. The range is 1 to 65535.
ratelimit-period *seconds*	Number of seconds that the switch ignores Extensible Authentication Protocol over LAN (EAPOL) packets from clients that have been successfully authenticated during this duration. The range is 1 to 65535.
reauth-period {*seconds* | **server**}	Set the number of seconds between re-authentication attempts. The keywords have these meanings: • *seconds*—Sets the number of seconds from 1 to 65535; the default is 3600 seconds. • **server**—Sets the number of seconds as the value of the Session-Timeout RADIUS attribute (Attribute[27]).
server-timeout *seconds*	Number of seconds that the switch waits for the retransmission of packets by the switch to the authentication server. The range is 30 to 65535.
supp-timeout *seconds*	Number of seconds that the switch waits for the retransmission of packets by the switch to the IEEE 802.1x client. The range is 30 to 65535.
tx-period *seconds*	Number of seconds that the switch waits for a response to an EAP-request/identity frame from the client before retransmitting the request. The range is 5 to 65535.

Defaults

These are the default settings:

reauth-period is 3600 seconds.

quiet-period is 60 seconds.

tx-period is 5 seconds.

supp-timeout is 30 seconds.

server-timeout is 30 seconds.

rate-limit is 1 second.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should change the default value of this command only to adjust for unusual circumstances such as unreliable links or specific behavioral problems with certain clients and authentication servers.

The **dot1x timeout reauth-period** interface configuration command affects the behavior of the switch only if you have enabled periodic re-authentication by using the **dot1x reauthentication** interface configuration command.

During the quiet period, the switch does not accept or initiate any authentication requests. If you want to provide a faster response time to the user, enter a number smaller than the default.

When the **ratelimit-period** is set to 0 (the default), the switch does not ignore EAPOL packets from clients that have been successfully authenticated and forwards them to the RADIUS server.

Examples

This example shows how to enable periodic re-authentication and to set 4000 as the number of seconds between re-authentication attempts:

```
Switch(config-if)# dot1x reauthentication
Switch(config-if)# dot1x timeout reauth-period 4000
```

This example shows how to enable periodic re-authentication and to specify the value of the Session-Timeout RADIUS attribute as the number of seconds between re-authentication attempts:

```
Switch(config-if)# dot1x reauthentication
Switch(config-if)# dot1x timeout reauth-period server
```

This example shows how to set 30 seconds as the quiet time on the switch:

```
Switch(config-if)# dot1x timeout quiet-period 30
```

This example shows how to set 45 seconds as the switch-to-authentication server retransmission time:

```
Switch(config)# dot1x timeout server-timeout 45
```

This example shows how to set 45 seconds as the switch-to-client retransmission time for the EAP request frame:

```
Switch(config-if)# dot1x timeout supp-timeout 45
```

This example shows how to set 60 as the number of seconds to wait for a response to an EAP-request/identity frame from the client before re-transmitting the request:

```
Switch(config-if)# dot1x timeout tx-period 60
```

This example shows how to set 30 as the number of seconds that the switch ignores EAPOL packets from successfully authenticated clients:

```
Switch(config-if)# dot1x timeout ratelimit-period 30
```

You can verify your settings by entering the **show dot1x** privileged EXEC command.

Related Commands

Command	Description
dot1x max-req	Sets the maximum number of times that the switch sends an EAP-request/identity frame before restarting the authentication process.
dot1x reauthentication	Enables periodic re-authentication of the client.
show dot1x	Displays IEEE 802.1x status for all ports.

duplex

Use the **duplex** interface configuration command to specify the duplex mode of operation for a port. Use the **no** form of this command to return the port to its default value.

duplex {**auto** | **full** | **half**}

no duplex

Syntax Description

auto	Enable automatic duplex configuration; port automatically detects whether it should run in full- or half-duplex mode, depending on the attached device mode.
full	Enable full-duplex mode.
half	Enable half-duplex mode (only for interfaces operating at 10 or 100 Mb/s). You cannot configure half-duplex mode for interfaces operating at 1000 or 10,000 Mb/s.

Defaults

The default is **auto** for Fast Ethernet and Gigabit Ethernet ports.

The default is **full** for 100BASE-*x* (where -*x* is -BX, -FX, -FX-FE, or - LX) SFP modules.

Duplex options are not supported on the 1000BASE-*x* (where -*x* is -BX, -CWDM, -LX, -SX, or -ZX) SFP modules.

For information about which SFP modules are supported on your switch, see the product release notes.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command is not available on a 10-Gigabit Ethernet interface.

For Fast Ethernet ports, setting the port to **auto** has the same effect as specifying **half** if the attached device does not autonegotiate the duplex parameter.

For Gigabit Ethernet ports, setting the port to **auto** has the same effect as specifying **full** if the attached device does not autonegotiate the duplex parameter.

Note Half-duplex mode is supported on Gigabit Ethernet interfaces if the duplex mode is **auto** and the connected device is operating at half duplex. However, you cannot configure these interfaces to operate in half-duplex mode.

Certain ports can be configured to be either full duplex or half duplex. Applicability of this command depends on the device to which the switch is attached.

If both ends of the line support autonegotiation, we highly recommend using the default autonegotiation settings. If one interface supports autonegotiation and the other end does not, configure duplex and speed on both interfaces; do use the **auto** setting on the supported side.

If the speed is set to **auto**, the switch negotiates with the device at the other end of the link for the speed setting and then forces the speed setting to the negotiated value. The duplex setting remains as configured on each end of the link, which could result in a duplex setting mismatch.

You can configure the duplex setting when the speed is set to **auto**.

Caution Changing the interface speed and duplex mode configuration might shut down and re-enable the interface during the reconfiguration.

For guidelines on setting the switch speed and duplex parameters, see the "Configuring Interface Characteristics" chapter in the software configuration guide for this release.

Examples

This example shows how to configure an interface for full-duplex operation:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# duplex full
```

You can verify your setting by entering the **show interfaces** privileged EXEC command.

Related Commands

Command	Description
show interfaces	Displays the interface settings on the switch.
speed	Sets the speed on a 10/100 or 10/100/1000 Mb/s interface.

errdisable detect cause

To enable error-disable detection for a specific cause or for all causes, use the **errdisable detect cause** global configuration command. To disable the error-disable detection feature, use the **no** form of this command.

errdisable detect cause {**all** | **bpduguard** | **dhcp-rate-limit** | **dtp-flap** | **gbic-invalid** | inline-power | **link-flap** | **loopback** | **pagp-flap** | **psp** | **sfp-config-mismatch**}

no errdisable detect cause {**all** | **bpduguard** | **dhcp-rate-limit** | **dtp-flap** | **gbic-invalid** | inline-power | **link-flap** | **loopback** | **pagp-flap** | **psp** | **sfp-config-mismatch**}

For the bridge protocol data unit (BPDU) guard and port security, you can use this command to configure the switch to disable only a specific VLAN on a port instead of disabling the entire port.

When the per-VLAN error-disable feature is turned off and a BPDU guard violation occurs, the entire port is disabled. Use the **no** form of this command to disable the per-VLAN error-disable feature.

errdisable detect cause bpduguard shutdown vlan

no errdisable detect cause bpduguard shutdown vlan

Syntax Description

all	Enable error detection for all error-disabled causes.
bpduguard shutdown vlan	Enable per-VLAN error-disable for BPDU guard.
dhcp-rate-limit	Enable error detection for DHCP snooping.
dtp-flap	Enable error detection for the Dynamic Trunking Protocol (DTP) flapping.
gbic-invalid	Enable error detection for an invalid Gigabit Interface Converter (GBIC) module. **Note** On the Catalyst 2918 switch, this error refers to an invalid small form-factor pluggable (SFP) module.
inline-power	Enable error detection for inline power.
link-flap	Enable error detection for link-state flapping.
loopback	Enable error detection for detected loopbacks.
pagp-flap	Enable error detection for the Port Aggregation Protocol (PAgP) flap error-disabled cause.
psp	Enable error detection for protocol storm protection
sfp-config-mismatch	Enable error detection on an SFP configuration mismatch.

Command Default

Detection is enabled for all causes. All causes are configured to shut down the entire port.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.
12.2(58)SE	The **psp** keyword was added.

Usage Guidelines

A cause (**link-flap**, **dhcp-rate-limit**, and so forth) is the reason why the error-disabled state occurred. When a cause is detected on a port, the port is placed in an error-disabled state, an operational state that is similar to a link-down state.

When a port is error-disabled, it is effectively shut down, and no traffic is sent or received on the port. For the BPDU guard and port-security features, you can configure the switch to shut down just the offending VLAN on the port when a violation occurs, instead of shutting down the entire port.

If you set a recovery mechanism for the cause by entering the **errdisable recovery** global configuration command for the cause, the port is brought out of the error-disabled state and allowed to retry the operation when all causes have timed out. If you do not set a recovery mechanism, you must enter the **shutdown** and then the **no shutdown** commands to manually change the port from the error-disabled state.

For protocol storm protection, excess packets are dropped for a maximum of two virtual ports. Virtual port error disabling using the **psp** keyword is not supported for EtherChannel and Flexlink interfaces.

To verify your settings, enter the **show errdisable detect** privileged EXEC command.

Examples

This example shows how to enable error-disable detection for the link-flap error-disabled cause:

```
Switch(config)# errdisable detect cause link-flap
```

This example shows how to globally configure BPDU guard for per-VLAN error disable:

```
switch(config)# errdisable detect cause bpduguard shutdown vlan
```

You can verify your settings by entering the **show errdisable detect** privileged EXEC command.

Related Commands

Command	Description
show errdisable detect	Displays error-disabled detection information.
show interfaces status err-disabled	Displays interface status or a list of interfaces in the error-disabled state.
clear errdisable interface	Clears the error-disabled state from a port or VLAN that was error disabled by the per-VLAN error disable feature.

errdisable detect cause small-frame

Use the **errdisable detect cause small-frame** global configuration command on the switch stack or on a standalone switch to allow any switch port to be error disabled if incoming VLAN-tagged packets are small frames (67 bytes or less) and arrive at the minimum configured rate (the threshold). Use the **no** form of this command to return to the default setting.

errdisable detect cause small-frame

no errdisable detect cause small-frame

Syntax Description

This command has no arguments or keywords.

Defaults

This feature is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command globally enables the small-frame arrival feature. Use the **small violation-rate** interface configuration command to set the threshold for each port.

You can configure the port to be automatically re-enabled by using the **errdisable recovery cause small-frame** global configuration command. You configure the recovery time by using the **errdisable recovery interval** *interval global configuration command.*

Examples

This example shows how to enable the switch ports to be put into the error-disabled mode if incoming small frames arrive at the configured threshold:

```
Switch(config)# errdisable detect cause small-frame
```

You can verify your setting by entering the **show interfaces** privileged EXEC command.

Related Commands

Command	Description
errdisable recovery cause small-frame	Enables the recovery timer.
errdisable recovery interval	Specifies the time to recover from the specified error-disabled state.
show interfaces	Displays the interface settings on the switch, including input and output flow control.
small-frame violation rate	Configures the rate (threshold) for incoming small frames to cause a port to be put into the error-disabled state.

errdisable recovery cause small-frame

Use the **errdisable recovery cause small-frame** global configuration command on the switch stack or on a standalone switch to enable the recovery timer for ports to be automatically re-enabled after they are error disabled by the arrival of small frames. Use the **no** form of this command to return to the default setting.

errdisable recovery cause small-frame

no errdisable recovery cause small-frame

Syntax Description

This command has no arguments or keywords.

Defaults

This feature is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command enables the recovery timer for error-disabled ports. You configure the recovery time by using the errdisable **recovery interval** *interval interface configuration command.*

Examples

This example shows how to set the recovery timer:

```
Switch(config)# errdisable recovery cause small-frame
```

You can verify your setting by entering the **show interfaces** user EXEC command.

Related Commands

Command	Description
errdisable detect cause small-frame	Allows any switch port to be put into the error-disabled state if an incoming frame is smaller than the configured minimum size and arrives at the specified rate (threshold).
show interfaces	Displays the interface settings on the switch, including input and output flow control.
small-frame violation rate	Configures the size for an incoming (small) frame to cause a port to be put into the error-disabled state.

errdisable recovery

Use the **errdisable recovery** global configuration command to configure the recover mechanism variables. Use the **no** form of this command to return to the default setting.

errdisable recovery {**cause** {**all** | **bpduguard** | **channel-misconfig** | **dhcp-rate-limit** | **dtp-flap** | **gbic-invalid** | **inline-power** | **link-flap** | **loopback** | **pagp-flap** | **psecure-violation** | **psp** | **security-violation** | **sfp-mismatch** | **udld** | **vmps**} | {**interval** *interval*}

no errdisable recovery {**cause** {**all** | **bpduguard** | **channel-misconfig** | **dhcp-rate-limit** | **dtp-flap** | **gbic-invalid** | **inline-power** | **link-flap** | **loopback** | **pagp-flap** | **psecure-violation** | **psp** | **security-violation** | **sfp-mismatch** | **udld** | **vmps**} | {**interval** *interval*}

Syntax Description

cause	Enable the error-disabled mechanism to recover from a specific cause.
all	Enable the timer to recover from all error-disabled causes.
bpduguard	Enable the timer to recover from the bridge protocol data unit (BPDU) guard error-disabled state.
channel-misconfig	Enable the timer to recover from the EtherChannel misconfiguration error-disabled state.
dhcp-rate-limit	Enable the timer to recover from the DHCP snooping error-disabled state.
dtp-flap	Enable the timer to recover from the Dynamic Trunking Protocol (DTP) flap error-disabled state.
gbic-invalid	Enable the timer to recover from an invalid Gigabit Interface Converter (GBIC) module error-disabled state. **Note** On the Catalyst 2918 switch, this error refers to an invalid small form-factor pluggable (SFP) error-disabled state.
inline-power	Enable error detection for inline-power.
link-flap	Enable the timer to recover from the link-flap error-disabled state.
loopback	Enable the timer to recover from a loopback error-disabled state.
pagp-flap	Enable the timer to recover from the Port Aggregation Protocol (PAgP)-flap error-disabled state.
psecure-violation	Enable the timer to recover from a port security violation disable state.
psp	Enable the timer to recover from the protocol storm protection error-disabled state.
security-violation	Enable the timer to recover from an IEEE 802.1x-violation disabled state.
sfp-config-mismatch	Enable error detection on an SFP configuration mismatch.
udld	Enable the timer to recover from the UniDirectional Link Detection (UDLD) error-disabled state.

vmps	Enable the timer to recover from the VLAN Membership Policy Server (VMPS) error-disabled state.
interval *interval*	Specify the time to recover from the specified error-disabled state. The range is 30 to 86400 seconds. The same interval is applied to all causes. The default interval is 300 seconds. **Note** The error-disabled recovery timer is initialized at a random differential from the configured interval value. The difference between the actual timeout value and the configured value can be up to 15 percent of the configured interval.

Defaults

Recovery is disabled for all causes.

The default recovery interval is 300 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.
12.2(58)SE	The **psp** keyword was added.

Usage Guidelines

A cause (**link-flap, bpduguard**, and so forth) is defined as the reason that the error-disabled state occurred. When a cause is detected on a port, the port is placed in the error-disabled state, an operational state similar to the link-down state.

When a port is error-disabled, it is effectively shut down, and no traffic is sent or received on the port. For the BPDU guard and port-security features, you can configure the switch to shut down just the offending VLAN on the port when a violation occurs, instead of shutting down the entire port.

If you do not enable the recovery for the cause, the port stays in the error-disabled state until you enter the **shutdown** and the **no shutdown** interface configuration commands. If you enable the recovery for a cause, the port is brought out of the error-disabled state and allowed to retry the operation again when all the causes have timed out.

Otherwise, you must enter the **shutdown** and then the **no shutdown** commands to manually recover a port from the error-disabled state.

Examples

This example shows how to enable the recovery timer for the BPDU guard error-disabled cause:

```
Switch(config)# errdisable recovery cause bpduguard
```

This example shows how to set the timer to 500 seconds:

```
Switch(config)# errdisable recovery interval 500
```

You can verify your settings by entering the **show errdisable recovery** privileged EXEC command.

Related Commands

Command	Description
show errdisable recovery	Displays error-disabled recovery timer information.
show interfaces status err-disabled	Displays interface status or a list of interfaces in error-disabled state.
clear errdisable interface	Clears the error-disabled state from a port or VLAN that was error disabled by the per-VLAN error disable feature.

exception crashinfo

Use the **exception crashinfo** global configuration command to configure the switch to create the extended crashinfo file when the Cisco IOS image fails. Use the **no** form of this command to disable this feature.

exception crashinfo

no exception crashinfo

Syntax Description

This command has no arguments or keywords.

Defaults

The switch creates the extended crashinfo file.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The basic crashinfo file includes the Cisco IOS image name and version that failed, and a list of the processor registers. The extended crashinfo file includes additional information that can help determine the cause of the switch failure.

Use the **no exception crashinfo** global configuration command to configure the switch to not create the extended crashinfo file.

Examples

This example shows how to configure the switch to not create the extended crashinfo file:

```
Switch(config)# no exception crashinfo
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the operating configuration, including defined macros.

flowcontrol

Use the **flowcontrol** interface configuration command to set the receive flow-control state for an interface. When flow control **send** is operable and on for a device and it detects any congestion at its end, it notifies the link partner or the remote device of the congestion by sending a pause frame. When flow control **receive** is on for a device and it receives a pause frame, it stops sending any data packets. This prevents any loss of data packets during the congestion period.

Use the **receive off** keywords to disable flow control.

flowcontrol receive {**desired** | **off** | **on**}

Note The Catalyst 2918 switch can receive but not send pause frames.

Syntax Description

receive	Set whether the interface can receive flow-control packets from a remote device.
desired	Allow an interface to operate with an attached device that is required to send flow-control packets or with an attached device that is not required to but can send flow-control packets.
off	Turn off the ability of an attached device to send flow-control packets to an interface.
on	Allow an interface to operate with an attached device that is required to send flow-control packets or with an attached device that is not required to but can send flow-control packets.

Defaults

The default is **flowcontrol receive off**.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The switch does not support sending flow-control pause frames.

Note that the **on** and **desired** keywords have the same result.

When you use the **flowcontrol** command to set a port to control traffic rates during congestion, you are setting flow control on a port to one of these conditions:

- **receive on** or **desired**: The port cannot send pause frames, but can operate with an attached device that is required to or is able to send pause frames. The port can receive pause frames.
- **receive off**: Flow control does not operate in either direction. In case of congestion, no indication is given to the link partner, and no pause frames are sent or received by either device.

Table 2-2 shows the flow control results on local and remote ports for a combination of settings. The table assumes that **receive desired** has the same results as using the **receive on** keywords.

Table 2-1 Flow Control Settings and Local and Remote Port Flow Control Resolution

Flow Control Settings		Flow Control Resolution	
Local Device	**Remote Device**	**Local Device**	**Remote Device**
send off/receive on	**send on/receive on**	Receives only	Sends and receives
	send on/receive off	Receives only	Sends only
	send desired/receive on	Receives only	Sends and receives
	send desired/receive off	Receives only	Sends only
	send off/receive on	Receives only	Receives only
	send off/receive off	Does not send or receive	Does not send or receive
send off/receive off	**send on/receive on**	Does not send or receive	Does not send or receive
	send on/receive off	Does not send or receive	Does not send or receive
	send desired/receive on	Does not send or receive	Does not send or receive
	send desired/receive off	Does not send or receive	Does not send or receive
	send off/receive on	Does not send or receive	Does not send or receive
	send off/receive off	Does not send or receive	Does not send or receive

Examples

This example shows how to configure the local port to not support flow control by the remote port:

```
Switch(config)# interface gigabitethernet0/21
Switch(config-if)# flowcontrol receive off
```

You can verify your settings by entering the **show interfaces** privileged EXEC command.

Related Commands

Command	Description
show interfaces	Displays the interface settings on the switch, including input and output flow control.

interface port-channel

Use the **interface port-channel** global configuration command to access or create the port-channel logical interface. Use the **no** form of this command to remove the port-channel.

interface port-channel *port-channel-number*

no interface port-channel *port-channel-number*

Syntax Description

port-channel-number	Port-channel number. The range is 1 to 6.

Defaults

No port-channel logical interfaces are defined.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

For Layer 2 EtherChannels, you do not have to create a port-channel interface first before assigning a physical port to a channel group. Instead, you can use the **channel-group** interface configuration command. It automatically creates the port-channel interface when the channel group gets its first physical port. If you create the port-channel interface first, the *channel-group-number* can be the same as the *port-channel-number,* or you can use a new number. If you use a new number, the **channel-group** command dynamically creates a new port channel.

Only one port channel in a channel group is allowed.

Follow these guidelines when you use the **interface port-channel** command:

- If you want to use the Cisco Discovery Protocol (CDP), you must configure it only on the physical port and not on the port-channel interface.
- Do not configure a port that is an active member of an EtherChannel as an IEEE 802.1x port. If IEEE 802.1x is enabled on a not-yet active port of an EtherChannel, the port does not join the EtherChannel.

For a complete list of configuration guidelines, see the “Configuring EtherChannels” chapter in the software configuration guide for this release.

Examples

This example shows how to create a port-channel interface with a port channel number of 5:

```
Switch(config)# interface port-channel 5
```

You can verify your setting by entering the **show running-config** privileged EXEC or **show etherchannel** *channel-group-number* **detail** privileged EXEC command.

Related Commands

Command	Description
channel-group	Assigns an Ethernet port to an EtherChannel group.
show etherchannel	Displays EtherChannel information for a channel.
show running-config	Displays the current operating configuration.

interface range

Use the **interface range** global configuration command to enter interface range configuration mode and to execute a command on multiple ports at the same time. Use the **no** form of this command to remove an interface range.

interface range {*port-range* | **macro** *name*}

no interface range {*port-range* | **macro** *name*}

Syntax Description

port-range	Port range. For a list of valid values for *port-range*, see the "Usage Guidelines" section.
macro *name*	Specify the name of a macro.

Defaults

This command has no default setting.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you enter interface range configuration mode, all interface parameters you enter are attributed to all interfaces within the range.

For VLANs, you can use the **interface range** command only on existing VLAN switch virtual interfaces (SVIs). To display VLAN SVIs, enter the **show running-config** privileged EXEC command. VLANs not displayed cannot be used in the **interface range** command. The commands entered under **interface range** command are applied to all existing VLAN SVIs in the range.

All configuration changes made to an interface range are saved to NVRAM, but the interface range itself is not saved to NVRAM.

You can enter the interface range in two ways:

- Specifying up to five interface ranges
- Specifying a previously defined interface-range macro

All interfaces in a range must be the same type; that is, all Fast Ethernet ports, all Gigabit Ethernet ports, all EtherChannel ports, or all VLANs. However, you can define up to five interface ranges with a single command, with each range separated by a comma.

Valid values for *port-range* type and interface:

- **vlan** *vlan-ID*, where VLAN ID is from 1 to 4094

Note Although the command-line interface (CLI) shows options to set multiple VLANs, these are not supported.

- **fastethernet** module/{*first port*} - {*last port*}, where module is always **0**
- **gigabitethernet** module/{*first port*} - {*last port*}, where module is always **0**

  For physical interfaces:

  - module is always 0
  - the range is *type* **0**/*number* - *number* (for example, **gigabitethernet0/1 - 2**)
- **port-channel** *port-channel-number* - *port-channel-number*, where *port-channel-number* is from 1 to 6

Note When you use the **interface range** command with port channels, the first and last port channel number in the range must be active port channels.

When you define a range, you must enter a space between the first entry and the hyphen (-):

```
interface range gigabitethernet0/1 -2
```

When you define multiple ranges, you must still enter a space after the first entry and before the comma (,):

```
interface range fastethernet0/1 - 2, gigabitethernet0/1 - 2
```

You cannot specify both a macro and an interface range in the same command.

You can also specify a single interface in *port-range*. The command is then similar to the **interface** *interface-id* global configuration command.

For more information about configuring interface ranges, see the software configuration guide for this release.

Examples

This example shows how to use the **interface range** command to enter interface-range configuration mode to apply commands to two ports:

```
Switch(config)# interface range gigabitethernet0/1 - 2
Switch(config-if-range)#
```

This example shows how to use a port-range macro *macro1* for the same function. The advantage is that you can reuse *macro1* until you delete it.

```
Switch(config)# define interface-range macro1 gigabitethernet0/1 - 2
Switch(config)# interface range macro macro1
Switch(config-if-range)#
```

Related Commands

Command	Description
define interface-range	Creates an interface range macro.
show running-config	Displays the configuration information currently running on the switch.

interface vlan

Use the **interface vlan** global configuration command to create or access a VLAN and to enter interface configuration mode. Use the **no** form of this command to delete a VLAN.

interface vlan *vlan-id*

no interface vlan *vlan-id*

Syntax Description

vlan-id	VLAN number. The range is 1 to 4094.

Defaults

The default VLAN interface is VLAN 1.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

VLANs are created the first time that you enter the **interface vlan** *vlan-id* command for a particular VLAN. The *vlan-id* corresponds to the VLAN-tag associated with data frames on an IEEE 802.1Q encapsulated trunk or the VLAN ID configured for an access port.

If you delete a VLAN by entering the **no interface vlan** *vlan-id* command, the deleted interface is no longer visible in the output from the **show interfaces** privileged EXEC command.

Note You cannot delete the VLAN 1 interface.

You can re-instate a deleted VLAN by entering the **interface vlan** *vlan-id* command for the deleted interface. The interface comes back up, but the previous configuration is gone.

This example shows how to create a new VLAN with VLAN ID 23 and to enter interface configuration mode:

```
Switch(config)# interface vlan 23
Switch(config-if)#
```

You can verify your setting by entering the **show interfaces** and **show interfaces vlan** *vlan-id* privileged EXEC commands.

Related Commands

Command	Description
show interfaces vlan *vlan-id*	Displays the administrative and operational status of all interfaces or the specified VLAN.

ip access-group

Use the **ip access-group** interface configuration command to apply an access-control list to a VLAN interface to control access to the CPU. Use the **no** form of this command to remove all access groups or the specified access group from the interface.

ip access-group {*access-list-number* | *name*} {**in** | **out**}

no ip access-group [*access-list-number* | *name*] {**in** | **out**}

Syntax Description

access-list-number	The number of the IP access control list (ACL). The range is 1 to 199 or 1300 to 2699.
name	The name of an IP ACL, specified in the **ip access-list** global configuration command.
in	Specify filtering on inbound packets.
out	Specify filtering on outbound packets.

Defaults

No access control list is applied to the interface.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.
12.2(52)EZ	This command was introduced.

Usage Guidelines

You can apply named or numbered standard or extended IP access control lists to a VLAN interface. To define an access control list by name, use the **ip access-list** global configuration command. To define a numbered access list, use the **access list** global configuration command. You can used numbered standard access control lists ranging from 1 to 99 and 1300 to 1999 or extended access control lists ranging from 100 to 199 and 2000 to 2699.

You can apply an ACL to either inbound or outbound VLAN interfaces to filter packets that are intended for the CPU, such as SNMP, Telnet, or web traffic. IPv4 ACLs applied to VLAN interfaces provide switch management security by limiting access to a specific host in the network or to specific applications (SNMP, Telnet, SSH, and so on). ACLs attached to VLAN interfaces do not impact the hardware switching of packets on the VLAN.

- You can apply only one IP ACL per interface.
- ACLs do not support logging; if the **log** keyword is specified in the IP ACL, it is ignored.

For standard inbound access control lists, after the switch receives a packet, it checks the source address of the packet against the access control list. IP extended access control lists can optionally check other fields in the packet, such as the destination IP address, protocol type, or port numbers. If the access control list permits the packet, the switch continues to process the packet. If the access control list denies the packet, the switch discards the packet.

If the specified access control list does not exist, all packets are passed.

Examples

This example shows how to apply access control list 3 to filter packets going to the CPU:

```
Switch(config)# interface vlan 1
Switch(config-if)# ip access-group 3 in
```

You can verify your settings by entering the **show ip interface, show access-lists,** or **show ip access-lists** privileged EXEC command.

Related Commands

Command	Description
access list	Configures a numbered ACL.
ip access-list	Configures a named ACL.
show access-lists	Displays ACLs configured on the switch.
show ip access-lists	Displays IP ACLs configured on the switch.
show ip interface	Displays information about interface status and configuration.

ip address

Use the **ip address** interface configuration command to set an IP address for the Layer 2 switch. Use the **no** form of this command to remove an IP address or to disable IP processing.

ip address *ip-address subnet-mask* [**secondary**]

no ip address [*ip-address subnet-mask*] [**secondary**]

Syntax Description

ip-address	IP address.
subnet-mask	Mask for the associated IP subnet.
secondary	(Optional) Specifies that the configured address is a secondary IP address. If this keyword is omitted, the configured address is the primary IP address.

Defaults

No IP address is defined.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you remove the switch IP address through a Telnet session, your connection to the switch will be lost.

Hosts can find subnet masks using the Internet Control Message Protocol (ICMP) Mask Request message. Routers respond to this request with an ICMP Mask Reply message.

You can disable IP processing on a particular interface by removing its IP address with the **no ip address** command. If the switch detects another host using one of its IP addresses, it will send an error message to the console.

You can use the optional keyword **secondary** to specify an unlimited number of secondary addresses. Secondary addresses are treated like primary addresses, except the system never generates datagrams other than routing updates with secondary source addresses. IP broadcasts and ARP requests are handled properly, as are interface routes in the IP routing table.

Note If any router on a network segment uses a secondary address, all other devices on that same segment must also use a secondary address from the same network or subnet. Inconsistent use of secondary addresses on a network segment can very quickly cause routing loops.

If your switch receives its IP address from a Bootstrap Protocol (BOOTP) or a DHCP server and you remove the switch IP address by using the **no ip address** command, IP processing is disabled, and the BOOTP or the DHCP server cannot reassign the address.

Examples

This example shows how to configure the IP address for the Layer 2 switch on a subnetted network:

```
Switch(config)# interface vlan 1
Switch(config-if)# ip address 172.20.128.2 255.255.255.0

You can verify your settings by entering the show running-config privileged EXEC command.
```

Related Commands

Command	Description
show running-config	Displays the running configuration on the switch.

ip device tracking

To enable IP device tracking, use the **ip device tracking** global configuration command. Use the **no** form of this command to disable this feature.

ip device tracking

no ip device tracking

Syntax Description

This command has no arguments or keywords.

Command Default

IP device tracking is disabled.

Command Modes

Global configuration

Command History

12.2(44)SE	This command was introduced.

Usage Guidelines

When IP device tracking is enabled, you can set the IP device tracking probe interval, count, and configure the ARP probe address with the **ip device tracking probe** command.

Use the **show ip device tracking all** command to display information about entries in the IP device tracking table. For more information about this command, see the Cisco IOS Security Command Reference, Release 12.4T.

Examples

This example shows how to enable device tracking:

```
Switch(config)# ip device tracking
Switch(config)#
```

Related Commands

Command	Description
ip device tracking probe	Configures the IP device tracking table for ARP probes.
show ip device tracking all	Displays information about the entries in the IP device tracking table.

ip device tracking probe

Use the **ip device tracking probe** global configuration command to configure the IP device tracking table for Address Resolution Protocol (ARP) probes. Use the **no** form of this command to disable ARP probes.

ip device tracking probe {**count** | **interval** | **use-svi**}

no ip device tracking probe {**count** | **interval** | **use-svi**}

Syntax Description

count *number*	Sets the number of times that the switch sends the ARP probe. The range is from 1 to 255.
interval *seconds*	Sets the number of seconds that the switch waits for a response before resending the ARP probe. The range is from 30 to 1814400 seconds.
use-svi	Uses the switch virtual interface (SVI) IP address as source of ARP probes.

Command Default

The count number is 3.

The interval is 30 seconds.

The ARP probe default source IP address is the Layer 3 interface and 0.0.0.0 for switchports.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use the **count** keyword option to set the number of times that the switch sends the ARP probe. The range is from 1 to 255.

Use the **interval** keyword option to set the number of seconds that the switch waits for a response before resending the ARP probe. The range is from 30 to 1814400 seconds.

Use the **use-svi** keyword option to configure the IP device tracking table to use the SVI IP address for ARP probes in cases when the default source ip address 0.0.0.0 for switch ports is used and the ARP probes drop.

Use the **show ip device tracking all** command to display information about entries in the IP device tracking table. For more information about this command, see the Cisco IOS Security Command Reference, Release 12.4T.

Examples

This example shows how to set SVI as the source for ARP probes:

```
Switch(config)# ip device tracking probe use-svi
Switch(config)#
```

Related Commands

Command	Description
show ip device tracking all	Displays information about the entries in the IP device tracking table.

ip dhcp snooping

Use the **ip dhcp snooping** global configuration command to globally enable DHCP snooping. Use the **no** form of this command to return to the default setting.

ip dhcp snooping

no ip dhcp snooping

Syntax Description

This command has no arguments or keywords.

Defaults

DHCP snooping is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

For any DHCP snooping configuration to take effect, you must globally enable DHCP snooping.

DHCP snooping is not active until you enable snooping on a VLAN by using the **ip dhcp snooping vlan** *vlan-id* global configuration command.

Examples

This example shows how to enable DHCP snooping:

```
Switch(config)# ip dhcp snooping
```

You can verify your settings by entering the **show ip dhcp snooping** user EXEC command.

Related Commands

Command	Description
ip dhcp snooping vlan	Enables DHCP snooping on a VLAN.
show ip igmp snooping	Displays the DHCP snooping configuration.
show ip dhcp snooping binding	Displays the DHCP snooping binding information.

ip dhcp snooping binding

Use the **ip dhcp snooping binding** privileged EXEC command to configure the DHCP snooping binding database and to add binding entries to the database. Use the **no** form of this command to delete entries from the binding database.

ip dhcp snooping binding *mac-address* **vlan** *vlan-id ip-address* **interface** *interface-id* **expiry** *seconds*

no ip dhcp snooping binding *mac-address* **vlan** *vlan-id ip-address* **interface** *interface-id*

Syntax Description

mac-address	Specify a MAC address.
vlan *vlan-id*	Specify a VLAN number. The range is 1 to 4094.
ip-address	Specify an IP address.
interface *interface-id*	Specify an interface on which to add or delete a binding entry.
expiry *seconds*	Specify the interval (in seconds) after which the binding entry is no longer valid. The range is 1 to 4294967295.

Defaults

No default database is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this command when you are testing or debugging the switch.

In the DHCP snooping binding database, each database entry, also referred to a binding, has an IP address, an associated MAC address, the lease time (in hexadecimal format), the interface to which the binding applies, and the VLAN to which the interface belongs. The database can have up to 8192 bindings.

Use the **show ip dhcp snooping binding** privileged EXEC command to display only the configured bindings.

Examples

This example shows how to generate a DHCP binding configuration with an expiration time of 1000 seconds on a port in VLAN 1:

```
Switch# ip dhcp snooping binding 0001.1234.1234 vlan 1 172.20.50.5 interface
gigabitethernet0/1 expiry 1000
```

You can verify your settings by entering the **show ip dhcp snooping binding** privileged EXEC command.

Related Commands

Command	Description
ip dhcp snooping	Enables DHCP snooping on a VLAN.
show ip dhcp snooping binding	Displays the dynamically configured bindings in the DHCP snooping binding database and the configuration information.

ip dhcp snooping database

Use the **ip dhcp snooping database** global configuration command to configure the DHCP snooping binding database agent. Use the **no** form of this command to disable the agent, to reset the timeout value, or to reset the write-delay value.

ip dhcp snooping database {{**flash:/***filename* | **ftp://***user:password@host/filename* | **http://***[[username:password]@]{hostname | host-ip}[/directory]/image-name***.tar** | **rcp://***user@host/filename* | **tftp://***host/filename*} | **timeout** *seconds* | **write-delay** *seconds*}

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

Syntax Description

flash:/*filename*	Specify that the database agent or the binding file is in the flash memory.
ftp://*user***:***password@host/filename*	Specify that the database agent or the binding file is on an FTP server.
http://*[[username:password]@] {hostname | host-ip}[/directory] /image-name***.tar**	Specify that the database agent or the binding file is on an FTP server.
rcp://*user@host/filename*	Specify that the database agent or the binding file is on a Remote Control Protocol (RCP) server.
tftp://*host/filename*	Specify that the database agent or the binding file is on a TFTP server.
timeout *seconds*	Specify (in seconds) how long to wait for the database transfer process to finish before stopping. The default is 300 seconds. The range is 0 to 86400. Use 0 to define an infinite duration, which means to continue trying the transfer indefinitely.
write-delay *seconds*	Specify (in seconds) the duration for which the transfer should be delayed after the binding database changes. The default is 300 seconds. The range is 15 to 86400.

Defaults

The URL for the database agent or binding file is not defined.

The timeout value is 300 seconds (5 minutes).

The write-delay value is 300 seconds (5 minutes).

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The DHCP snooping binding database can have up to 8192 bindings.

To ensure that the lease time in the database is accurate, we recommend that Network Time Protocol (NTP) is enabled and configured for these features:

- NTP authentication
- NTP peer and server associations
- NTP broadcast service
- NTP access restrictions
- NTP packet source IP address

If NTP is configured, the switch writes binding changes to the binding file only when the switch system clock is synchronized with NTP.

Because both NVRAM and the flash memory have limited storage capacities, we recommend that you store a binding file on a TFTP server. You must create an empty file at the configured URL on network-based URLs (such as TFTP and FTP) before the switch can first write bindings to the binding file at that URL.

Use the **ip dhcp snooping database flash:/***filename* command to save the DHCP snooping binding database in the NVRAM.

If you set the **ip dhcp snooping database timeout** command to 0 seconds and the database is being written to a TFTP file, if the TFTP server goes down, the database agent continues to try the transfer indefinitely. No other transfer can be initiated while this one is in progress. This might be inconsequential because if the server is down, no file can be written to it.

Use the **no ip dhcp snooping database** command to disable the agent.

Use the **no ip dhcp snooping database timeout** command to reset the timeout value.

Use the **no ip dhcp snooping database write-delay** command to reset the write-delay value.

Examples

This example shows how to store a binding file at an IP address of 10.1.1.1 that is in a directory called *directory.* A file named *file* must be present on the TFTP server.

```
Switch(config)# ip dhcp snooping database tftp://10.1.1.1/directory/file
```

This example shows how to store a binding file called *file01.txt* in the NVRAM:

```
Switch(config)# ip dhcp snooping database flash:file01.txt
```

You can verify your settings by entering the **show ip dhcp snooping database** privileged EXEC command.

Related Commands

Command	Description
ip dhcp snooping	Enables DHCP snooping on a VLAN.
ip dhcp snooping binding	Configures the DHCP snooping binding database.
show ip dhcp snooping database	Displays the status of DHCP snooping database agent.

ip dhcp snooping information option

Use the **ip dhcp snooping information option** global configuration command to enable DHCP option-82 data insertion. Use the **no** form of this command to disable DHCP option-82 data insertion.

ip dhcp snooping information option

no ip dhcp snooping information option

Syntax Description

This command has no arguments or keywords.

Defaults

DHCP option-82 data is inserted.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You must globally enable DHCP snooping by using the **ip dhcp snooping** global configuration command for any DHCP snooping configuration to take effect.

When the option-82 feature is enabled and a switch receives a DHCP request from a host, it adds the option-82 information in the packet. The option-82 information contains the switch MAC address (the remote ID suboption) and the port identifier, **vlan-mod-port**, from which the packet is received (circuit ID suboption). The switch forwards the DHCP request that includes the option-82 field to the DHCP server.

When the DHCP server receives the packet, it can use the remote ID, the circuit ID, or both to assign IP addresses and implement policies, such as restricting the number of IP addresses that can be assigned to a single remote ID or a circuit ID. Then the DHCP server echoes the option-82 field in the DHCP reply.

The DHCP server unicasts the reply to the switch if the request was relayed to the server by the switch. When the client and server are on the same subnet, the server broadcasts the reply. The switch inspects the remote ID and possibly the circuit ID fields to verify that it originally inserted the option-82 data. The switch removes the option-82 field and forwards the packet to the switch port that connects to the DHCP host that sent the DHCP request.

Examples

This example shows how to enable DHCP option-82 data insertion:

```
Switch(config)# ip dhcp snooping information option
```

You can verify your settings by entering the **show ip dhcp snooping** user EXEC command.

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP snooping configuration.
show ip dhcp snooping binding	Displays the DHCP snooping binding information.

ip dhcp snooping information option allow-untrusted

Use the **ip dhcp snooping information option allow-untrusted** global configuration command on an aggregation switch to configure it to accept DHCP packets with option-82 information that are received on untrusted ports that might be connected to an edge switch. Use the **no** form of this command to return to the default setting.

ip dhcp snooping information option allow-untrusted

no ip dhcp snooping information option allow-untrusted

Syntax Description

This command has no arguments or keywords.

Defaults

The switch drops DHCP packets with option-82 information that are received on untrusted ports that might be connected to an edge switch.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You might want an edge switch to which a host is connected to insert DHCP option-82 information at the edge of your network. You might also want to enable DHCP security features, such as DHCP snooping, IP source guard, or dynamic Address Resolution Protocol (ARP) inspection, on an aggregation switch. However, if DHCP snooping is enabled on the aggregation switch, the switch drops packets with option-82 information that are received on an untrusted port and does not learn DHCP snooping bindings for connected devices on a trusted interface.

If the edge switch to which a host is connected inserts option-82 information and you want to use DHCP snooping on an aggregation switch, enter the **ip dhcp snooping information option allow-untrusted** command on the aggregation switch. The aggregation switch can learn the bindings for a host even though the aggregation switch receives DHCP snooping packets on an untrusted port. You can also enable DHCP security features on the aggregation switch. The port on the edge switch to which the aggregation switch is connected must be configured as a trusted port.

Note Do not enter the **ip dhcp snooping information option allow-untrusted** command on an aggregation switch to which an untrusted device is connected. If you enter this command, an untrusted device might spoof the option-82 information.

Examples

This example shows how to configure an access switch to not check the option-82 information in untrusted packets from an edge switch and to accept the packets:

```
Switch(config)# ip dhcp snooping information option allow-untrusted
```

You can verify your settings by entering the **show ip dhcp snooping** user EXEC command.

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP snooping configuration.
show ip dhcp snooping binding	Displays the DHCP snooping binding information.

ip dhcp snooping limit rate

Use the **ip dhcp snooping limit rate** interface configuration command to configure the number of DHCP messages an interface can receive per second. Use the **no** form of this command to return to the default setting.

ip dhcp snooping limit rate *rate*

no ip dhcp snooping limit rate

Syntax Description

rate	Number of DHCP messages an interface can receive per second. The range is 1 to 2048.

Defaults

DHCP snooping rate limiting is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Normally, the rate limit applies to untrusted interfaces. If you want to configure rate limiting for trusted interfaces, keep in mind that trusted interfaces might aggregate DHCP traffic on multiple VLANs (some of which might not be snooped) in the switch, and you will need to adjust the interface rate limits to a higher value.

If the rate limit is exceeded, the interface is error-disabled. If you enabled error recovery by entering the **errdisable recovery dhcp-rate-limit** global configuration command, the interface retries the operation again when all the causes have timed out. If the error-recovery mechanism is not enabled, the interface stays in the error-disabled state until you enter the **shutdown** and **no shutdown** interface configuration commands.

Examples

This example shows how to set a message rate limit of 150 messages per second on an interface:

```
Switch(config-if)# ip dhcp snooping limit rate 150
```

You can verify your settings by entering the **show ip dhcp snooping** user EXEC command.

Related Commands

Command	Description
errdisable recovery	Configures the recover mechanism.
show ip dhcp snooping	Displays the DHCP snooping configuration.
show ip dhcp snooping binding	Displays the DHCP snooping binding information.

ip dhcp snooping trust

Use the **ip dhcp snooping trust** interface configuration command to configure a port as trusted for DHCP snooping purposes. Use the **no** form of this command to return to the default setting.

ip dhcp snooping trust

no ip dhcp snooping trust

Syntax Description

This command has no arguments or keywords.

Defaults

DHCP snooping trust is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Configure as trusted ports those that are connected to a DHCP server or to other switches or routers. Configure as untrusted ports those that are connected to DHCP clients.

Examples

This example shows how to enable DHCP snooping trust on a port:

```
Switch(config-if)# ip dhcp snooping trust
```

You can verify your settings by entering the **show ip dhcp snooping** user EXEC command.

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP snooping configuration.
show ip dhcp snooping binding	Displays the DHCP snooping binding information.

ip dhcp snooping verify

Use the **ip dhcp snooping verify** global configuration command to configure the switch to verify on an untrusted port that the source MAC address in a DHCP packet matches the client hardware address. Use the **no** form of this command to configure the switch to not verify the MAC addresses.

ip dhcp snooping verify mac-address

no ip dhcp snooping verify mac-address

Syntax Description

This command has no arguments or keywords.

Defaults

The switch verifies the source MAC address in a DHCP packet that is received on untrusted ports matches the client hardware address in the packet.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

In a service-provider network, when a switch receives a packet from a DHCP client on an untrusted port, it automatically verifies that the source MAC address and the DHCP client hardware address match. If the addresses match, the switch forwards the packet. If the addresses do not match, the switch drops the packet.

Examples

This example shows how to disable the MAC address verification:

```
Switch(config)# no ip dhcp snooping verify mac-address
```

You can verify your settings by entering the **show ip dhcp snooping** user EXEC command.

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP snooping configuration.

ip dhcp snooping vlan

Use the **ip dhcp snooping vlan** global configuration command to enable DHCP snooping on a VLAN. Use the **no** form of this command to return to the default setting.

ip dhcp snooping vlan *vlan-range*

no ip dhcp snooping vlan *vlan-range*

Syntax Description

vlan-range	Specify a VLAN ID or a range of VLANs on which to enable DHCP snooping. The range is 1 to 4094. You can enter a single VLAN ID identified by VLAN ID number, a series of VLAN IDs separated by commas, a range of VLAN IDs separated by hyphens, or a range of VLAN IDs separated by entering the starting and ending VLAN IDs separated by a space.

Defaults

DHCP snooping is disabled on all VLANs.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You must first globally enable DHCP snooping before enabling DHCP snooping on a VLAN.

Examples

This example shows how to enable DHCP snooping on VLAN 10:

```
Switch(config)# ip dhcp snooping vlan 10
```

You can verify your settings by entering the **show ip dhcp snooping** user EXEC command.

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP snooping configuration.
show ip dhcp snooping binding	Displays the DHCP snooping binding information.

ip igmp filter

Use the **ip igmp filter** interface configuration command to control whether or not all hosts on a Layer 2 interface can join one or more IP multicast groups by applying an Internet Group Management Protocol (IGMP) profile to the interface. Use the **no** form of this command to remove the specified profile from the interface.

ip igmp filter *profile number*

no ip igmp filter

Syntax Description

profile number	The IGMP profile number to be applied. The range is 1 to 4294967295.

Defaults

No IGMP filters are applied.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can apply IGMP filters only to Layer 2 physical interfaces; you cannot apply IGMP filters to ports that belong to an EtherChannel group.

An IGMP profile can be applied to one or more switch port interfaces, but one port can have only one profile applied to it.

Examples

This example shows how to apply IGMP profile 22 to a port:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# ip igmp filter 22
```

You can verify your setting by using the **show running-config** privileged EXEC command and by specifying an interface.

Related Commands

Command	Description
ip igmp profile	Configures the specified IGMP profile number.
show running-config interface *interface-id*	Displays the running configuration on the switch interface, including the IGMP profile (if any) that is applied to an interface.

ip igmp max-groups

Use the **ip igmp max-groups** interface configuration command to set the maximum number of Internet Group Management Protocol (IGMP) groups that a Layer 2 interface can join or to configure the IGMP throttling action when the maximum number of entries is in the forwarding table. Use the **no** form of this command to set the maximum back to the default, which is to have no maximum limit, or to return to the default throttling action, which is to drop the report.

ip igmp max-groups {*number* | **action** {**deny** | **replace**}}

no ip igmp max-groups {*number* | **action**}

Syntax Description

number	The maximum number of IGMP groups that an interface can join. The range is 0 to 4294967294. The default is no limit.
action deny	When the maximum number of entries is in the IGMP snooping forwarding table, drop the next IGMP join report. This is the default action.
action replace	When the maximum number of entries is in the IGMP snooping forwarding table, replace the existing group with the new group for which the IGMP report was received.

Defaults

The default maximum number of groups is no limit.

After the switch learns the maximum number of IGMP group entries on an interface, the default throttling action is to drop the next IGMP report that the interface receives and to not add an entry for the IGMP group to the interface.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can use this command only on Layer 2 physical interfaces and on logical EtherChannel interfaces. You cannot set IGMP maximum groups for ports that belong to an EtherChannel group.

Follow these guidelines when configuring the IGMP throttling action:

- If you configure the throttling action as **deny** and set the maximum group limitation, the entries that were previously in the forwarding table are not removed but are aged out. After these entries are aged out, when the maximum number of entries is in the forwarding table, the switch drops the next IGMP report received on the interface.
- If you configure the throttling action as **replace** and set the maximum group limitation, the entries that were previously in the forwarding table are removed. When the maximum number of entries is in the forwarding table, the switch replaces a randomly selected multicast entry with the received IGMP report.
- When the maximum group limitation is set to the default (no maximum), entering the **ip igmp max-groups** {**deny | replace**} command has no effect.

Examples

This example shows how to limit to 25 the number of IGMP groups that a port can join:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# ip igmp max-groups 25
```

This example shows how to configure the switch to replace the existing group with the new group for which the IGMP report was received when the maximum number of entries is in the forwarding table:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# ip igmp max-groups action replace
```

You can verify your setting by using the **show running-config** privileged EXEC command and by specifying an interface.

Related Commands

Command	Description
show running-config interface *interface-id*	Displays the running configuration on the switch interface, including the maximum number of IGMP groups that an interface can join and the throttling action.

ip igmp profile

Use the **ip igmp profile** global configuration command to create an Internet Group Management Protocol (IGMP) profile and enter IGMP profile configuration mode. From this mode, you can specify the configuration of the IGMP profile to be used for filtering IGMP membership reports from a switchport. Use the **no** form of this command to delete the IGMP profile.

ip igmp profile *profile number*

no ip igmp profile *profile number*

Syntax Description

profile number	The IGMP profile number being configured. The range is 1 to 4294967295.

Defaults

No IGMP profiles are defined. When configured, the default action for matching an IGMP profile is to deny matching addresses.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you are in IGMP profile configuration mode, you can create the profile by using these commands:

- **deny**: specifies that matching addresses are denied; this is the default condition.
- **exit**: exits from igmp-profile configuration mode.
- **no**: negates a command or resets to its defaults.
- **permit**: specifies that matching addresses are permitted.
- **range**: specifies a range of IP addresses for the profile. This can be a single IP address or a range with a start and an end address.

  When entering a range, enter the low IP multicast address, a space, and the high IP multicast address.

You can apply an IGMP profile to one or more Layer 2 interfaces, but each interface can have only one profile applied to it.

Examples

This example shows how to configure IGMP profile 40 that permits the specified range of IP multicast addresses:

```
Switch(config)# ip igmp profile 40
Switch(config-igmp-profile)# permit
Switch(config-igmp-profile)# range 233.1.1.1 233.255.255.255
```

You can verify your settings by using the **show ip igmp profile** privileged EXEC command.

Related Commands

Command	Description
ip igmp filter	Applies the IGMP profile to the specified interface.

ip igmp snooping

Use the **ip igmp snooping** global configuration command to globally enable Internet Group Management Protocol (IGMP) snooping on the switch or to enable it on a per-VLAN basis. Use the **no** form of this command to return to the default setting.

ip igmp snooping [**vlan** *vlan-id*]

no ip igmp snooping [**vlan** *vlan-id*]

Syntax Description

vlan *vlan-id*	(Optional) Enable IGMP snooping on the specified VLAN. The range is 1 to 1001 and 1006 to 4094.

Defaults

IGMP snooping is globally enabled on the switch.

IGMP snooping is enabled on VLAN interfaces.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When IGMP snooping is enabled globally, it is enabled in all the existing VLAN interfaces. When IGMP snooping is globally disabled, it is disabled on all the existing VLAN interfaces.

VLAN IDs 1002 to 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in IGMP snooping.

Examples

This example shows how to globally enable IGMP snooping:

```
Switch(config)# ip igmp snooping
```

This example shows how to enable IGMP snooping on VLAN 1:

```
Switch(config)# ip igmp snooping vlan 1
```

You can verify your settings by entering the **show ip igmp snooping** privileged EXEC command.

Related Commands

Command	Description
ip igmp snooping report-suppression	Enables IGMP report suppression.
show ip igmp snooping groups	Displays IGMP snooping multicast information.
show ip igmp snooping mrouter	Displays the IGMP snooping router ports.
show ip igmp snooping querier	Displays the configuration and operation information for the IGMP querier configured on a switch.

ip igmp snooping last-member-query-interval

Use the **ip igmp snooping last-member-query-interval** global configuration command to enable the Internet Group Management Protocol (IGMP) configurable-leave timer globally or on a per-VLAN basis. Use the **no** form of this command to return to the default setting.

ip igmp snooping [**vlan** *vlan-id*] **last-member-query-interval** *time*

no ip igmp snooping [**vlan** *vlan-id*] **last-member-query-interval**

Syntax Description

vlan *vlan-id*	(Optional) Enable IGMP snooping and the leave timer on the specified VLAN. The range is 1 to 1001 and 1006 to 4094.
time	Interval time out in seconds. The range is 100 to 5000 milliseconds.

Defaults

The default timeout setting is 1000 milliseconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When IGMP snooping is globally enabled, IGMP snooping is enabled on all the existing VLAN interfaces. When IGMP snooping is globally disabled, IGMP snooping is disabled on all the existing VLAN interfaces.

VLAN IDs 1002 to 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in IGMP snooping.

Configuring the leave timer on a VLAN overrides the global setting.

The IGMP configurable leave time is only supported on devices running IGMP Version 2.

The configuration is saved in NVRAM.

Examples

This example shows how to globally enable the IGMP leave timer for 2000 milliseconds:

```
Switch(config)# ip igmp snooping last-member-query-interval 2000
```

This example shows how to configure the IGMP leave timer for 3000 milliseconds on VLAN 1:

```
Switch(config)# ip igmp snooping vlan 1 last-member-query-interval 3000
```

You can verify your settings by entering the **show ip igmp snooping** privileged EXEC command.

Related Commands

Command	Description
ip igmp snooping	Enables IGMP snooping on the switch or on a VLAN.
ip igmp snooping vlan immediate-leave	Enables IGMP Immediate-Leave processing.
ip igmp snooping vlan mrouter	Configures a Layer 2 port as a multicast router port.
ip igmp snooping vlan static	Configures a Layer 2 port as a member of a group.
show ip igmp snooping	Displays the IGMP snooping configuration.

ip igmp snooping querier

Use the **ip igmp snooping querier** global configuration command to globally enable the Internet Group Management Protocol (IGMP) querier function in Layer 2 networks. Use the command with keywords to enable and configure the IGMP querier feature on a VLAN interface. Use the **no** form of this command to return to the default settings.

ip igmp snooping querier [**vlan** *vlan-id*] [**address** *ip-address* | **max-response-time** *response-time* | **query-interval** *interval-count* | **tcn query** [**count** *count* | **interval** *interval*] | **timer expiry** | **version** *version*]

no ip igmp snooping querier [**vlan** *vlan-id*] [**address | max-response-time | query-interval | tcn query** { **count** *count* | **interval** *interval*} | **timer expiry | version**]

Syntax Description

vlan *vlan-id*	(Optional) Enable IGMP snooping and the IGMP querier function on the specified VLAN. The range is 1 to 1001 and 1006 to 4094.
address *ip-address*	(Optional) Specify a source IP address. If you do not specify an IP address, the querier tries to use the global IP address configured for the IGMP querier.
max-response-time *response-time*	(Optional) Set the maximum time to wait for an IGMP querier report. The range is 1 to 25 seconds.
query-interval *interval-count*	(Optional) Set the interval between IGMP queriers. The range is 1 to 18000 seconds.
tcn query[count *count* **| interval** *interval*]	(Optional) Set parameters related to Topology Change Notifications (TCNs). The keywords have these meanings: • **count** *count*—Set the number of TCN queries to be executed during the TCN interval time. The range is 1 to 10. • **interval** *interval*—Set the TCN query interval time. The range is 1 to 255.
timer expiry	(Optional) Set the length of time until the IGMP querier expires. The range is 60 to 300 seconds.
version *version*	(Optional) Select the IGMP version number that the querier feature uses. Select 1 or 2.

Defaults

The IGMP snooping querier feature is globally disabled on the switch.

When enabled, the IGMP snooping querier disables itself if it detects IGMP traffic from a multicast-enabled device.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this command to enable IGMP snooping to detect the IGMP version and IP address of a device that sends IGMP query messages, which is also called a *querier.*

By default, the IGMP snooping querier is configured to detect devices that use IGMP *Version 2* (IGMPv2) but does not detect clients that are using IGMP *Version 1* (IGMPv1). You can manually configure the **max-response-time** value when devices use IGMPv2. You cannot configure the **max-response-time** when devices use IGMPv1. (The value cannot be configured and is set to zero).

Non-RFC compliant devices running IGMPv1 might reject IGMP general query messages that have a non-zero value as the **max-response-time** value. If you want the devices to accept the IGMP general query messages, configure the IGMP snooping querier to run IGMPv1.

VLAN IDs 1002 to 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in IGMP snooping.

Examples

This example shows how to globally enable the IGMP snooping querier feature:

```
Switch(config)# ip igmp snooping querier
```

This example shows how to set the IGMP snooping querier maximum response time to 25 seconds:

```
Switch(config)# ip igmp snooping querier max-response-time 25
```

This example shows how to set the IGMP snooping querier interval time to 60 seconds:

```
Switch(config)# ip igmp snooping querier query-interval 60
```

This example shows how to set the IGMP snooping querier TCN query count to 25:

```
Switch(config)# ip igmp snooping querier tcn count 25
```

This example shows how to set the IGMP snooping querier timeout to 60 seconds:

```
Switch(config)# ip igmp snooping querier timeout expiry 60
```

This example shows how to set the IGMP snooping querier feature to version 2:

```
Switch(config)# ip igmp snooping querier version 2
```

You can verify your settings by entering the **show ip igmp snooping** privileged EXEC command.

Related Commands

Command	Description
ip igmp snooping report-suppression	Enables IGMP report suppression.
show ip igmp snooping	Displays the IGMP snooping configuration.
show ip igmp snooping groups	Displays IGMP snooping multicast information.
show ip igmp snooping mrouter	Displays the IGMP snooping router ports.

ip igmp snooping report-suppression

Use the **ip igmp snooping report-suppression** global configuration command to enable Internet Group Management Protocol (IGMP) report suppression. Use the **no** form of this command to disable IGMP report suppression and to forward all IGMP reports to multicast routers.

ip igmp snooping report-suppression

no ip igmp snooping report-suppression

Syntax Description

This command has no arguments or keywords.

Defaults

IGMP report suppression is enabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

IGMP report suppression is supported only when the multicast query has IGMPv1 and IGMPv2 reports. This feature is not supported when the query includes IGMPv3 reports.

The switch uses IGMP report suppression to forward only one IGMP report per multicast router query to multicast devices. When IGMP router suppression is enabled (the default), the switch sends the first IGMP report from all hosts for a group to all the multicast routers. The switch does not send the remaining IGMP reports for the group to the multicast routers. This feature prevents duplicate reports from being sent to the multicast devices.

If the multicast router query includes requests only for IGMPv1 and IGMPv2 reports, the switch forwards only the first IGMPv1 or IGMPv2 report from all hosts for a group to all the multicast routers. If the multicast router query also includes requests for IGMPv3 reports, the switch forwards all IGMPv1, IGMPv2, and IGMPv3 reports for a group to the multicast devices.

If you disable IGMP report suppression by entering the **no ip igmp snooping report-suppression** command, all IGMP reports are forwarded to all the multicast routers.

Examples

This example shows how to disable report suppression:

```
Switch(config)# no ip igmp snooping report-suppression
```

You can verify your settings by entering the **show ip igmp snooping** privileged EXEC command.

Related Commands

Command	Description
ip igmp snooping	Enables IGMP snooping on the switch or on a VLAN.
show ip igmp snooping	Displays the IGMP snooping configuration of the switch or the VLAN.

ip igmp snooping tcn

Use the **ip igmp snooping tcn** global configuration command to configure the Internet Group Management Protocol (IGMP) Topology Change Notification (TCN) behavior. Use the **no** form of this command to return to the default settings.

ip igmp snooping tcn {**flood query count** *count* | **query solicit**}

no ip igmp snooping tcn {**flood query count** | **query solicit**}

Syntax Description

flood query count *count*	Specify the number of IGMP general queries for which the multicast traffic is flooded. The range is 1 to 10.
query solicit	Send an IGMP leave message (global leave) to speed the process of recovering from the flood mode caused during a TCN event.

Defaults

The TCN flood query count is 2.

The TCN query solicitation is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use **ip igmp snooping tcn flood query count** global configuration command to control the time that multicast traffic is flooded after a TCN event. If you set the TCN flood query count to 1 by using the **ip igmp snooping tcn flood query count** command, the flooding stops after receiving 1 general query. If you set the count to 7, the flooding of multicast traffic due to the TCN event lasts until 7 general queries are received. Groups are relearned based on the general queries received during the TCN event.

Use the **ip igmp snooping tcn query solicit** global configuration command to enable the switch to send the global leave message whether or not it is the spanning-tree root. This command also speeds the process of recovering from the flood mode caused during a TCN event.

Examples

This example shows how to specify 7 as the number of IGMP general queries for which the multicast traffic is flooded:

```
Switch(config)# no ip igmp snooping tcn flood query count 7
```

You can verify your settings by entering the **show ip igmp snooping** privileged EXEC command.

Related Commands

Command	Description
ip igmp snooping	Enables IGMP snooping on the switch or on a VLAN.
ip igmp snooping tcn flood	Specifies flooding on an interface as the IGMP snooping spanning-tree TCN behavior.
show ip igmp snooping	Displays the IGMP snooping configuration of the switch or the VLAN.

ip igmp snooping tcn flood

Use the **ip igmp snooping tcn flood** interface configuration command to specify multicast flooding as the Internet Group Management Protocol (IGMP) snooping spanning-tree Topology Change Notification (TCN) behavior. Use the **no** form of this command to disable the multicast flooding.

ip igmp snooping tcn flood

no ip igmp snooping tcn flood

Syntax Description

This command has no arguments or keywords.

Defaults

Multicast flooding is enabled on an interface during a spanning-tree TCN event.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When the switch receives a TCN, multicast traffic is flooded to all the ports until two general queries are received. If the switch has many ports with attached hosts that are subscribed to different multicast groups, the flooding might exceed the capacity of the link and cause packet loss.

You can change the flooding query count by using the **ip igmp snooping tcn flood query count** *count* global configuration command.

Examples

This example shows how to disable the multicast flooding on an interface:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# no ip igmp snooping tcn flood
```

You can verify your settings by entering the **show ip igmp snooping** privileged EXEC command.

Related Commands

Command	Description
ip igmp snooping	Enables IGMP snooping on the switch or on a VLAN.
ip igmp snooping tcn	Configures the IGMP TCN behavior on the switch.
show ip igmp snooping	Displays the IGMP snooping configuration of the switch or the VLAN.

ip igmp snooping vlan immediate-leave

Use the **ip igmp snooping immediate-leave** global configuration command to enable Internet Group Management Protocol (IGMP) snooping immediate-leave processing on a per-VLAN basis. Use the **no** form of this command to return to the default setting.

ip igmp snooping vlan *vlan-id* **immediate-leave**

no ip igmp snooping vlan *vlan-id* **immediate-leave**

Syntax Description

vlan-id	Enable IGMP snooping and the Immediate-Leave feature on the specified VLAN. The range is 1 to 1001 and 1006 to 4094.

Defaults

IGMP immediate-leave processing is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

VLAN IDs 1002 to 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in IGMP snooping.

You should configure the Immediate- Leave feature only when there is a maximum of one receiver on every port in the VLAN. The configuration is saved in NVRAM.

The Immediate-Leave feature is supported only with IGMP Version 2 hosts.

Examples

This example shows how to enable IGMP immediate-leave processing on VLAN 1:

```
Switch(config)# ip igmp snooping vlan 1 immediate-leave
```

You can verify your settings by entering the **show ip igmp snooping** privileged EXEC command.

Related Commands

Command	Description
ip igmp snooping report-suppression	Enables IGMP report suppression.
show ip igmp snooping	Displays the snooping configuration.
show ip igmp snooping groups	Displays IGMP snooping multicast information.
show ip igmp snooping mrouter	Displays the IGMP snooping router ports.
show ip igmp snooping querier	Displays the configuration and operation information for the IGMP querier configured on a switch.

ip igmp snooping vlan mrouter

Use the **ip igmp snooping mrouter** global configuration command to add a multicast router port or to configure the multicast learning method. Use the **no** form of this command to return to the default settings.

ip igmp snooping vlan *vlan-id* **mrouter** {**interface** *interface-id* | **learn** {**cgmp** | **pim-dvmrp**}}

no ip igmp snooping vlan *vlan-id* **mrouter** {**interface** *interface-id* | **learn** {**cgmp** | **pim-dvmrp**}}

Syntax Description

vlan-id	Enable IGMP snooping, and add the port in the specified VLAN as the multicast router port. The range is 1 to 1001 and 1006 to 4094.
interface *interface-id*	Specify the next-hop interface to the multicast router. The keywords have these meanings: • **fastethernet** *interface number*—a Fast Ethernet IEEE 802.3 interface. • **gigabitethernet** *interface number*—a Gigabit Ethernet IEEE 802.3z interface. • **port-channel** *interface number*—a channel interface. The range is 0 to6.
learn {**cgmp** | **pim-dvmrp**}	Specify the multicast router learning method. The keywords have these meanings: • **cgmp**—Set the switch to learn multicast router ports by snooping on Cisco Group Management Protocol (CGMP) packets. • **pim-dvmrp**—Set the switch to learn multicast router ports by snooping on IGMP queries and Protocol-Independent Multicast-Distance Vector Multicast Routing Protocol (PIM-DVMRP) packets.

Defaults

By default, there are no multicast router ports.

The default learning method is **pim-dvmrp**—to snoop IGMP queries and PIM-DVMRP packets.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

VLAN IDs 1002 to 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in IGMP snooping.

The CGMP learn method is useful for reducing control traffic.

The configuration is saved in NVRAM.

Examples

This example shows how to configure a port as a multicast router port:

```
Switch(config)# ip igmp snooping vlan 1 mrouter interface gigabitethernet0/22
```

This example shows how to specify the multicast router learning method as CGMP:

```
Switch(config)# ip igmp snooping vlan 1 mrouter learn cgmp
```

You can verify your settings by entering the **show ip igmp snooping** privileged EXEC command.

Related Commands

Command	Description
ip igmp snooping report-suppression	Enables IGMP report suppression.
show ip igmp snooping	Displays the snooping configuration.
show ip igmp snooping groups	Displays IGMP snooping multicast information.
show ip igmp snooping mrouter	Displays the IGMP snooping router ports.
show ip igmp snooping querier	Displays the configuration and operation information for the IGMP querier configured on a switch.

ip igmp snooping vlan static

Use the **ip igmp snooping static** global configuration command to enable Internet Group Management Protocol (IGMP) snooping and to statically add a Layer 2 port as a member of a multicast group. Use the **no** form of this command to remove ports specified as members of a static multicast group.

ip igmp snooping vlan *vlan-id* **static** *ip-address* **interface** *interface-id*

no ip igmp snooping vlan *vlan-id* **static** *ip-address* **interface** *interface-id*

Syntax Description

vlan-id	Enable IGMP snooping on the specified VLAN. The range is 1 to 1001 and 1006 to 4094.
ip-address	Add a Layer 2 port as a member of a multicast group with the specified group IP address.
interface *interface-id*	Specify the interface of the member port. The keywords have these meanings: • **fastethernet** *interface number*—a Fast Ethernet IEEE 802.3 interface. • **gigabitethernet** *interface number*—a Gigabit Ethernet IEEE 802.3z interface. • **port-channel** *interface number*—a channel interface. The range is 0 to 6.

Defaults

By default, there are no ports statically configured as members of a multicast group.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

VLAN IDs 1002 to 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in IGMP snooping.

The configuration is saved in NVRAM.

Examples

This example shows how to statically configure a host on an interface:

```
Switch(config)# ip igmp snooping vlan 1 static 0100.5e02.0203 interface gigabitethernet0/1
Configuring port gigabitethernet0/1 on group 0100.5e02.0203
```

You can verify your settings by entering the **show ip igmp snooping** privileged EXEC command.

Related Commands

Command	Description
ip igmp snooping report-suppression	Enables IGMP report suppression.
show ip igmp snooping	Displays the snooping configuration.
show ip igmp snooping groups	Displays IGMP snooping multicast information.
show ip igmp snooping mrouter	Displays the IGMP snooping router ports.
show ip igmp snooping querier	Displays the configuration and operation information for the IGMP querier configured on a switch.

ip ssh

Use the **ip ssh** global configuration command to configure the switch to run Secure Shell (SSH) Version 1 or SSH Version 2. This command is available only when your switch is running the cryptographic (encrypted) software image. Use the **no** form of this command to return to the default setting.

ip ssh version [**1** | **2**]

no ip ssh version [**1** | **2**]

Syntax Description

1	(Optional) Configure the switch to run SSH Version 1 (SSHv1).
2	(Optional) Configure the switch to run SSH Version 2 (SSHv2).

Defaults

The default version is the latest SSH version supported by the SSH client.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you do not enter this command or if you do not specify a keyword, the SSH server selects the latest SSH version supported by the SSH client. For example, if the SSH client supports SSHv1 and SSHv2, the SSH server selects SSHv2.

The switch supports an SSHv1 or an SSHv2 server. It also supports an SSHv1 client. For more information about the SSH server and the SSH client, see the software configuration guide for this release.

A Rivest, Shamir, and Adelman (RSA) key pair generated by an SSHv1 server can be used by an SSHv2 server and the reverse.

Examples

This example shows how to configure the switch to run SSH Version 2:

```
Switch(config)# ip ssh version 2
```

You can verify your settings by entering the **show ip ssh** or **show ssh** privileged EXEC command.

Related Commands

Command	Description
show ip ssh	Displays if the SSH server is enabled and displays the version and configuration information for the SSH server.
show ssh	Displays the status of the SSH server.

ipv6 mld snooping

Use the **ipv6 mld snooping** global configuration command without keywords to enable IPv6 Multicast Listener Discovery (MLD) snooping globally or on the specified VLAN. Use the **no** form of this command to disable MLD snooping on the switch or the VLAN.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

ipv6 mld snooping [**vlan** *vlan-id*]

no ipv6 mld snooping [**vlan** *vlan-id*]

Syntax Description

vlan *vlan-id*	(Optional) Enable or disable IPv6 MLD snooping on the specified VLAN. The VLAN ID range is from 1 to 1001 and 1006 to 4094.

Defaults

MLD snooping is globally disabled on the switch.

MLD snooping is enabled on all VLANs. However, MLD snooping must be globally enabled before VLAN snooping can take place.

Command Modes

Global configuration.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 default** global configuration command and reload the switch.

When MLD snooping is globally disabled, it is disabled on all the existing VLAN interfaces. When you globally enable MLD snooping, it is enabled on all VLAN interfaces that are in the default state (enabled). VLAN configuration overrides global configuration on interfaces where MLD snooping is disabled.

If MLD snooping is globally disabled you cannot enable it on a VLAN. If MLD snooping is globally enabled, you can disable it on individual VLANs.

Examples

This example shows how to globally enable MLD snooping:

```
DomainMember(config)# ipv6 mld snooping
```

This example shows how to disable MLD snooping on a VLAN:

```
DomainMember(config)# no ipv6 mld snooping vlan 11
```

You can verify your settings by entering the **show ipv6 mld snooping** user EXEC command.

Related Commands

Command	Description
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to allow both IPv4 and IPv6 traffic.
show ipv6 mld snooping	Displays MLD snooping configuration, in the user EXEC mode.

ipv6 mld snooping last-listener-query-count

Use the **ipv6 mld snooping last-listener-query-count** global configuration command to configure IPv6 Multicast Listener Discovery Mulitcast Address Specific Queries (MASQs) that are sent before aging out a client. Use the **no** form of this command to reset the query count to its default settings.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

ipv6 mld snooping [**vlan** *vlan-id*] **last-listener-query-count** *integer_value*

no ipv6 mld snooping [**vlan** *vlan-id*] **last-listener-query-count**

Syntax Description

vlan *vlan-id*	(Optional) Configure last-listener query count on the specified VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
last-listener-query-count *integer_value*	The range is from 1 to 7.

Command Default

The global count is 2.

The VLAN count is 0 (the global count is used).

Command Modes

Global configuration.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 default** global configuration command and reload the switch.

In MLD snooping, the IPv6 multicast router periodically sends out queries to hosts belonging to the multicast group. If a host wants to leave a multicast group, it can simply leave or it can respond to the query with a Multicast Listener Done message (equivalent to an IGMP Leave message). When Immediate Leave is not configured (which is the case if multiple clients for a group exist on the same port), the configured last-listener query count determines the number of MASQs that are sent before an MLD client is aged out.

When the last-listener query count is set for a VLAN, this count overrides the value configured globally. When the VLAN count is not configured (set to default 0), the global count is used.

VLAN numbers 1002 through 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in MLD snooping.

Examples

This example shows how to globally set the last-listener query count:

```
Switch(config)# ipv6 mld snooping last-listener-query-count 1
```

This example shows how to set the last-listener query count for VLAN 10:

```
Switch(config)# ipv6 mld snooping vlan 10 last-listener-query-count 3
```

To verify your settings, use **show ipv6 mld snooping** [**vlan** *vlan-id*] user EXEC command.

Related Commands

Command	Description
ipv6 mld snooping last-listener-query-interval	Sets IPv6 MLD snooping last-listener query interval.
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to allow both IPv4 and IPv6 traffic.
show ipv6 mld snooping querier	Displays MLD snooping configuration.

ipv6 mld snooping last-listener-query-interval

Use the **ipv6 mld snooping last-listener-query-interval** global configuration command to configure IPv6 Multicast Listener Discovery (MLD) snooping last-listener query interval on the switch or on a VLAN. This time interval is the maximum time that a multicast router waits after issuing a Mulitcast Address Specific Query (MASQ) before deleting a port from the multicast group. Use the **no** form of this command to reset the query time to the default settings.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

ipv6 mld snooping [**vlan** *vlan-id*] **last-listener-query-interval** *integer_value*

no ipv6 mld snooping [**vlan** *vlan-id*] **last-listener-query-interval**

Syntax Description

vlan *vlan-id*	(Optional) Configure last-listener query interval on the specified VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
last-listener-query-interval *integer_value*	Set the time period (in thousands of a second) that a multicast router has to wait after issuing an MASQ before deleting a port from the multicast group. The range is 100 to 32,768. The default is 1000 (1 second),

Command Default

The global query interval (maximum response time) is 1000 (1 second).

The VLAN query interval (maximum response time) is 0 (the global count is used).

Command Modes

Global configuration.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 default** global configuration command and reload the switch.

In MLD snooping, when the IPv6 multicast router receives an MLD leave message, it sends out queries to hosts belonging to the multicast group. If there are no responses from a port to an MASQ for a length of time, the router deletes the port from the membership database of the multicast address. The last listener query interval is the maximum time that the router waits before deleting a nonresponsive port from the multicast group.

When a VLAN query interval is set it overrides the global query interval. When the VLAN interval is set at 0, the global value is used.

VLAN numbers 1002 through 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in MLD snooping.

Examples

This example shows how to globally set the last-listener query interval to 2 seconds:

```
Switch(config)# ipv6 mld snooping last-listener-query-interval 2000
```

This example shows how to set the last-listener query interval for VLAN 1 to 5.5 seconds:

```
Switch (config)# ipv6 mld snooping vlan 1 last-listener-query-interval 5500
```

You can verify your settings by entering the **show ipv6 MLD snooping** [**vlan** *vlan-id*] user EXEC command.

Related Commands

Command	Description
ipv6 mld snooping last-listener-query-count	Sets IPv6 MLD snooping last-listener query count.
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to allow both IPv4 and IPv6 traffic.
show ipv6 mld snooping querier	Sets IPv6 MLD snooping last-listener query interval.

ipv6 mld snooping listener-message-suppression

Use the **ipv6 mld snooping listener-message-suppression** global configuration command to enable IPv6 Multicast Listener Discovery (MLD) snooping listener message suppression. Use the **no** form of this command to disable MLD snooping listener message suppression.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

ipv6 mld snooping listener-message-suppression

no ipv6 mld snooping listener-message-suppression

Command Default

MLD snooping listener message suppression is disabled.

Command Modes

Global configuration.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 default** global configuration command and reload the switch.

MLD snooping listener message suppression is equivalent to IGMP snooping report suppression. When enabled, MLDv1 reports that a group receives are forwarded to IPv6 multicast routers only once in every report-forward time. This prevents the forwarding of duplicate reports.

Examples

This example shows how to enable MLD snooping listener-message-suppression:

```
Switch(config)# ipv6 mld snooping listener-message-suppression
```

This example shows how to disable MLD snooping listener-message-suppression:

```
Switch(config)# no ipv6 mld snooping listener-message-suppression
```

To verify your settings use the **show ipv6 mld snooping** [**vlan** *vlan-id*] user EXEC command.

Related Commands

Command	Description
ipv6 mld snooping	Enables IPv6 MLD snooping.
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to allow both IPv4 and IPv6 traffic.
show ipv6 mld snooping	Displays MLD snooping configuration.

ipv6 mld snooping robustness-variable

Use the **ipv6 mld snooping robustness-variable** global configuration command to configure the number of IPv6 Multicast Listener Discovery (MLD) queries that the switch sends before deleting a listener that does not respond or enter a VLAN ID to configure on a per-VLAN basis. Use the **no** form of this command to reset the variable to the default settings.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

ipv6 mld snooping [**vlan** *vlan-id*] **robustness-variable** *integer_value*

no ipv6 mld snooping [**vlan** *vlan-id*] **robustness-variable**

Syntax Description

vlan *vlan-id*	(Optional) Configure the robustness variable on the specified VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
integer_value	The range is from 1 to 3.

Command Default

The global robustness variable (number of queries before deleting a listener) is 2.

The VLAN robustness variable (number of queries before aging out a multicast address) is 0, which means that the system uses the global robustness variable for aging out the listener.

Command Modes

Global configuration.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 default** global configuration command and reload the switch.

Robustness is measured in terms of the number of MLDv1 queries sent with no response before a port is removed from a multicast group. A port is deleted when the configured number of MLDv1 queries do not receive any MLDv1 reports. The global value determines the number of queries that the switch waits for before deleting a listener that does not respond and applies to all VLANs that do not have a VLAN value set.

The robustness value configured for a VLAN overrides the global value. If the VLAN robustness value is 0 (the default), the global value is used.

VLAN numbers 1002 through 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in MLD snooping.

Examples

This example shows how to configure the global robustness variable so that the switch sends out three queries before it deletes a listener port that does not respond:

```
Switch(config)# ipv6 mld snooping robustness-variable 3
```

This example shows how to configure the robustness variable for VLAN 1. This value overrides the global configuration for the VLAN:

```
Switch(config)# ipv6 mld snooping vlan 1 robustness-variable 1
```

To verify your settings use the **show ipv6 MLD snooping** [**vlan** *vlan-id*] user EXEC command.

Related Commands

Command	Description
ipv6 mld snooping last-listener-query-count	Sets IPv6 MLD snooping last-listener query count.
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to allow both IPv4 and IPv6 traffic.
show ipv6 mld snooping	Displays MLD snooping configuration.

ipv6 mld snooping tcn

Use the **ipv6 mld snooping tcn** global configuration commands to configure IP version 6 (IPv6) Multicast Listener Discovery (MLD) Topology Change Notifications (TCNs). Use the **no** form of the commands to reset the default settings.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

ipv6 mld snooping tcn {**flood query count** *integer_value* | **query solicit**}

no ipv6 mld snooping tcn {**flood query count** *integer_value* | **query solicit**}

Syntax Description

flood query count *integer_value*	Set the flood query count, which is the number of queries that are sent before forwarding multicast data to only those ports requesting to receive it. The range is 1 to 10.
query solicit	Enable soliciting of TCN queries.

Command Default

TCN query soliciting is disabled.

When enabled, the default flood query count is 2.

Command Modes

Global configuration.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 default** global configuration command and reload the switch.

Examples

This example shows how to enable TCN query soliciting:

```
Switch(config)# ipv6 mld snooping tcn query solicit.
```

This example shows how to set the flood query count to 5:

```
Switch(config)# ipv6 mld snooping tcn flood query count 5.
```

To verify your settings use the **show ipv6 MLD snooping** [**vlan** *vlan-id*] user EXEC command.

Related Commands

Command	Description
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to allow both IPv4 and IPv6 traffic.
show ipv6 mld snooping	Displays MLD snooping configuration.

ipv6 mld snooping vlan

Use the **ipv6 mld snooping vlan** global configuration command to configure IPv6 Multicast Listener Discovery (MLD) snooping parameters on the VLAN interface. Use the **no** form of this command to reset the parameters to their default settings.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

ipv6 mld snooping vlan *vlan-id* [**immediate-leave** | **last-listener-query-count** **last-listener-query-interval** *integer_value* | **mrouter interface** *interface number* | **robustness-variable** *integer_value* | **static** *ipv6-multicast-address* **interface** *interface-id*]

no ipv6 mld snooping vlan *vlan-id* [**immediate-leave** | **last-listener-query-count** **last-listener-query-interval** *integer_value* | **mrouter interface** *interface number* | **robustness-variable** *integer_value* | **static** *ipv6-multicast-address* **interface** *interface-id*]

Syntax Description

vlan *vlan-id*	Specify a VLAN number. The range is 1 to 1001 and 1006 to 4094.
immediate-leave	(Optional) Enable MLD Immediate-Leave processing on a VLAN interface. Use the **no** form of the command to disable the Immediate Leave feature on the interface.
last-listener-query-interval *integer_value*	Set the time period (in thousands of a second) that a multicast router has to wait for after issuing an MASQ, before deleting a port from the multicast group. The range is 100 to 32,768. The default is 1000 (1 second),
last-listener-query-count *integer_value*	Configure last-listener query count on the specified VLAN. The range is from 1 to 7.
mrouter interface	(Optional) Configure a multicast router port. The **no** form of the command removes the configuration.
robustness-variable *integer_value*	The range is from 1 to 3.
static *ipv6-multicast-address*	(Optional) Configure a multicast group with the specified IPv6 multicast address.
interface *interface-id*	Add a Layer 2 port to the group. The mrouter or static interface can be a physical port or a **port-channel** interface in the range of 1 to 48.

Command Default

MLD snooping Immediate-Leave processing is disabled.

There are no static IPv6 multicast groups.

There are no multicast router ports.

Command Modes

Global configuration.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 default** global configuration command and reload the switch.

You should configure the Immediate-Leave function when there is only one receiver on every port in the VLAN. The configuration is saved in NVRAM.

The **static** keyword is used to configure the MLD member ports statically.

The configuration, the static ports, and groups are saved in NVRAM.

Examples

This example shows how to enable MLD Immediate-Leave processing on VLAN 1:

```
Switch(config)# ipv6 mld snooping vlan 1 immediate-leave
```

This example shows how to disable MLD Immediate-Leave processing on VLAN 1:

```
Switch(config)# no ipv6 mld snooping vlan 1 immediate-leave
```

This example shows how to configure a port as a multicast router port:

```
Switch(config)# ipv6 mld snooping vlan 1 mrouter interface gigabitethernet1/01/2
```

This example shows how to configure a static multicast group:

```
Switch(config)# ipv6 mld snooping vlan 2 static FF12::34 interface gigabitethernet1/01/2
```

To verify your settings use the **show ipv6 mld snooping vlan** *vlan-id* user EXEC command.

Related Commands

Command	Description
ipv6 mld snooping	Enables IPv6 MLD snooping.
ipv6 mld snooping vlan	Configures IPv6 MLD snooping on the VLAN.
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to allow both IPv4 and IPv6 traffic.
show ipv6 mld snooping	Displays IPv6 MLD snooping configuration.

lacp port-priority

Use the **lacp port-priority** interface configuration command to configure the port priority for the Link Aggregation Control Protocol (LACP). Use the **no** form of this command to return to the default setting.

lacp port-priority *priority*

no lacp port-priority

Syntax Description

priority	Port priority for LACP. The range is 1 to 65535.

Defaults

The default is 32768.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **lacp port-priority** interface configuration command determines which ports are bundled and which ports are put in hot-standby mode when there are more than eight ports in an LACP channel group.

An LACP channel group can have up to 16 Ethernet ports of the same type. Up to eight ports can be active, and up to eight ports can be in standby mode.

In port-priority comparisons, a numerically *lower* value has a *higher* priority: When there are more than eight ports in an LACP channel-group, the eight ports with the numerically lowest values (highest priority values) for LACP port priority are bundled into the channel group, and the lower-priority ports are put in hot-standby mode. If two or more ports have the same LACP port priority (for example, they are configured with the default setting of 65535) an internal value for the port number determines the priority.

Note The LACP port priorities are only effective if the ports are on the switch that controls the LACP link. See the **lacp system-priority** global configuration command for determining which switch controls the link.

Use the **show lacp internal** privileged EXEC command to display LACP port priorities and internal port number values.

For information about configuring LACP on physical ports, see the “Configuring EtherChannels” chapter in the software configuration guide for this release.

Examples

This example shows how to configure the LACP port priority on a port:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# lacp port-priority 1000
```

You can verify your settings by entering the **show lacp** [*channel-group-number*] **internal** privileged EXEC command.

Related Commands

Command	Description
channel-group	Assigns an Ethernet port to an EtherChannel group.
lacp system-priority	Configures the LACP system priority.
show lacp [*channel-group-number*] **internal**	Displays internal information for all channel groups or for the specified channel group.

lacp system-priority

Use the **lacp system-priority** global configuration command to configure the system priority for the Link Aggregation Control Protocol (LACP). Use the **no** form of this command to return to the default setting.

lacp system-priority *priority*

no lacp system-priority

Syntax Description

priority	System priority for LACP. The range is 1 to 65535.

Defaults

The default is 32768.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **lacp system-priority** command determines which switch in an LACP link controls port priorities.

An LACP channel group can have up to 16 Ethernet ports of the same type. Up to eight ports can be active, and up to eight ports can be in standby mode. When there are more than eight ports in an LACP channel-group, the switch on the controlling end of the link uses port priorities to determine which ports are bundled into the channel and which ports are put in hot-standby mode. Port priorities on the other switch (the noncontrolling end of the link) are ignored.

In priority comparisons, numerically lower values have higher priority. Therefore, the system with the numerically lower value (higher priority value) for LACP system priority becomes the controlling system. If both switches have the same LACP system priority (for example, they are both configured with the default setting of 32768), the LACP system ID (the switch MAC address) determines which switch is in control.

The **lacp system-priority** command applies to all LACP EtherChannels on the switch.

Use the **show etherchannel summary** privileged EXEC command to see which ports are in the hot-standby mode (denoted with an H port-state flag in the output display).

For more information about configuring LACP on physical ports, see the “Configuring EtherChannels” chapter in the software configuration guide for this release.

Examples

This example shows how to set the LACP system priority:

```
Switch(config)# lacp system-priority 20000
```

You can verify your settings by entering the **show lacp sys-id** privileged EXEC command.

Related Commands

Command	Description
channel-group	Assigns an Ethernet port to an EtherChannel group.
lacp port-priority	Configures the LACP port priority.
show lacp sys-id	Displays the system identifier that is being used by LACP.

location (global configuration)

Use the **location** global configuration command to configure location information for an endpoint. Use the **no** form of this command to remove the location information.

location {**admin-tag** *string* | **civic-location identifier** *id* | **elin-location** *string* **identifier** *id*}

no location {**admin-tag** *string* | **civic-location identifier** *id* | **elin-location** *string* **identifier** *id*}

Syntax Description

admin-tag	Configure administrative tag or site information.
civic-location	Configure civic location information.
elin-location	Configure emergency location information (ELIN).
identifier *id*	Specify the ID for the civic location or the elin location. The ID range is 1 to 4095. **Note** The identifier for the civic location in the LLDP-MED TLV is limited to 250 bytes or less. To avoid error messages about available buffer space during switch configuration, be sure that the total length of all civic-location information specified for each civic-location identifier does not exceed 250 bytes.
string	Specify the site or location information in alphanumeric format.

Defaults

This command has no default setting.

Command Modes

Global configuration

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

After entering the **location civic-location identifier** *id* global configuration command, you enter civic location configuration mode. In this mode, you can enter the civic location and the postal location information.

The civic-location identifier must not exceed 250 bytes.

Use the **no lldp med-tlv-select location** information interface configuration command to disable the location TLV. The location TLV is enabled by default. For more information, see the "Configuring LLDP and LLDP-MED" chapter of the software configuration guide for this release.

Examples

This example shows how to configure civic location information on the switch:

```
Switch(config)# location civic-location identifier 1
Switch(config-civic)# number 3550
Switch(config-civic)# primary-road-name "Cisco Way"
Switch(config-civic)# city "San Jose"
Switch(config-civic)# state CA
Switch(config-civic)# building 19
Switch(config-civic)# room C6
Switch(config-civic)# county "Santa Clara"
Switch(config-civic)# country US
Switch(config-civic)# end
```

You can verify your settings by entering the **show location civic-location** privileged EXEC command.
This example shows how to configure the emergency location information on the switch:

```
Switch (config)# location elin-location 14085553881 identifier 1
```

You can verify your settings by entering the **show location elin** privileged EXEC command.

Related Commands

Command	Description
location (interface configuration)	Configures the location information for an interface.
show location	Displays the location information for an endpoint.

location (interface configuration)

Use the **location** interface command to enter location information for an interface. Use the **no** form of this command to remove the interface location information.

location {**additional-location-information** *word* | **civic-location-id** *id* | **elin-location-id** *id*}

no location {**additional-location-information** *word* | **civic-location-id** *id* | **elin-location-id** *id*}

Syntax Description

additional-location-information	Configure additional information for a location or place.
word	Specify a word or phrase that provides additional location information.
civic-location-id	Configure global civic location information for an interface.
elin-location-id	Configure emergency location information for an interface.
id	Specify the ID for the civic location or the elin location. The ID range is 1 to 4095. **Note** The identifier for the civic location in the LLDP-MED TLV is limited to 250 bytes or less. To avoid error messages about available buffer space during switch configuration, be sure that the total length of all civic-location information specified for each civic-location ID does not exceed 250 bytes.

Defaults

This command has no default setting.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

After entering the **location civic-location-id** *id* interface configuration command, you enter civic location configuration mode. In this mode, you can enter the additional location information.

The civic-location identifier must not exceed 250 bytes.

Examples

These examples show how to enter civic location information for an interface:

```
Switch(config-if)# interface gigabitethernet0/1
Switch(config-if)# location civic-location-id 1
Switch(config-if)# end
```

You can verify your settings by entering the **show location civic interface** privileged EXEC command.

This example shows how to enter emergency location information for an interface:

```
Switch(config-if)# interface gigabitethernet0/1
Switch(config-if)# location elin-location-id 1
Switch(config-if)# end
```

You can verify your settings by entering the **show location elin interface** privileged EXEC command.

Related Commands

Command	Description
location (global configuration)	Configures the location information for an endpoint.
show location	Displays the location information for an endpoint.

logging event

Use the **logging event** interface configuration command to enable notification of interface link status changes. Use the **no** form of this command to disable notification.

logging event {**bundle-status** | **link-status** | **spanning-tree** | **status** | **trunk status**}

no logging event {**bundle-status** | **link-status** | **spanning-tree** | **status** | **trunk status**}

Syntax Description

bundle-status	Enable notification of BUNDLE and UNBUNDLE messages.
link-status	Enable notification of interface data link status changes.
spanning-tree	Enable notification of spanning-tree events.
status	Enable notification of spanning-tree state change messages.
trunk-status	Enable notification of trunk-status messages.

Defaults

Event logging is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to enable spanning-tree logging:

```
Switch(config-if)# logging event spanning-tree
```

logging file

Use the **logging file** global configuration command to set logging file parameters. Use the **no** form of this command to return to the default setting.

logging file *filesystem*:*filename* [*max-file-size* | **nomax** [*min-file-size*]] [*severity-level-number* | *type*]

no logging file *filesystem*:*filename* [*severity-level-number* | *type*]

Syntax Description

filesystem:*filename*	Alias for a flash file system. Contains the path and name of the file that contains the log messages.
max-file-size	(Optional) Specify the maximum logging file size. The range is 4096 to 2147483647.
nomax	(Optional) Specify the maximum file size of 2147483647.
min-file-size	(Optional) Specify the minimum logging file size. The range is 1024 to 2147483647.
severity-level-number	(Optional) Specify the logging severity level. The range is 0 to 7. See the *type* option for the meaning of each level.
type	(Optional) Specify the logging type. These keywords are valid: • **emergencies**—System is unusable (severity 0). • **alerts**—Immediate action needed (severity 1). • **critical**—Critical conditions (severity 2). • **errors**—Error conditions (severity 3). • **warnings**—Warning conditions (severity 4). • **notifications**—Normal but significant messages (severity 5). • **informational**—Information messages (severity 6). • **debugging**—Debugging messages (severity 7).

Defaults

The minimum file size is 2048 bytes; the maximum file size is 4096 bytes.

The default severity level is 7 (**debugging** messages and numerically lower levels).

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The log file is stored in ASCII text format in an internal buffer on the switch. You can access logged system messages by using the switch command-line interface (CLI) or by saving them to a properly configured syslog server. If the switch fails, the log is lost unless you had previously saved it to flash memory by using the **logging file flash:***filename* global configuration command.

After saving the log to flash memory by using the **logging file flash:***filename* global configuration command, you can use the **more flash:***filename* privileged EXEC command to display its contents.

The command rejects the minimum file size if it is greater than the maximum file size minus 1024; the minimum file size then becomes the maximum file size minus 1024.

Specifying a *level* causes messages at that level and numerically lower levels to be displayed.

Examples

This example shows how to save informational log messages to a file in flash memory:

```
Switch(config)# logging file flash:logfile informational
```

You can verify your setting by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the running configuration on the switch.

mac address-table aging-time

Use the **mac address-table aging-time** global configuration command to set the length of time that a dynamic entry remains in the MAC address table after the entry is used or updated. Use the **no** form of this command to return to the default setting. The aging time applies to all VLANs or a specified VLAN.

mac address-table aging-time {**0** | *10-1000000*} [**vlan** *vlan-id*]

no mac address-table aging-time {**0** | *10-1000000*} [**vlan** *vlan-id*]

Syntax Description

0	This value disables aging. Static address entries are never aged or removed from the table.
10-1000000	Aging time in seconds. The range is 10 to 1000000 seconds.
vlan *vlan-id*	(Optional) Specify the VLAN ID to which to apply the aging time. The range is 1 to 4094.

Defaults

The default is 300 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If hosts do not send continuously, increase the aging time to record the dynamic entries for a longer time. Increasing the time can reduce the possibility of flooding when the hosts send again.

If you do not specify a specific VLAN, this command sets the aging time for all VLANs.

Examples

This example shows how to set the aging time to 200 seconds for all VLANs:

```
Switch(config)# mac address-table aging-time 200
```

You can verify your setting by entering the **show mac address-table aging-time** privileged EXEC command.

Related Commands

Command	Description
show mac address-table aging-time	Displays the MAC address table aging time for all VLANs or the specified VLAN.

mac address-table notification

Use the **mac address-table notification** global configuration command to enable the MAC address notification feature on the switch. Use the **no** form of this command to return to the default setting.

mac address-table notification [**history-size** *value*] | [**interval** *value*]

no mac address-table notification [**history-size** | **interval**]

Syntax Description

history-size *value*	(Optional) Configure the maximum number of entries in the MAC notification history table. The range is 0 to 500 entries.
interval *value*	(Optional) Set the notification trap interval. The switch sends the notification traps when this amount of time has elapsed. The range is 0 to 2147483647 seconds.

Defaults

By default, the MAC address notification feature is disabled.

The default trap interval value is 1 second.

The default number of entries in the history table is 1.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The MAC address notification feature sends Simple Network Management Protocol (SNMP) traps to the network management system (NMS) whenever a new MAC address is added or an old address is deleted from the forwarding tables. MAC notifications are generated only for dynamic and secure MAC addresses. Events are not generated for self addresses, multicast addresses, or other static addresses.

When you configure the **history-size** option, the existing MAC address history table is deleted, and a new table is created.

You enable the MAC address notification feature by using the **mac address-table notification** command. You must also enable MAC address notification traps on an interface by using the **snmp trap mac-notification** interface configuration command and configure the switch to send MAC address traps to the NMS by using the **snmp-server enable traps mac-notification** global configuration command.

Examples

This example shows how to enable the MAC address-table notification feature, set the interval time to 60 seconds, and set the history-size to 100 entries:

```
Switch(config)# mac address-table notification
Switch(config)# mac address-table notification interval 60
Switch(config)# mac address-table notification history-size 100
```

You can verify your settings by entering the **show mac address-table notification** privileged EXEC command.

Related Commands

Command	Description
clear mac address-table notification	Clears the MAC address notification global counters.
show mac address-table notification	Displays the MAC address notification settings on all interfaces or on the specified interface.
snmp-server enable traps	Sends the SNMP MAC notification traps when the **mac-notification** keyword is appended.
snmp trap mac-notification	Enables the SNMP MAC notification trap on a specific interface.

mac address-table static

Use the **mac address-table static** global configuration command to add static addresses to the MAC address table. Use the **no** form of this command to remove static entries from the table.

mac address-table static *mac-addr* **vlan** *vlan-id* **interface** *interface-id*

no mac address-table static *mac-addr* **vlan** *vlan-id* [**interface** *interface-id*]

Syntax Description

mac-addr	Destination MAC address (unicast or multicast) to add to the address table. Packets with this destination address received in the specified VLAN are forwarded to the specified interface.
vlan *vlan-id*	Specify the VLAN for which the packet with the specified MAC address is received. The range is 1 to 4094.
interface *interface-id*	Interface to which the received packet is forwarded. Valid interfaces include physical ports and port channels.

Defaults

No static addresses are configured.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to add the static address c2f3.220a.12f4 to the MAC address table. When a packet is received in VLAN 4 with this MAC address as its destination, the packet is forwarded to the specified interface:

```
Switch(config)# mac address-table static c2f3.220a.12f4 vlan 4 interface
gigabitethernet0/1
```

You can verify your setting by entering the **show mac address-table** privileged EXEC command.

Related Commands

Command	Description
show mac address-table static	Displays static MAC address table entries only.

mac address-table static drop

Use the **mac address-table static drop** global configuration command to enable unicast MAC address filtering and to configure the switch to drop traffic with a specific source or destination MAC address. Use the **no** form of this command to return to the default setting.

mac address-table static *mac-addr* **vlan** *vlan-id* **drop**

no mac address-table static *mac-addr* **vlan** *vlan-id*

Syntax Description

mac-addr	Unicast source or destination MAC address. Packets with this MAC address are dropped.
vlan *vlan-id*	Specify the VLAN for which the packet with the specified MAC address is received. Valid VLAN IDs are 1 to 4094.

Defaults

Unicast MAC address filtering is disabled. The switch does not drop traffic for specific source or destination MAC addresses.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Follow these guidelines when using this feature:

- Multicast MAC addresses, broadcast MAC addresses, and router MAC addresses are not supported. Packets that are forwarded to the CPU are also not supported.
- If you add a unicast MAC address as a static address and configure unicast MAC address filtering, the switch either adds the MAC address as a static address or drops packets with that MAC address, depending on which command was entered last. The second command that you entered overrides the first command.

  For example, if you enter the **mac address-table static** *mac-addr* **vlan** *vlan-id* **interface** *interface-id* global configuration command followed by the **mac address-table static** *mac-addr* **vlan** *vlan-id* **drop** command, the switch drops packets with the specified MAC address as a source or destination.

  If you enter the **mac address-table static** *mac-addr* **vlan** *vlan-id* **drop** global configuration command followed by the **mac address-table static** *mac-addr* **vlan** *vlan-id* **interface** *interface-id* command, the switch adds the MAC address as a static address.

Examples

This example shows how to enable unicast MAC address filtering and to configure the switch to drop packets that have a source or destination address of c2f3.220a.12f4. When a packet is received in VLAN 4 with this MAC address as its source or destination, the packet is dropped:

```
Switch(config)# mac address-table static c2f3.220a.12f4 vlan 4 drop
```

This example shows how to disable unicast MAC address filtering:

```
Switch(config)# no mac address-table static c2f3.220a.12f4 vlan 4
```

You can verify your setting by entering the **show mac address-table static** privileged EXEC command.

Related Commands

Command	Description
show mac address-table static	Displays only static MAC address table entries.

mdix auto

Use the **mdix auto** interface configuration command to enable the automatic medium-dependent interface crossover (auto-MDIX) feature on the interface. When auto-MDIX is enabled, the interface automatically detects the required cable connection type (straight-through or crossover) and configures the connection appropriately. Use the **no** form of this command to disable auto-MDIX.

mdix auto

no mdix auto

Syntax Description

This command has no arguments or keywords.

Defaults

Auto-MDIX is enabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you enable auto-MDIX on an interface, you must also set the interface speed and duplex to **auto** so that the feature operates correctly.

When auto-MDIX (and autonegotiation of speed and duplex) is enabled on one or both of connected interfaces, link up occurs, even if the cable type (straight-through or crossover) is incorrect.

Auto-MDIX is supported on all 10/100 and 10/100/1000 Mb/s interfaces. It is not supported on 1000BASE-SX or -LX small form-factor pluggable (SFP) module interfaces.

Examples

This example shows how to enable auto-MDIX on a port:

```
Switch# configure terminal
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# speed auto
Switch(config-if)# duplex auto
Switch(config-if)# mdix auto
Switch(config-if)# end
```

You can verify the operational state of auto-MDIX on the interface by entering the **show controllers ethernet-controller** *interface-id* **phy** privileged EXEC command.

Related Commands

Command	Description
show controllers ethernet-controller *interface-id* **phy**	Displays general information about internal registers of an interface, including the operational state of auto-MDIX.

media-type

Use the **media-type** interface configuration command to manually select the interface and type of a dual-purpose uplink port or to enable the switch to dynamically select the type that first links up. Use the **no** form of this command to return to the default setting.

media-type {**auto-select** | **rj45** | **sfp**}

no media-type

Syntax Description

auto-select	Enable the switch to dynamically select the type based on which one first links up.
rj45	Select the RJ-45 interface.
sfp	Select the small form-factor pluggable (SFP) module interface.

Defaults

The default is that the switch dynamically selects **auto-select**.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You cannot use the dual-purpose uplinks as redundant links.

To configure the speed or duplex settings on a dual-purpose uplink, you must select the interface type. When you change the type, the speed and duplex configurations are removed. The switch configures both types with autonegotiation of both speed and duplex (the default).

When you select **auto-select**, the switch dynamically selects the type that first links up. When link up is achieved, the switch disables the other type until the active link goes down. When the active link goes down, the switch enables both types until one of them links up. In auto-select mode, the switch configures both types with autonegotiation of speed and duplex (the default).

When you select **rj45**, the switch disables the SFP module interface. If you connect a cable to this port, it cannot attain a link up even if the RJ-45 side is down or is not connected. In this mode, the dual-purpose port behaves like a 10/100/1000BASE-TX interface. You can configure the speed and duplex settings consistent with this interface type.

When you select **sfp**, the switch disables the RJ-45 interface. If you connect a cable to this port, it cannot attain a link up even if the SFP module side is down or if the SFP module is not present. Based on the type of installed SFP module, you can configure the speed and duplex settings consistent with this interface type.

When the switch powers on or when you enable a dual-purpose uplink port through the **shutdown** and the **no shutdown** interface configuration commands, the switch gives preference to the SFP module interface. In all other situations, the switch selects the active link based on which type first links up.

If you configure **auto-select**, you cannot configure the **speed** and **duplex** interface configuration commands.

The Catalyst 2918 switch supports 1000BASE-LX/LH, 1000BASE-SX, and 100BASE-FX SFP modules. It operates with 100BASE-FX SFP modules as follows:

- When the 100BASE -X SFP module is inserted into the module slot and there is no link on the RJ-45 side, the switch disables the RJ-45 interface and selects the SFP module interface. This is the behavior even if there is no cable connected and if there is no link on the SFP side.
- When the 100BASE-X SFP module is inserted and there is a link on the RJ-45 side, the switch continues with that link. If the link goes down, the switch disables the RJ-45 side and selects the SFP module interface.
- When the 100BASE-X SFP module is removed, the switch again dynamically selects the type (**auto-select**) and re-enables the RJ-45 side.

Examples

This example shows how to select the SFP interface:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# media-type sfp
```

You can verify your setting by entering the **show interfaces** *interface-id* **capabilities** or the **show interfaces** *interface-id* **transceiver properties** privileged EXEC commands.

Related Commands

Command	Description
show interfaces capabilities	Displays the capabilities of all interfaces or the specified interface.
show interfaces transceiver properties	Displays speed and duplex settings and media-type on an interface.

mls qos

Use the **mls qos** global configuration command to enable quality of service (QoS) for the entire switch. When the **mls qos** command is entered, QoS is enabled with the default parameters on all ports in the system. Use the **no** form of this command to reset all the QoS-related statistics and to disable the QoS features for the entire switch.

mls qos

no mls qos

Syntax Description

This command has no arguments or keywords.

Defaults

QoS is disabled. There is no concept of trusted or untrusted ports because the packets are not modified (the CoS, DSCP, and IP precedence values in the packet are not changed). Traffic is switched in pass-through mode (packets are switched without any rewrites and classified as best effort without any policing).

When QoS is enabled with the **mls qos** global configuration command and all other QoS settings are set to their defaults, traffic is classified as best effort (the DSCP and CoS value is set to 0) without any policing. No policy maps are configured. The default port trust state on all ports is untrusted. The default ingress and egress queue settings are in effect.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

QoS must be globally enabled to use QoS classification, policing, mark down or drop, queueing, and traffic shaping features. You can create a policy-map and attach it to a port before entering the **mls qos** command. However, until you enter the **mls qos** command, QoS processing is disabled.

Policy-maps and class-maps used to configure QoS are not deleted from the configuration by the **no mls qos** command, but entries corresponding to policy maps are removed from the switch hardware to save system resources. To re-enable QoS with the previous configurations, use the **mls qos** command.

Toggling the QoS status of the switch with this command modifies (reallocates) the sizes of the queues. During the queue size modification, the queue is temporarily shut down during the hardware reconfiguration, and the switch drops newly arrived packets for this queue.

Examples

This example shows how to enable QoS on the switch:

```
Switch(config)# mls qos
```

You can verify your settings by entering the **show mls qos** privileged EXEC command.

Related Commands

Command	Description
show mls qos	Displays QoS information.

mls qos cos

Use the **mls qos cos** interface configuration command to define the default class of service (CoS) value of a port or to assign the default CoS to all incoming packets on the port. Use the **no** form of this command to return to the default setting.

mls qos cos {*default-cos* | **override**}

no mls qos cos {*default-cos* | **override**}

Syntax Description

default-cos	Assign a default CoS value to a port. If packets are untagged, the default CoS value becomes the packet CoS value. The CoS range is 0 to 7.
override	Override the CoS of the incoming packets, and apply the default CoS value on the port to all incoming packets.

Defaults

The default CoS value for a port is 0.

CoS override is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can use the default value to assign a CoS and Differentiated Services Code Point (DSCP) value to all incoming packets that are untagged (if the incoming packet does not have a CoS value). You also can assign a default CoS and DSCP value to all incoming packets by using the **override** keyword.

Use the **override** keyword when all incoming packets on certain ports deserve higher or lower priority than packets entering from other ports. Even if a port is previously set to trust DSCP, CoS, or IP precedence, this command overrides the previously configured trust state, and all the incoming CoS values are assigned the default CoS value configured with the **mls qos cos** command. If an incoming packet is tagged, the CoS value of the packet is modified with the default CoS of the port at the ingress port.

Examples

This example shows how to configure the default port CoS to 4 on a port:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# mls qos trust cos
Switch(config-if)# mls qos cos 4
```

This example shows how to assign all the packets entering a port to the default port CoS value of 4 on a port:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# mls qos cos 4
Switch(config-if)# mls qos cos override
```

You can verify your settings by entering the **show mls qos interface** privileged EXEC command.

Related Commands

Command	Description
show mls qos interface	Displays quality of service (QoS) information.

mls qos rewrite ip dscp

Use the **mls qos rewrite ip dscp** global configuration command to configure the switch to change (rewrite) the Differentiated Services Code Point (DSCP) field of an incoming IP packet. Use the **no** form of this command to configure the switch to not modify (rewrite) the DSCP field of the packet and to enable DSCP transparency.

mls qos rewrite ip dscp

no mls qos rewrite ip dscp

Syntax Description

This command has no arguments or keywords.

Defaults

DSCP transparency is disabled. The switch changes the DSCP field of the incoming IP packet.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

DSCP transparency affects only the DSCP field of a packet at the egress. If DSCP transparency is enabled by using the **no mls qos rewrite ip dscp** command, the switch does not modify the DSCP field in the incoming packet, and the DSCP field in the outgoing packet is the same as that in the incoming packet.

By default, DSCP transparency is disabled. The switch modifies the DSCP field in an incoming packet, and the DSCP field in the outgoing packet is based on the quality of service (QoS) configuration, including the port trust setting, policing and marking, and the DSCP-to-DSCP mutation map.

Regardless of the DSCP transparency configuration, the switch modifies the internal DSCP value of the packet that the switch uses to generate a class of service (CoS) value representing the priority of the traffic. The switch also uses the internal DSCP value to select an egress queue and threshold.

For example, if QoS is enabled and an incoming packet has a DSCP value of 32, the switch might modify the internal DSCP value based on the policy-map configuration and change the internal DSCP value to 16. If DSCP transparency is enabled, the outgoing DSCP value is 32 (same as the incoming value). If DSCP transparency is disabled, the outgoing DSCP value is 16 because it is based on the internal DSCP value.

Examples

This example shows how to enable DSCP transparency and configure the switch to not change the DSCP value of the incoming IP packet:

```
Switch(config)# mls qos
Switch(config)# no mls qos rewrite ip dscp
```

This example shows how to disable DSCP transparency and configure the switch to change the DSCP value of the incoming IP packet:

```
Switch(config)# mls qos
Switch(config)# mls qos rewrite ip dscp
```

You can verify your settings by entering the **show running config | include rewrite** privileged EXEC command.

Related Commands

Command	Description
mls qos	Enables QoS globally.
show mls qos	Displays QoS information.
show running-config | include rewrite	Displays the DSCP transparency setting.

mls qos srr-queue input cos-map

Use the **mls qos srr-queue input cos-map** global configuration command to map class of service (CoS) values to an ingress queue or to map CoS values to a queue and to a threshold ID. Use the **no** form of this command to return to the default setting.

mls qos srr-queue input cos-map queue *queue-id* {*cos1...cos8* | **threshold** *threshold-id cos1...cos8*}

no mls qos srr-queue input cos-map

Syntax Description

queue *queue-id*	Specify a queue number. For *queue-id*, the range is 1 to 2.
cos1...cos8	Map CoS values to an ingress queue. For *cos1...cos8*, enter up to eight values, and separate each value with a space. The range is 0 to 7.
threshold *threshold-id cos1...cos8*	Map CoS values to a queue threshold ID. For *threshold-id*, the range is 1 to 3. For *cos1...cos8*, enter up to eight values, and separate each value with a space. The range is 0 to 7.

Defaults

Table 2-3 shows the default CoS input queue threshold map:

Table 2-2 Default CoS Input Queue Threshold Map

CoS Value	Queue ID - Threshold ID
0–4	1–1
5	2–1
6, 7	1–1

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The CoS assigned at the ingress port selects an ingress or egress queue and threshold.

The drop-threshold percentage for threshold 3 is predefined. It is set to the queue-full state. You can assign two weighted tail-drop (WTD) threshold percentages to an ingress queue by using the **mls qos srr-queue input threshold** global configuration command.

You can map each CoS value to a different queue and threshold combination, allowing the frame to follow different behavior.

Examples

This example shows how to map CoS values 0 to 3 to ingress queue 1 and to threshold ID 1. It maps CoS values 4 and 5 to ingress queue 1 and to threshold ID 2:

```
Switch(config)# mls qos srr-queue input cos-map queue 1 threshold 1 0 1 2 3
Switch(config)# mls qos srr-queue input cos-map queue 1 threshold 2 4 5
```

You can verify your settings by entering the **show mls qos maps** privileged EXEC command.

Related Commands

Command	Description
mls qos srr-queue input priority-queue	Configures the ingress priority queue and guarantees bandwidth.
show mls qos maps	Displays QoS mapping information.

mls qos srr-queue input priority-queue

Use the **mls qos srr-queue input priority-queue** global configuration command to configure the ingress priority queue and to guarantee bandwidth on the internal ring if the ring is congested. Use the **no** form of this command to return to the default setting.

mls qos srr-queue input priority-queue *queue-id* **bandwidth** *weight*

no mls qos srr-queue input priority-queue *queue-id*

Syntax Description

queue-id	Ingress queue ID. The range is 1 to 2.
bandwidth *weight*	Bandwidth percentage of the internal ring. The range is 0 to 40.

Defaults

The priority queue is queue 2, and 10 percent of the bandwidth is allocated to it.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use the priority queue only for traffic that needs to be expedited (for example, voice traffic, which needs minimum delay and jitter).

The priority queue is guaranteed part of the bandwidth on the internal ring. This reduces the delay and jitter under heavy network traffic on an oversubscribed ring. (There is more traffic than the backplane can carry, and the queues are full and dropping frames).

Shaped round robin (SRR) services the priority queue for its configured weight as specified by the **bandwidth** keyword in the **mls qos srr-queue input priority-queue** *queue-id* **bandwidth** *weight* global configuration command. Then SRR shares the remaining bandwidth with both ingress queues and services them as specified by the weights configured with the **mls qos srr-queue input bandwidth** *weight1 weight2* global configuration command.

To disable priority queueing, set the bandwidth weight to 0, for example, **mls qos srr-queue input priority-queue** *queue-id* **bandwidth 0**.

Examples

This example shows how to assign the ingress bandwidths for the queues. Queue 1 is the priority queue with 10 percent of the bandwidth allocated to it. SRR services queue 1 (the priority queue) first for its configured 10 percent bandwidth. Then SRR equally shares the remaining 90 percent of the bandwidth between queues 1 and 2 by allocating 45 percent to each queue:

```
Switch(config)# mls qos srr-queue input priority-queue 1 bandwidth 10
```

You can verify your settings by entering the **show mls qos interface** [*interface-id*] **queueing** or the **show mls qos input-queue** privileged EXEC command.

Related Commands

Command	Description
mls qos srr-queue input cos-map	Maps class of service (CoS) values to an ingress queue or maps CoS values to a queue and to a threshold ID.
show mls qos input-queue	Displays ingress queue settings.
show mls qos interface queueing	Displays quality of service (QoS) information.

mls qos srr-queue output cos-map

Use the **mls qos srr-queue output cos-map** global configuration command to map class of service (CoS) values to an egress queue or to map CoS values to a queue and to a threshold ID. Use the **no** form of this command to return to the default setting.

mls qos srr-queue output cos-map queue *queue-id* {*cos1...cos8* | **threshold** *threshold-id cos1...cos8*}

no mls qos srr-queue output cos-map

Syntax Description

queue *queue-id*	Specify a queue number. For *queue-id*, the range is 1 to 4.
cos1...cos8	Map CoS values to an egress queue. For *cos1...cos8*, enter up to eight values, and separate each value with a space. The range is 0 to 7.
threshold *threshold-id cos1...cos8*	Map CoS values to a queue threshold ID. For *threshold-id*, the range is 1 to 3. For *cos1...cos8*, enter up to eight values, and separate each value with a space. The range is 0 to 7.

Defaults

Table 2-4 shows the default CoS output queue threshold map:

Table 2-3 Default Cos Output Queue Threshold Map

CoS Value	Queue ID–Threshold ID
0, 1	2–1
2, 3	3–1
4	4–1
5	1–1
6, 7	4–1

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The drop-threshold percentage for threshold 3 is predefined. It is set to the queue-full state.

Note The egress queue default settings are suitable for most situations. You should change them only when you have a thorough understanding of the egress queues and if these settings do not meet your quality of service (QoS) solution.

You can assign two weighted tail-drop (WTD) threshold percentages to an egress queue by using the **mls qos queue-set output** *qset-id* **threshold** global configuration command.

You can map each CoS value to a different queue and threshold combination, allowing the frame to follow different behavior.

Examples

This example shows how to map a port to queue-set 1. It maps CoS values 0 to 3 to egress queue 1 and to threshold ID 1.

```
Switch(config)# mls qos srr-queue output cos-map queue 1 threshold 1 0 1 2 3
```

You can verify your settings by entering the **show mls qos maps**, the **show mls qos interface** [*interface-id*] **buffers**, or the **show mls qos queue-set** privileged EXEC command.

Related Commands

Command	Description
show mls qos interface buffers	Displays QoS information.
show mls qos maps	Displays QoS mapping information.

mls qos trust

Use the **mls qos trust** interface configuration command to configure the port trust state. Ingress traffic can be trusted, and classification is performed by examining the packet class of service (CoS). Use the **no** form of this command to return a port to its untrusted state.

mls qos trust cos

no mls qos trust cos

Syntax Description

cos	(Optional) Classify an ingress packet by using the packet CoS value. For an untagged packet, use the port default CoS value.

Defaults

The port is not trusted.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Packets entering a quality of service (QoS) domain are classified at the edge of the domain. When the packets are classified at the edge, the switch port within the QoS domain can be configured to one of the trusted states because there is no need to classify the packets at every switch within the domain. Use this command to specify whether the port is trusted and which fields of the packet to use to classify traffic.

Examples

This example shows how to configure a port to trust the CoS field in the incoming packet:

```
switch(config)# interface gigabitethernet0/1
switch(config-if)# mls qos trust cos
```

Related Commands

Command	Description
mls qos cos	Defines the default CoS value of a port or assigns the default CoS to all incoming packets on the port.
show mls qos interface	Displays QoS information.

monitor session

Use the **monitor session** global configuration command to start a new Switched Port Analyzer (SPAN) session source or destination session, to enable ingress traffic on the destination port for a network security device (such as a Cisco IDS Sensor Appliance), to add or delete interfaces or VLANs to or from an existing SPAN session, and to limit (filter) SPAN source traffic to specific VLANs. Use the **no** form of this command to remove the SPAN session or to remove source or destination interfaces or filters from the SPAN session. For destination interfaces, the encapsulation options are ignored with the **no** form of the command.

monitor session *session_number* **destination** {**interface** *interface-id* [, | -] [**encapsulation {dot1q | replicate}] [ingress** {**dot1q vlan** *vlan-id* | **untagged vlan** *vlan-id* | **vlan** *vlan-id*}]}

monitor session *session_number* **filter vlan** *vlan-id* [, | -]

monitor session *session_number* **source** {**interface** *interface-id* [, | -] [**both** | **rx** | **tx**]} | {**vlan** *vlan-id* [, | -] [**both** | **rx** | **tx**]}

no monitor session {*session_number*}

no monitor session *session_number* **destination** {**interface** *interface-id* [, | -] [**encapsulation {dot1q | replicate}] [ingress** {**dot1q vlan** *vlan-id* | **untagged vlan** *vlan-id* | **vlan** *vlan-id*}]}

no monitor session *session_number* **filter vlan** *vlan-id* [, | -]

no monitor session *session_number* **source** {**interface** *interface-id* [, | -] [**both** | **rx** | **tx**]} | {**vlan** *vlan-id* [, | -] [**both** | **rx** | **tx**]}

Syntax Description

session_number	Specify the session number identified with the SPAN session. The only available number is 1.
destination	Specify the SPAN destination. A destination must be a physical port.
interface *interface-id*	Specify the destination or source interface for a SPAN session. Valid interfaces are physical ports (including type, and port number). For **source interface**, **port channel** is also a valid interface type, and the valid range is 1 to 6.
encapsulation dot1q	(Optional) Specify that the destination interface uses the IEEE 802.1Q encapsulation method.
encapsulation replicate	(Optional) Specify that the destination interface replicates the source interface encapsulation method.
ingress	(Optional) Enable ingress traffic forwarding.
dot1q vlan *vlan-id*	Accept incoming packets with IEEE 802.1Q encapsulation with the specified VLAN as the default VLAN.
untagged vlan *vlan-id*	Accept incoming packets with untagged encapsulation with the specified VLAN as the default VLAN.
vlan *vlan-id*	When used with only the **ingress** keyword, set default VLAN for ingress traffic.
,	(Optional) Specify a series of interfaces or VLANs, or separate a range of interfaces or VLANs from a previous range. Enter a space before and after the comma.

-	(Optional) Specify a range of interfaces or VLANs. Enter a space before and after the hyphen.
filter vlan *vlan-id*	Specify a list of VLANs as filters on trunk source ports to limit SPAN source traffic to specific VLANs. The *vlan-id* range is 1 to 4094.
source	Specify the SPAN source. A source can be a physical port, a port channel, or a VLAN.
both, rx, tx	(Optional) Specify the traffic direction to monitor. If you do not specify a traffic direction, the source interface sends both transmitted and received traffic.
source vlan *vlan-id*	Specify the SPAN source interface as a VLAN ID. The range is 1 to 4094.

Defaults

No monitor sessions are configured.

On a source interface, the default is to monitor both received and transmitted traffic.

On a trunk interface used as a source port, all VLANs are monitored.

If **encapsulation replicate** is not specified on a local SPAN destination port, packets are sent in native form with no encapsulation tag.

Ingress forwarding is disabled on destination ports.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Traffic that enters or leaves source ports or source VLANs can be monitored by using SPAN. Traffic routed to source ports or source VLANs cannot be monitored.

You can set only one SPAN session on a switch. You can have a maximum of 64 destination ports on a switch.

Each session can include multiple ingress or egress source ports or VLANs, but you cannot combine source ports and source VLANs in a single session. Each session can include multiple destination ports.

When you use VLAN-based SPAN (VSPAN) to analyze network traffic in a VLAN or set of VLANs, all active ports in the source VLANs become source ports for the SPAN session. Trunk ports are included as source ports for VSPAN, and only packets with the monitored VLAN ID are sent to the destination port.

You can monitor traffic on a single port or VLAN or on a series or range of ports or VLANs. You select a series or range of interfaces or VLANs by using the [**,** | **-**] options.

If you specify a series of VLANs or interfaces, you must enter a space before and after the comma. If you specify a range of VLANs or interfaces, you must enter a space before and after the hyphen (**-**).

EtherChannel ports cannot be configured as SPAN destination ports. A physical port that is a member of an EtherChannel group can be used as a destination port, but it cannot participate in the EtherChannel group while it is as a SPAN destination.

You can monitor individual ports while they participate in an EtherChannel, or you can monitor the entire EtherChannel bundle by specifying the **port-channel** number as the source interface.

A port used as a destination port cannot be a SPAN source, nor can a port be a destination port for more than one session at a time.

You can enable IEEE 802.1x authentication on a port that is a SPAN destination port; however, IEEE 802.1x authentication is disabled until the port is removed as a SPAN destination. If IEEE 802.1x authentication is not available on the port, the switch returns an error message. You can enable IEEE 802.1x authentication on a SPAN source port.

VLAN filtering refers to analyzing network traffic on a selected set of VLANs on trunk source ports. By default, all VLANs are monitored on trunk source ports. You can use the **monitor session** *session_number* **filter vlan** *vlan-id* command to limit SPAN traffic on trunk source ports to only the specified VLANs.

VLAN monitoring and VLAN filtering are mutually exclusive. If a VLAN is a source, VLAN filtering cannot be enabled. If VLAN filtering is configured, a VLAN cannot become a source.

If ingress traffic forwarding is enabled for a network security device, the destination port forwards traffic at Layer 2.

Destination ports can be configured to act in these ways:

- When you enter **monitor session** *session_number* **destination interface** *interface-id* with no other keywords, egress encapsulation is untagged, and ingress forwarding is not enabled.
- When you enter **monitor session** *session_number* **destination interface** *interface-id* **ingress**, egress encapsulation is untagged; ingress encapsulation depends on the keywords that follow—**dot1q** or **untagged**.
- When you enter **monitor session** *session_number* **destination interface** *interface-id* **encapsulation dot1q** with no other keywords, egress encapsulation uses the IEEE 802.1Q encapsulation method.
- When you enter **monitor session** *session_number* **destination interface** *interface-id* **encapsulation dot1q ingress**, egress encapsulation uses the IEEE 802.1Q encapsulation method; ingress encapsulation depends on the keywords that follow—**dot1q** or **untagged**.
- When you enter **monitor session** *session_number* **destination interface** *interface-id* **encapsulation replicate** with no other keywords, egress encapsulation replicates the source interface encapsulation; ingress forwarding is not enabled.
- When you enter **monitor session** *session_number* **destination interface** *interface-id* **encapsulation replicate ingress**, egress encapsulation replicates the source interface encapsulation; ingress encapsulation depends on the keywords that follow—**dot1q** or **untagged**.

Examples

This example shows how to create a local SPAN session 1 to monitor both sent and received traffic on source port 1 to destination port 2:

```
Switch(config)# monitor session 1 source interface gigabitethernet0/1 both
Switch(config)# monitor session 1 destination interface gigabitethernet0/2
```

This example shows how to delete a destination port from an existing local SPAN session:

```
Switch(config)# no monitor session 2 destination gigabitethernet0/2
```

This example shows how to limit SPAN traffic in an existing session only to specific VLANs:

```
Switch(config)# monitor session 1 filter vlan 100 - 110
```

This example shows how to configure the destination port for ingress traffic on VLAN 5 by using a security device that supports IEEE 802.1Q encapsulation. Egress traffic replicates the source; ingress traffic uses IEEE 802.1Q encapsulation.

```
Switch(config)# monitor session 1 destination interface gigabitethernet0/2 encapsulation
replicate ingress dot1q vlan 5
```

This example shows how to configure the destination port for ingress traffic on VLAN 5 by using a security device that does not support encapsulation. Egress traffic and ingress traffic are untagged.

```
Switch(config)# monitor session 1 destination interface gigabitethernet0/2 ingress
untagged vlan 5
```

You can verify your settings by entering the **show monitor** privileged EXEC command. You can display SPAN configuration on the switch by entering the **show running-config** privileged EXEC command. SPAN information appears near the end of the output.

Related Commands

Command	Description
show monitor	Displays SPAN session information.
show running-config	Displays the current operating configuration.

network-policy

Use the **network-policy** interface configuration command to apply a network-policy profile to an interface. Use the **no** form of this command to remove the policy.

network-policy *profile number*

no network-policy

Syntax Description

profile number	Specify the network-policy profile number.

Defaults

No network-policy profiles are applied.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

Use the **network-policy** *profile number* interface configuration command to apply a profile to an interface.

If you first configure a network-policy profile on an interface, you cannot apply the **switchport voice vlan** command on the interface. If **switchport voice vlan** *vlan-id* is already configured on an interface, you can apply a network-policy profile on the interface. The interface then has the voice or voice-signaling VLAN network-policy profile applied on the interface.

Examples

This example shows how to apply network-policy profile 60 to an interface:

```
Switch(config)# interface_id
Switch(config-if)# network-policy profile 60
```

Related Commands

Command	Description
network-policy profile (global configuration)	Creates the network-policy profile.
network-policy profile (network-policy configuration)	Configures the attributes of network-policy profiles.
show network-policy profile	Displays the configured network-policy profiles.

network-policy profile (global configuration)

Use the **network-policy profile** global configuration command to create a network-policy profile and to enter network-policy configuration mode. Use the **no** form of this command to delete the policy and to return to global configuration mode.

network-policy profile *profile number*

no network-policy profile *profile number*

Syntax Description

profile number	Specify the network-policy profile number. The range is 1 to 4294967295.

Defaults

No network-policy profiles are defined.

Command Modes

Global configuration

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

Use the **network-policy profile** global configuration command to create a profile and to enter network-policy profile configuration mode.

To return to the privileged EXEC mode from the network-policy profile configuration mode, enter the **exit** command.

When you are in network-policy profile configuration mode, you can create the profile for voice and voice-signalling by specifying the values for VLAN, class of service (CoS), differentiated services code point (DSCP), and tagging mode.

These profile attributes are then contained in the Link Layer Discovery Protocol for Media Endpoint Devices (LLDP-MED) **network-policy** time-length-value (TLV).

Examples

This example shows how to create network-policy profile 60:

```
Switch(config)# network-policy profile 60
Switch(config-network-policy)#
```

Related Commands

Command	Description
network-policy	Applies a network-policy to an interface.
network-policy profile (network-policy configuration)	Configures the attributes of network-policy profiles.
show network-policy profile	Displays the configured network-policy profiles.

network-policy profile (network-policy configuration)

Use the **network-policy profile** configuration mode command to configure the network-policy profile created by using the **network-policy profile** global configuration command. Use the **no** form of this command without additional parameters to delete a profile. Use the **no** form with parameters to change its configured attributes.

network-policy profile *profile number* {**voice** | **voice-signaling**} **vlan** [*vlan-id* {**cos** *cvalue* | **dscp** *dvalue*}] | [[**dot1p** {**cos** *cvalue* | **dscp** *dvalue*}] | **none** | **untagged**]

no network-policy profile *profile number* {**voice** | **voice-signaling**} **vlan** [*vlan-id* | {**cos** *cvalue*} | {**dscp** *dvalue*}] | [[**dot1p** {**cos** *cvalue*} | {**dscp** *dvalue*}] | **none** | **untagged**]

Syntax Description

voice	Specify the voice application type.
voice-signaling	Specify the voice-signaling application type.
vlan	Specify the native VLAN for voice traffic.
vlan-id	(Optional) Specify the VLAN for voice traffic. The range is 1 to 4094.
cos *cvalue*	(Optional) Specify the Layer 2 priority class of service (CoS) for the configured VLAN. The range is 0 to 7; the default is 5.
dscp *dvalue*	(Optional) Specify the differentiated services code point (DSCP) value for the configured VLAN. The range is 0 to 63; the default is 46.
dot1p	(Optional) Configure the telephone to use IEEE 802.1p priority tagging and to use VLAN 0 (the native VLAN).
none	(Optional) Do not instruct the IP telephone about the voice VLAN. The telephone uses the configuration from the telephone key pad.
untagged	(Optional) Configure the telephone to send untagged voice traffic. This is the default for the telephone.

Defaults

No network policies are defined.

Command Modes

Network-policy configuration

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

Use the **network-policy profile** command to configure the attributes of a network-policy profile.

The **voice** application type is for dedicated IP telephones and similar devices that support interactive voice services. These devices are typically deployed on a separate VLAN for ease of deployment and enhanced security through isolation from data applications.

The **voice-signaling** application type is for network topologies that require a different policy for voice signaling than for voice media. This application type should not be advertised if all the same network policies apply as those advertised in the **voice policy** TLV.

This example shows how to configure the voice application type for VLAN 100 with a priority 4 CoS:

```
Switch(config)# network-policy profile 1
Switch(config-network-policy)# voice vlan 100 cos 4
```

This example shows how to configure the voice application type for VLAN 100 with a DSCP value of 34:

```
Switch(config)# network-policy profile 1
Switch(config-network-policy)# voice vlan 100 dscp 34
```

This example shows how to configure the voice application type for the native VLAN with priority tagging:

```
Switch(config-network-policy)# voice vlan dot1p cos 4
```

Related Commands

Command	Description
network-policy	Applies a network-policy to an interface.
network-policy profile (global configuration)	Creates the network-policy profile.
show network-policy profile	Displays the configured network-policy profiles.

no authentication logging verbose

Use the **no authentication logging verbose** global configuration command on the switch stack or on a standalone switch to filter detailed information from authentication system messages.

no authentication logging verbose

Defaults

All details are displayed in the system messages.

Syntax Description

This command has no arguments or keywords.

Command Modes

Global configuration

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

This command filters details, such as anticipated success, from authentication system messages.

Examples

To filter verbose authentication system messages:

```
Switch(config)# no authentication logging verbose
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
no authentication logging verbose	Filters details from authentication system messages.
no dot1x logging verbose	Filters details from 802.1x system messages.
no mab logging verbose	Filters details from MAC authentication bypass (MAB) system messages.

no dot1x logging verbose

Use the **no dot1x logging verbose** global configuration command on the switch stack or on a standalone switch to filter detailed information from 802.1x system messages.

no dot1x logging verbose

Defaults

All details are displayed in the system messages.

Syntax Description

This command has no arguments or keywords.

Command Modes

Global configuration

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

This command filters details, such as anticipated success, from 802.1x system messages.

Examples

To filter verbose 802.1x system messages:

```
Switch(config)# no dot1x logging verbose
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
no authentication logging verbose	Filters details from authentication system messages.
no dot1x logging verbose	Filters details from 802.1x system messages.
no mab logging verbose	Filters details from MAC authentication bypass (MAB) system messages.

no mab logging verbose

Use the **no mab logging verbose** global configuration command on the switch stack or on a standalone switch to filter detailed information from MAC authentication bypass (MAB) system messages.

no mab logging verbose

Defaults

All details are displayed in the system messages.

Syntax Description

This command has no arguments or keywords.

Command Modes

Global configuration

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

This command filters details, such as anticipated success, from MAC authentication bypass (MAB) system messages.

Examples

To filter verbose MAB system messages:

```
Switch(config)# no mab logging verbose
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
no authentication logging verbose	Filters details from authentication system messages.
no dot1x logging verbose	Filters details from 802.1x system messages.
no mab logging verbose	Filters details from MAC authentication bypass (MAB) system messages.

pagp learn-method

Use the **pagp learn-method** interface configuration command to learn the source address of incoming packets received from an EtherChannel port. Use the **no** form of this command to return to the default setting.

pagp learn-method {**aggregation-port** | **physical-port**}

no pagp learn-method

Syntax Description

aggregation-port	Specify address learning on the logical port-channel. The switch sends packets to the source using any of the ports in the EtherChannel. This setting is the default. With aggregate-port learning, it is not important on which physical port the packet arrives.
physical-port	Specify address learning on the physical port within the EtherChannel. The switch sends packets to the source using the same port in the EtherChannel from which it learned the source address. The other end of the channel uses the same port in the channel for a particular destination MAC or IP address.

Defaults

The default is aggregation-port (logical port channel).

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The learn method must be configured the same at both ends of the link.

Note The Catalyst 2918 switch supports address learning only on aggregate ports even though the **physical-port** keyword is provided in the CLI. The **pagp learn-method** and the **pagp port-priority** interface configuration commands have no effect on the switch hardware, but they are required for PAgP interoperability with devices that only support address learning by physical ports, such as the Catalyst 1900 switch.

When the link partner to the Catalyst 2918 switch is a physical learner, we recommend that you configure the switch as a physical-port learner by using the **pagp learn-method physical-port** interface configuration command and to set the load-distribution method based on the source MAC address by using the **port-channel load-balance src-mac** global configuration command. Use the **pagp learn-method** interface configuration command only in this situation.

Examples

This example shows how to set the learning method to learn the address on the physical port within the EtherChannel:

```
Switch(config-if)# pagp learn-method physical-port
```

This example shows how to set the learning method to learn the address on the port-channel within the EtherChannel:

```
Switch(config-if)# pagp learn-method aggregation-port
```

You can verify your settings by entering the **show running-config** privileged EXEC command or the **show pagp** *channel-group-number* **internal** privileged EXEC command.

Related Commands

Command	Description
pagp port-priority	Selects a port over which all traffic through the EtherChannel is sent.
show pagp	Displays PAgP channel-group information.
show running-config	Displays the current operating configuration.

pagp port-priority

Use the **pagp port-priority** interface configuration command to select a port over which all Port Aggregation Protocol (PAgP) traffic through the EtherChannel is sent. If all unused ports in the EtherChannel are in hot-standby mode, they can be placed into operation if the currently selected port and link fails. Use the **no** form of this command to return to the default setting.

pagp port-priority *priority*

no pagp port-priority

Syntax Description

priority	A priority number ranging from 0 to 255.

Defaults

The default is 128.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The physical port with the highest priority that is operational and has membership in the same EtherChannel is the one selected for PAgP transmission.

Note The Catalyst 2918 switch supports address learning only on aggregate ports even though the **physical-port** keyword is provided in the CLI. The **pagp learn-method** and the **pagp port-priority** interface configuration commands have no effect on the switch hardware, but they are required for PAgP interoperability with devices that only support address learning by physical ports, such as the Catalyst 1900 switch.

When the link partner to the Catalyst 2918 switch is a physical learner, we recommend that you configure the switch as a physical-port learner by using the **pagp learn-method physical-port** interface configuration command and to set the load-distribution method based on the source MAC address by using the **port-channel load-balance src-mac** global configuration command. Use the **pagp learn-method** interface configuration command only in this situation.

Examples

This example shows how to set the port priority to 200:

```
Switch(config-if)# pagp port-priority 200
```

You can verify your setting by entering the **show running-config** privileged EXEC command or the **show pagp** *channel-group-number* **internal** privileged EXEC command.

Related Commands

Command	Description
pagp learn-method	Provides the ability to learn the source address of incoming packets.
show pagp	Displays PAgP channel-group information.
show running-config	Displays the current operating configuration.

port-channel load-balance

Use the **port-channel load-balance** global configuration command to set the load-distribution method among the ports in the EtherChannel. Use the **no** form of this command to return to the default setting.

port-channel load-balance {**dst-ip** | **dst-mac** | **src-dst-ip** | **src-dst-mac** | **src-ip** | **src-mac**}

no port-channel load-balance

Syntax Description

dst-ip	Load distribution is based on the destination host IP address.
dst-mac	Load distribution is based on the destination host MAC address. Packets to the same destination are sent on the same port, but packets to different destinations are sent on different ports in the channel.
src-dst-ip	Load distribution is based on the source and destination host IP address.
src-dst-mac	Load distribution is based on the source and destination host MAC address.
src-ip	Load distribution is based on the source host IP address.
src-mac	Load distribution is based on the source MAC address. Packets from different hosts use different ports in the channel, but packets from the same host use the same port.

Defaults

The default is **src-mac**.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

For information about when to use these forwarding methods, see the "Configuring EtherChannels" chapter in the software configuration guide for this release.

Examples

This example shows how to set the load-distribution method to **dst-mac**:

```
Switch(config)# port-channel load-balance dst-mac
```

You can verify your setting by entering the **show running-config** privileged EXEC command or the **show etherchannel load-balance** privileged EXEC command.

Related Commands

Command	Description
interface port-channel	Accesses or creates the port channel.
show etherchannel	Displays EtherChannel information for a channel.
show running-config	Displays the current operating configuration.

priority-queue

Use the **priority-queue** interface configuration command to enable the egress expedite queue on a port. Use the **no** form of this command to return to the default setting.

priority-queue out

no priority-queue out

Syntax Description

out	Enable the egress expedite queue.

Defaults

The egress expedite queue is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you configure the **priority-queue out** command, the shaped round robin (SRR) weight ratios are affected because there is one fewer queue participating in SRR. This means that *weight1* in the **srr-queue bandwidth shape** or the **srr-queue bandwidth shape** interface configuration command is ignored (not used in the ratio calculation). The expedite queue is a priority queue, and it is serviced until empty before the other queues are serviced.

Follow these guidelines when the expedite queue is enabled or the egress queues are serviced based on their SRR weights:

- If the egress expedite queue is enabled, it overrides the SRR shaped and shared weights for queue 1.
- If the egress expedite queue is disabled and the SRR shaped and shared weights are configured, the shaped mode overrides the shared mode for queue 1, and SRR services this queue in shaped mode.
- If the egress expedite queue is disabled and the SRR shaped weights are not configured, SRR services the queue in shared mode.

Examples

This example shows how to enable the egress expedite queue when the SRR weights are configured. The egress expedite queue overrides the configured SRR weights.

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# srr-queue bandwidth shape 25 0 0 0
Switch(config-if)# srr-queue bandwidth share 30 20 25 25
Switch(config-if)# priority-queue out
```

This example shows how to disable the egress expedite queue after the SRR shaped and shared weights are configured. The shaped mode overrides the shared mode.

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# srr-queue bandwidth shape 25 0 0 0
Switch(config-if)# srr-queue bandwidth share 30 20 25 25
Switch(config-if)# no priority-queue out
```

You can verify your settings by entering the **show mls qos interface** *interface-id* **queueing** or the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show mls qos interface queueing	Displays the queueing strategy (SRR, priority queueing), the weights corresponding to the queues, and the CoS-to-egress-queue map.

psp

To control the rate at which protocol packets are sent to the switch, use the **psp** global configuration command to specify the upper threshold for the packet flow rate. The supported protocols are Address Resolution Protocol (ARP), ARP snooping, Dynamic Host Configuration Protocol (DHCP) v4, DHCP snooping, Internet Group Management Protocol (IGMP), and IGMP snooping. To disable protocol storm protection, use the **no** version of the command.

psp {**arp** | **dhcp** | **igmp**} **pps** *value*

no psp {**arp** | **dhcp** | **igmp**}

Syntax Description

arp	Set protocol packet flow rate for ARP and ARP snooping.
dhcp	Set protocol packet flow rate for DHCP and DHCP snooping.
igmp	Set protocol packet flow rate for IGMP and IGMP snooping.
pps *value*	Specify the threshold value for the number of packets per second. If the traffic exceeds this value, protocol storm protection is enforced. The range is from 5 to 50 packets per second.

Defaults

Protocol storm protection is disabled by default.

Command Modes

Global configuration

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

To set error-disable detection protocol storm protection, use the **errdisable detect cause psp** global configuration command.

When protocol storm protection is configured, a counter records the number of dropped packets. To see the number of dropped packets for a specific protocol, use the **show psp statistics** {**arp** | **dhcp** | **igmp**} privileged EXEC command. To see the number of dropped packets for all protocols, use the **show psp statistics all** command. To clear the counter for a protocol, use the **clear psp counter** [**arp** | **dhcp** | **igmp**] command.

Related Commands

Command	Description
show psp config	Displays the protocol storm protection configuration.
show psp statistics	Displays the number of dropped packets.
clear psp counter	Clears the counter of dropped packets.
errdisable detect cause psp	Enables error-disable detection for protocol storm protection.

radius-server dead-criteria

Use the **radius-server dead-criteria** global configuration command to configure the conditions that determine when a RADIUS server is considered unavailable or *dead*. Use the **no** form of this command to return to the default settings.

radius-server dead-criteria [**time** *seconds* [**tries** *number*] | **tries** *number*]

no radius-server dead-criteria [**time** *seconds* [**tries** *number*] | **tries** *number*]

Syntax Description

time *seconds*	(Optional) Set the time in seconds during which the switch does not need to get a valid response from the RADIUS server. The range is from 1 to 120 seconds.
tries *number*	(Optional) Set the number of times that the switch does not get a valid response from the RADIUS server before the server is considered unavailable. The range is from 1 to 100.

Defaults

The switch dynamically determines the *seconds* value that is from 10 to 60 seconds.

The switch dynamically determines the *tries* value that is from 10 to 100.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

We recommend that you configure the *seconds* and *number* parameters as follows:

- Use the **radius-server timeout** *seconds* global configuration command to specify the time in seconds during which the switch waits for a RADIUS server to respond before the IEEE 802.1x authentication times out. The switch dynamically determines the default *seconds* value that is from 10 to 60 seconds.
- Use the **radius-server retransmit** *retries* global configuration command to specify the number of times the switch tries to reach the radius servers before considering the servers to be unavailable. The switch dynamically determines the default *tries* value that is from 10 to 100.
- The *seconds* parameter is less than or equal to the number of retransmission attempts times the time in seconds before the IEEE 802.1x authentication times out.
- The *tries* parameter should be the same as the number of retransmission attempts.

Examples

This example shows how to configure 60 as the **time** and 10 as the number of **tries**, the conditions that determine when a RADIUS server is considered unavailable

```
Switch(config)# radius-server dead-criteria time 60 tries 10
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
radius-server retransmit *retries*	Specifies the number of times that the switch tries to reach the RADIUS servers before considering the servers to be unavailable.
radius-server timeout *seconds*	Specifies the time in seconds during which the switch waits for a RADIUS server to respond before the IEEE 802.1x authentication times out.
show running-config	Displays the running configuration on the switch.

radius-server host

Use the **radius-server host** global configuration command to configure the RADIUS server parameters, including the RADIUS accounting and authentication. Use the **no** form of this command to return to the default settings.

radius-server host *ip-address* [**acct-port** *udp-port*] [**auth-port** *udp-port*] [**test username** *name* [**idle-time** *time*] [**ignore-acct-port**] [**ignore-auth-port**]] [**key** *string*]

no radius-server host *ip-address*

Syntax Description

ip-address	Specify the IP address of the RADIUS server.
acct-port *udp-port*	(Optional) Specify the UDP port for the RADIUS accounting server. The range is from 0 to 65536.
auth-port *udp-port*	(Optional) Specify the UDP port for the RADIUS authentication server. The range is from 0 to 65536.
test username *name*	(Optional) Enable automatic server testing of the RADIUS server status, and specify the username to be used.
idle-time *time*	(Optional) Set the interval of time in minutes after which the switch sends test packets to the server. The range is from 1 to 35791 minutes.
ignore-acct-port	(Optional) Disables testing on the RADIUS-server accounting port.
ignore-auth-port	(Optional) Disables testing on the RADIUS-server authentication port.
key *string*	(Optional) Specify the authentication and encryption key for all RADIUS communication between the switch and the RADIUS daemon. The key is a text string that must match the encryption key used on the RADIUS server. Always configure the key as the last item in this command. Leading spaces are ignored, but spaces within and at the end of the key are used. If there are spaces in your key, do not enclose the key in quotation marks unless the quotation marks are part of the key.

Defaults

The UDP port for the RADIUS accounting server is 1646.

The UDP port for the RADIUS authentication server is 1645.

Automatic server testing is disabled.

The idle time is 60 minutes (1 hour).

When the automatic testing is enabled, testing occurs on the accounting and authentication UDP ports.

The authentication and encryption key (*string*) is not configured.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

We recommend that you configure the UDP port for the RADIUS accounting server and the UDP port for the RADIUS authentication server to nondefault values.

Use the **test username** *name* keywords to enable automatic server testing of the RADIUS server status and to specify the username to be used.

You can configure the authentication and encryption key by using the **radius-server host** *ip-address* **key** *string* or the **radius-server key** {**0** *string* | **7** *string* | *string*} global configuration command. Always configure the key as the last item in this command.

Examples

This example shows how to configure 1500 as the UDP port for the accounting server and 1510 as the UDP port for the authentication server:

```
Switch(config)# radius-server host 1.1.1.1 acct-port 1500 auth-port 1510
```

This example shows how to configure the UDP port for the accounting server and the authentication server, enable automated testing of the RADIUS server status, specify the username to be used, and configure a key string:

```
Switch(config)# radius-server host 1.1.1.2 acct-port 800 auth-port 900 test username
aaafail idle-time 75 key abc123
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
radius-server key {**0** *string* | **7** *string* | *string*}	Sets the authentication and encryption key for all RADIUS communications between the router and the RADIUS daemon.
show running-config	Displays the running configuration on the switch.

rcommand

Use the **rcommand** user EXEC command to start a Telnet session and to execute commands on a cluster member switch from the cluster command switch. To end the session, enter the **exit** command.

rcommand {*n* | **commander** | **mac-address** *hw-addr*}

Syntax Description

n	Provide the number that identifies a cluster member. The range is 0 to 15.
commander	Provide access to the cluster command switch from a cluster member switch.
mac-address *hw-addr*	MAC address of the cluster member switch.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command is available only on the cluster command switch.

If the switch is the cluster command switch but the cluster member switch *n* does not exist, an error message appears. To get the switch number, enter the **show cluster members** privileged EXEC command on the cluster command switch.

You can use this command to access a cluster member switch from the cluster command-switch prompt or to access a cluster command switch from the member-switch prompt.

For Catalyst 2900 XL, 3500 XL, 2950, 2970, 3550, 3560, and 3750 switches, the Telnet session accesses the member-switch command-line interface (CLI) at the same privilege level as on the cluster command switch. For example, if you execute this command at user level on the cluster command switch, the cluster member switch is accessed at user level. If you use this command on the cluster command switch at privileged level, the command accesses the remote device at privileged level. If you use an intermediate enable-level lower than *privileged*, access to the cluster member switch is at user level.

For Catalyst 1900 and 2820 switches running standard edition software, the Telnet session accesses the menu console (the menu-driven interface) if the cluster command switch is at privilege level 15. If the cluster command switch is at privilege level 1, you are prompted for the password before being able to access the menu console. Cluster command switch privilege levels map to the cluster member switches running standard edition software as follows:

- If the cluster command switch privilege level is from 1 to 14, the cluster member switch is accessed at privilege level 1.
- If the cluster command switch privilege level is 15, the cluster member switch is accessed at privilege level 15.

The Catalyst 1900 and 2820 CLI is available only on switches running Enterprise Edition Software.

This command will not work if the vty lines of the cluster command switch have access-class configurations.

You are not prompted for a password because the cluster member switches inherited the password of the cluster command switch when they joined the cluster.

Examples

This example shows how to start a session with member 3. All subsequent commands are directed to member 3 until you enter the **exit** command or close the session.

```
Switch# rcommand 3
Switch-3# show version
Cisco Internet Operating System Software ...
...
Switch-3# exit
Switch#
```

Related Commands

Command	Description
show cluster members	Displays information about the cluster members.

rmon collection stats

Use the **rmon collection stats** interface configuration command to collect Ethernet group statistics, which include usage statistics about broadcast and multicast packets, and error statistics about cyclic redundancy check (CRC) alignment errors and collisions. Use the **no** form of this command to return to the default setting.

rmon collection stats *index* [**owner** *name*]

no rmon collection stats *index* [**owner** *name*]

Syntax Description

index	Remote Network Monitoring (RMON) collection control index. The range is 1 to 65535.
owner *name*	(Optional) Owner of the RMON collection.

Defaults

The RMON statistics collection is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The RMON statistics collection command is based on hardware counters.

Examples

This example shows how to collect RMON statistics for the owner *root*:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# rmon collection stats 2 owner root
```

You can verify your setting by entering the **show rmon statistics** privileged EXEC command.

Related Commands

Command	Description
show rmon statistics	Displays RMON statistics.

sdm prefer

Use the **sdm prefer** global configuration command to configure the template used in Switch Database Management (SDM) resource allocation. You can use a template to allocate system resources to best support the features being used in your application. Use the **no** form of this command to return to the default template.

sdm prefer {**default** | **dual-ipv4-and-ipv6 default** | **qos**}

no sdm prefer

Syntax Description

default	Give balance to all functions.
dual-ipv4-and-ipv6 default	Allow the switch to be used in dual stack environments (supporting both IPv4 and IPv6)
qos	Provide maximum system usage for quality of service (QoS) access control entries (ACEs).

Defaults

The default template provides a balance to all features.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You must reload the switch for the configuration to take effect.

If you enter the **show sdm prefer** command before you enter the **reload** privileged EXEC command, the **show sdm prefer** command shows the template currently in use and the template that will become active after a reload.

Use the **no sdm prefer** command to set the switch to the default desktop template.

Table 2-4 lists the approximate numbers of each resource supported in each template.

Table 2-4 Approximate Number of Feature Resources Allowed by Each Template

Resource	Default	QoS	Dual IPv4 and IPv6
Unicast MAC addresses	8 K	8 K	8K
IPv4 IGMP groups	256	256	256
IPv4 MAC QoS ACEs	128	384	0
IPv4 MAC security ACEs	384	128	256

Examples

This example shows how to use the QoS template:

```
Switch(config)# sdm prefer qos
Switch(config)# exit
Switch# reload
```

This example shows how to configure the dual IPv4-and-IPv6 default template on a switch:

```
Switch(config)# sdm prefer dual-ipv4-and-ipv6 default
Switch(config)# exit
Switch# reload
```

You can verify your settings by entering the **show sdm prefer** privileged EXEC command.

Related Commands

Command	Description
show sdm prefer	Displays the current SDM template in use or displays the templates that can be used, with approximate resource allocation per feature.

service password-recovery

Use the **service password-recovery** global configuration command to enable the password-recovery mechanism (the default). This mechanism allows an end user with physical access to the switch to hold down the **Mode** button and interrupt the bootup process while the switch is powering up and to assign a new password. Use the **no** form of this command to disable part of the password-recovery functionality. When the password-recovery mechanism is disabled, interrupting the bootup process is allowed only if the user agrees to set the system back to the default configuration.

service password-recovery

no service password-recovery

Syntax Description

This command has no arguments or keywords.

Defaults

The password-recovery mechanism is enabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

As a system administrator, you can use the **no service password-recovery** command to disable some of the functionality of the password recovery feature by allowing an end user to reset a password only by agreeing to return to the default configuration.

To use the password-recovery procedure, a user with physical access to the switch holds down the **Mode** button while the unit powers up and for a second or two after the LED above port 1X turns off. When the button is released, the system continues with initialization.

If the password-recovery mechanism is disabled, this message appears:

```
The password-recovery mechanism has been triggered, but
is currently disabled. Access to the boot loader prompt
through the password-recovery mechanism is disallowed at
this point. However, if you agree to let the system be
reset back to the default system configuration, access
to the boot loader prompt can still be allowed.

Would you like to reset the system back to the default configuration (y/n)?
```

If the user chooses not to reset the system to the default configuration, the normal bootup process continues, as if the **Mode** button had not been pressed. If you choose to reset the system to the default configuration, the configuration file in flash memory is deleted, and the VLAN database file, *flash:vlan.dat* (if present), is deleted.

Note If you use the **no service password-recovery** command to control end user access to passwords, we recommend that you save a copy of the config file in a location away from the switch in case the end user uses the password recovery procedure and sets the system back to default values. Do not keep a backup copy of the config file on the switch.

If the switch is operating in VTP transparent mode, we recommend that you also save a copy of the vlan.dat file in a location away from the switch.

You can verify if password recovery is enabled or disabled by entering the **show version** privileged EXEC command.

Examples

This example shows how to disable password recovery on a switch so that a user can only reset a password by agreeing to return to the default configuration.

```
Switch(config)# no service-password recovery
Switch(config)# exit
```

Related Commands

Command	Description
show version	Displays version information for the hardware and firmware.

set

Use the **set** policy-map class configuration command to classify IP traffic by setting a Differentiated Services Code Point (DSCP) or an IP-precedence value in the packet. Use the **no** form of this command to remove traffic classification.

set {**dscp** *new-dscp* | [**ip**] **precedence** *new-precedence*}

no set {**dscp** *new-dscp* | [**ip**] **precedence** *new-precedence*}

Syntax Description

dscp *new-dscp*	New DSCP value assigned to the classified traffic. The range is 0 to 63. You also can enter a mnemonic name for a commonly used value.
[**ip**] **precedence** *new-precedence*	New IP-precedence value assigned to the classified traffic. The range is 0 to 7. You also can enter a mnemonic name for a commonly used value.

Defaults

No traffic classification is defined.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you have used the **set ip dscp p**olicy-map class configuration command, the switch changes this command to **set dscp** in the switch configuration. If you enter the **set ip dscp** policy-map class configuration command, this setting appears as **set dscp** in the switch configuration.

You can use the **set ip precedence** policy-map class configuration command or the **set precedence** policy-map class configuration command. This setting appears as **set ip precedence** in the switch configuration.

The **set** command is mutually exclusive with the **trust** policy-map class configuration command within the same policy map.

For the **set dscp** *new-dscp* or the **set ip precedence** *new-precedence* command, you can enter a mnemonic name for a commonly used value. For example, you can enter the **set dscp af11** command, which is the same as entering the **set dscp 10** command. You can enter the **set ip precedence critical** command, which is the same as entering the **set ip precedence 5** command. For a list of supported mnemonics, enter the **set dscp ?** or the **set ip precedence ?** command to see the command-line help strings.

To return to policy-map configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.

Examples

This example shows how to assign DSCP 10 to all FTP traffic without any policers:

```
Switch(config)# policy-map policy_ftp
Switch(config-pmap)# class ftp_class
Switch(config-pmap-c)# set dscp 10
Switch(config-pmap)# exit
```

You can verify your settings by entering the **show policy-map** privileged EXEC command.

Related Commands

Command	Description
show port-security	Displays QoS policy maps.
trust	Defines a trust state for traffic classified through the **class** policy-map configuration command or the **class-map** global configuration command.

setup

Use the **setup** privileged EXEC command to configure the switch with its initial configuration.

setup

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you use the **setup** command, make sure that you have this information:

- IP address and network mask
- Password strategy for your environment
- Whether the switch will be used as the cluster command switch and the cluster name

When you enter the **setup** command, an interactive dialog, called the System Configuration Dialog, appears. It guides you through the configuration process and prompts you for information. The values shown in brackets next to each prompt are the default values last set by using either the **setup** command facility or the **configure** privileged EXEC command.

Help text is provided for each prompt. To access help text, press the question mark (**?**) key at a prompt.

To return to the privileged EXEC prompt without making changes and without running through the entire System Configuration Dialog, press **Ctrl-C**.

When you complete your changes, the setup program shows you the configuration command script that was created during the setup session. You can save the configuration in NVRAM or return to the setup program or the command-line prompt without saving it.

Examples

This is an example of output from the **setup** command:

```
Switch# setup
--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.

Basic management setup configures only enough connectivity
for management of the system, extended setup will ask you
to configure each interface on the system.

Would you like to enter basic management setup? [yes/no]: yes
Configuring global parameters:
```

```
Enter host name [Switch]:host-name

  The enable secret is a password used to protect access to
  privileged EXEC and configuration modes. This password, after
  entered, becomes encrypted in the configuration.
  Enter enable secret: enable-secret-password

  The enable password is used when you do not specify an
  enable secret password, with some older software versions, and
  some boot images.
  Enter enable password: enable-password

  The virtual terminal password is used to protect
  access to the router over a network interface.
  Enter virtual terminal password: terminal-password

  Configure SNMP Network Management? [no]: yes
  Community string [public]:

Current interface summary
Any interface listed with OK? value "NO" does not have a valid configuration

Interface                  IP-Address      OK? Method Status                Protocol
Vlan1                      172.20.135.202  YES NVRAM  up                    up

GigabitEthernet0/1         unassigned      YES unset  up                    up

GigabitEthernet0/2         unassigned      YES unset  up                    down

<output truncated>

Port-channel1              unassigned      YES unset  up                    down

Enter interface name used to connect to the
management network from the above interface summary: vlan1

Configuring interface vlan1:
Configure IP on this interface? [yes]: yes
IP address for this interface: ip_address
Subnet mask for this interface [255.0.0.0]: subnet_mask

Would you like to enable as a cluster command switch? [yes/no]: yes

Enter cluster name: cluster-name

The following configuration command script was created:

hostname host-name
enable secret 5 $1$LiBw$0Xc1wyT.PXPkuhFwqyhVi0
enable password enable-password
line vty 0 15
password terminal-password
snmp-server community public
!
no ip routing
!
interface GigabitEthernet0/1
no ip address
!
interface GigabitEthernet0/2
no ip address
!
```

```
cluster enable cluster-name
!
end
Use this configuration? [yes/no]: yes
!
[0] Go to the IOS command prompt without saving this config.

[1] Return back to the setup without saving this config.

[2] Save this configuration to nvram and exit.

Enter your selection [2]:
```

Related Commands

Command	Description
show running-config	Displays the running configuration on the switch.
show version	Displays version information for the hardware and firmware.

setup express

Use the **setup express** global configuration command to enable Express Setup mode. Use the **no** form of this command to disable Express Setup mode.

setup express

no setup express

Syntax Description

This command has no arguments or keywords.

Defaults

Express Setup is enabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When Express Setup is enabled on a new (unconfigured) switch, pressing the Mode button for 2 seconds activates Express Setup. You can access the switch through an Ethernet port by using the IP address 10.0.0.1 and then can configure the switch with the web-based Express Setup program or the command-line interface (CLI)-based setup program.

When you press the Mode button for 2 seconds on a configured switch, the LEDs above the Mode button start blinking. If you press the Mode button for a total of 10 seconds, the switch configuration is deleted, and the switch reboots. The switch can then be configured like a new switch, either through the web-based Express Setup program or the CLI-based setup program.

Note As soon as you make any change to the switch configuration (including entering *no* at the beginning of the CLI-based setup program), configuration by Express Setup is no longer available. You can only run Express Setup again by pressing the Mode button for 10 seconds. This deletes the switch configuration and reboots the switch.

If Express Setup is active on the switch, entering the **write memory** or **copy running-configuration startup-configuration** privileged EXEC commands deactivates Express Setup. The IP address 10.0.0.1 is no longer valid on the switch, and your connection using this IP address ends.

The primary purpose of the **no setup express** command is to prevent someone from deleting the switch configuration by pressing the Mode button for 10 seconds.

Examples

This example shows how to enable Express Setup mode:

```
Switch(config)# setup express
```

You can verify that Express Setup mode is enabled by pressing the Mode button:

- On an unconfigured switch, the LEDs above the Mode button turn solid green after 3 seconds.
- On a configured switch, the mode LEDs begin blinking after 2 seconds and turn solid green after 10 seconds.

Caution If you *hold* the Mode button down for a total of 10 seconds, the configuration is deleted, and the switch reboots.

This example shows how to disable Express Setup mode:

```
Switch(config)# no setup express
```

You can verify that Express Setup mode is disabled by pressing the Mode button. The mode LEDs do not turn solid green *or* begin blinking green if Express Setup mode is not enabled on the switch.

Related Commands

Command	Description
show setup express	Displays if Express Setup mode is active.

show access-lists

Use the **show access-lists** privileged EXEC command to display access control lists (ACLs) configured on the switch.

show access-lists [*name* | *number* | **hardware counters** | **ipc**]

Syntax Description

name	(Optional) Name of the ACL.
number	(Optional) ACL number. The range is 1 to 2699.
hardware counters	(Optional) Display global hardware ACL statistics for switched and routed packets.
ipc	(Optional) Display Interprocess Communication (IPC) protocol access-list configuration download information.

Note Though visible in the command-line help strings, the **rate-limit** keywords are not supported.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(52)SE	This command was introduced.

Usage Guidelines

The switch supports only IP standard and extended access control lists. Therefore, the allowed numbers are only 1 to 199 and 1300 to 2699.

Examples

This is an example of output from the **show access-lists** command:

```
Switch# show access-lists
Standard IP access list 1
    10 permit 1.1.1.1
    20 permit 2.2.2.2
    30 permit any
    40 permit 0.255.255.255, wildcard bits 12.0.0.0
Standard IP access list videowizard_1-1-1-1
    10 permit 1.1.1.1
Standard IP access list videowizard_10-10-10-10
    10 permit 10.10.10.10
Extended IP access list 121
    10 permit ahp host 10.10.10.10 host 20.20.10.10 precedence routine
Extended IP access list CMP-NAT-ACL
    Dynamic Cluster-HSRP deny   ip any any
    10 deny ip any host 19.19.11.11
    20 deny ip any host 10.11.12.13
    Dynamic Cluster-NAT permit ip any any
    10 permit ip host 10.99.100.128 any
    20 permit ip host 10.46.22.128 any
```

```
30 permit ip host 10.45.101.64 any
40 permit ip host 10.45.20.64 any
50 permit ip host 10.213.43.128 any
60 permit ip host 10.91.28.64 any
70 permit ip host 10.99.75.128 any
80 permit ip host 10.38.49.0 any
```

Related Commands

Command	Description
access-list	Configures a standard or extended numbered access control list on the switch.
ip access list	Configures a named IP access control list on the switch.

show archive status

Use the show **archive status** privileged EXEC command to display the status of a new image being downloaded to a switch with the HTTP or the TFTP protocol.

show archive status

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you use the **archive download-sw** privileged EXEC command to download an image to a TFTP server, the output of the **archive download-sw** command shows the status of the download.

If you do not have a TFTP server, you can use Network Assistant or the embedded device manager to download the image by using HTTP. The **show archive status** command shows the progress of the download.

Examples

These are examples of output from the **show archive status** command:

```
Switch# show archive status
IDLE: No upgrade in progress

Switch# show archive status
LOADING: Upgrade in progress

Switch# show archive status
EXTRACT: Extracting the image

Switch# show archive status
VERIFY: Verifying software

Switch# show archive status
RELOAD: Upgrade completed. Reload pending
```

Related Commands

Command	Description
archive download-sw	Downloads a new image from a TFTP server to the switch.

show boot

Use the **show boot** privileged EXEC command to display the settings of the boot environment variables.

show boot

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show boot** command. Table 2-5 describes each field in the display.

```
Switch# show boot
BOOT path-list: flash:c2928-lanlite-mz.122-44.SE.bin
Config file:         flash:/config.text
Private Config file: flash:/private-config
Enable Break:        no
Manual Boot:         yes
HELPER path-list:
NVRAM/Config file
      buffer size:   32768
```

Table 2-5 show boot Field Descriptions

Field	Description
BOOT path-list	Displays a semicolon separated list of executable files to try to load and execute when automatically booting up. If the BOOT environment variable is not set, the system attempts to load and execute the first executable image it can find by using a recursive, depth-first search through the flash file system. In a depth-first search of a directory, each encountered subdirectory is completely searched before continuing the search in the original directory. If the BOOT variable is set but the specified images cannot be loaded, the system attempts to boot up with the first bootable file that it can find in the flash file system.
Config file	Displays the filename that Cisco IOS uses to read and write a nonvolatile copy of the system configuration.
Private Config file	Displays the filename that Cisco IOS uses to read and write a nonvolatile copy of the system configuration.
Enable Break	Displays whether a break during booting up is enabled or disabled. If it is set to yes, on, or 1, you can interrupt the automatic bootup process by pressing the Break key on the console after the flash file system is initialized.

Table 2-5 show boot Field Descriptions

Field	Description
Manual Boot	Displays whether the switch automatically or manually boots up. If it is set to no or 0, the bootloader attempts to automatically boot up the system. If it is set to anything else, you must manually boot up the switch from the bootloader mode.
Helper path-list	Displays a semicolon separated list of loadable files to dynamically load during the bootloader initialization. Helper files extend or patch the functionality of the bootloader.
NVRAM/Config file buffer size	Displays the buffer size that Cisco IOS uses to hold a copy of the configuration file in memory. The configuration file cannot be larger than the buffer size allocation.

Related Commands

Command	Description
boot config-file	Specifies the filename that Cisco IOS uses to read and write a nonvolatile copy of the system configuration.
boot enable-break	Enables interrupting the automatic boot process.
boot manual	Enables manually booting up the switch during the next bootup cycle.
boot private-config-file	Specifies the filename that Cisco IOS uses to read and write a nonvolatile copy of the private configuration.
boot system	Specifies the Cisco IOS image to load during the next bootup cycle.

show cable-diagnostics tdr

Use the **show cable-diagnostics tdr** privileged EXEC command to display the Time Domain Reflector (TDR) results.

show cable-diagnostics tdr interface *interface-id*

Syntax Description

interface-id	Specify the interface on which TDR was run.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

TDR is supported only on 10/100 and 10/100/1000 copper Ethernet ports. It is not supported on SFP module ports. For more information about TDR, see the software configuration guide for this release.

Examples

This is an example of output from the **show cable-diagnostics tdr interface** *interface-id* command:

```
Switch# show cable-diagnostics tdr interface gigabitethernet0/2
TDR test last run on: March 01 20:15:40
Interface Speed Local pair Pair length        Remote pair Pair status
--------- ----- ---------- ------------------ ----------- --------------------
Gi0/2     auto  Pair A     0    +/- 2  meters N/A         Open

                Pair B     0    +/- 2  meters N/A         Open
                Pair C     0    +/- 2  meters N/A         Open
                Pair D     0    +/- 2  meters N/A         Open
```

Table 2-6 lists the descriptions of the fields in the **show cable-diagnostics tdr** command output.

Table 2-6 Fields Descriptions for the show cable-diagnostics tdr Command Output

Field	Description
Interface	Interface on which TDR was run.
Speed	Speed of connection.
Local pair	Name of the pair of wires that TDR is testing on the local interface.
Pair length	Location on the cable where the problem is, with respect to your switch. TDR can only find the location in one of these cases: • The cable is properly connected, the link is up, and the interface speed is 1000 Mb/s. • The cable is open. • The cable has a short.

Table 2-6 Fields Descriptions for the show cable-diagnostics tdr Command Output (continued)

Field	Description
Remote pair	Name of the pair of wires to which the local pair is connected. TDR can learn about the remote pair only when the cable is properly connected and the link is up.
Pair status	The status of the pair of wires on which TDR is running: • Normal—The pair of wires is properly connected. • Not completed—The test is running and is not completed. • Not supported—The interface does not support TDR. • Open—The pair of wires is open. • Shorted—The pair of wires is shorted.

This is an example of output from the **show interfaces** *interface-id* command when TDR is running:

```
Switch# show interfaces gigabitethernet0/2
gigabitethernet0/2 is up, line protocol is up (connected: TDR in Progress)
```

This is an example of output from the **show cable-diagnostics tdr interface** *interface-id* command when TDR is not running:

```
Switch# show cable-diagnostics tdr interface gigabitethernet0/2
% TDR test was never issued on Gi0/2
```

If an interface does not support TDR, this message appears:

```
% TDR test is not supported on switch 1
```

Related Commands

Command	Description
test cable-diagnostics tdr	Enables and runs TDR on an interface.

show cluster

Use the **show cluster** user EXEC command to display the cluster status and a summary of the cluster to which the switch belongs. This command can be entered on the cluster command switch and cluster member switches.

show cluster

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you enter this command on a switch that is not a cluster member, the error message `Not a management cluster member` appears.

On a cluster member switch, this command displays the identity of the cluster command switch, the switch member number, and the state of its connectivity with the cluster command switch.

On a cluster command switch, this command displays the cluster name and the total number of members. It also shows the cluster status and time since the status changed. If redundancy is enabled, it displays the primary and secondary command-switch information.

Examples

This is an example of output when the **show cluster** command is entered on the active cluster command switch:

```
Switch> show cluster
Command switch for cluster "Ajang"
        Total number of members:        7
        Status:                         1 members are unreachable
        Time since last status change:  0 days, 0 hours, 2 minutes
        Redundancy:                     Enabled
                Standby command switch: Member 1
                Standby Group:          Ajang_standby
                Standby Group Number:   110
        Heartbeat interval:             8
        Heartbeat hold-time:            80
        Extended discovery hop count:   3
```

This is an example of output when the **show cluster** command is entered on a cluster member switch:

```
Switch1> show cluster
Member switch for cluster "hapuna"
        Member number:                  3
        Management IP address:          192.192.192.192
        Command switch mac address:     0000.0c07.ac14
        Heartbeat interval:             8
        Heartbeat hold-time:            80
```

This is an example of output when the **show cluster** command is entered on a cluster member switch that is configured as the standby cluster command switch:

```
Switch> show cluster
Member switch for cluster "hapuna"
        Member number:                  3 (Standby command switch)
        Management IP address:          192.192.192.192
        Command switch mac address:     0000.0c07.ac14
        Heartbeat interval:             8
        Heartbeat hold-time:            80
```

This is an example of output when the **show cluster** command is entered on the cluster command switch that has lost connectivity with member 1:

```
Switch> show cluster
Command switch for cluster "Ajang"
        Total number of members:        7
        Status:                         1 members are unreachable
        Time since last status change:  0 days, 0 hours, 5 minutes
        Redundancy:                     Disabled
        Heartbeat interval:             8
        Heartbeat hold-time:            80
        Extended discovery hop count:   3
```

This is an example of output when the **show cluster** command is entered on a cluster member switch that has lost connectivity with the cluster command switch:

```
Switch> show cluster
Member switch for cluster "hapuna"
        Member number:                  <UNKNOWN>
        Management IP address:          192.192.192.192
        Command switch mac address:     0000.0c07.ac14
        Heartbeat interval:             8
        Heartbeat hold-time:            80
```

Related Commands

Command	Description
cluster enable	Enables a command-capable switch as the cluster command switch, assigns a cluster name, and optionally assigns a member number to it.
show cluster candidates	Displays a list of candidate switches.
show cluster members	Displays information about the cluster members.

show cluster candidates

Use the **show cluster candidates** privileged EXEC command to display a list of candidate switches.

show cluster candidates [**detail** | **mac-address** *H.H.H.*]

Syntax Description

detail	(Optional) Display detailed information for all candidates.
mac-address *H.H.H.*	(Optional) MAC address of the cluster candidate.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command is available only on the cluster command switch.

If the switch is not a cluster command switch, the command displays an empty line at the prompt.

The SN in the display means *switch member number*. If E appears in the SN column, it means that the switch is discovered through extended discovery. If E does not appear in the SN column, it means that the *switch member number* is the upstream neighbor of the candidate switch. The hop count is the number of devices the candidate is from the cluster command switch.

Examples

This is an example of output from the **show cluster candidates** command:

```
Switch> show cluster candidates
                                                                |---Upstream---|
        MAC Address    Name         Device Type      PortIf  FEC Hops SN PortIf  FEC
        00d0.7961.c4c0 StLouis-2    WS-C2918-12T Gi0/1        2   1  Fa0/11
        00d0.bbf5.e900 ldf-dist-128 WS-C3524-XL      Fa0/7        1   0  Fa0/24
        00e0.1e7e.be80 1900_Switch  1900             3        0   1   0  Fa0/11
        00e0.1e9f.7a00 Surfers-24   WS-C2924-XL      Fa0/5        1   0  Fa0/3
        00e0.1e9f.8c00 Surfers-12-2 WS-C2912-XL      Fa0/4        1   0  Fa0/7
        00e0.1e9f.8c40 Surfers-12-1 WS-C2912-XL      Fa0/1        1   0  Fa0/9
```

This is an example of output from the **show cluster candidates** command that uses the MAC address of a cluster member switch directly connected to the cluster command switch:

```
Switch> show cluster candidates mac-address 00d0.7961.c4c0
Device 'Tahiti-12' with mac address number 00d0.7961.c4c0
        Device type:            cisco WS-2918-12T
        Upstream MAC address:   00d0.796d.2f00 (Cluster Member 0)
        Local port:             Gi0/1   FEC number:
        Upstream port:          Gi0/11  FEC Number:
Hops from cluster edge: 1
        Hops from command device: 1
```

This is an example of output from the **show cluster candidates** command that uses the MAC address of a cluster member switch three hops from the cluster edge:

```
Switch> show cluster candidates mac-address 0010.7bb6.1cc0
Device 'Ventura' with mac address number 0010.7bb6.1cc0
        Device type:            cisco WS-C2912MF-XL
        Upstream MAC address:   0010.7bb6.1cd4
        Local port:             Fa2/1   FEC number:
        Upstream port:          Fa0/24  FEC Number:
        Hops from cluster edge: 3
        Hops from command device: -
```

This is an example of output from the **show cluster candidates detail** command:

```
Switch> show cluster candidates detail
Device 'Tahiti-12' with mac address number 00d0.7961.c4c0
        Device type:            cisco WS-C3512-XL
        Upstream MAC address:   00d0.796d.2f00 (Cluster Member 1)
        Local port:             Fa0/3   FEC number:
        Upstream port:          Fa0/13  FEC Number:
        Hops from cluster edge: 1
        Hops from command device: 2
Device '1900_Switch' with mac address number 00e0.1e7e.be80
        Device type:            cisco 1900
        Upstream MAC address:   00d0.796d.2f00 (Cluster Member 2)
        Local port:             3       FEC number: 0
        Upstream port:          Fa0/11  FEC Number:
        Hops from cluster edge: 1
        Hops from command device: 2
Device 'Surfers-24' with mac address number 00e0.1e9f.7a00
        Device type:            cisco WS-C2924-XL
        Upstream MAC address:   00d0.796d.2f00 (Cluster Member 3)
        Local port:             Fa0/5   FEC number:
        Upstream port:          Fa0/3   FEC Number:
        Hops from cluster edge: 1
        Hops from command device: 2
```

Related Commands

Command	Description
show cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.
show cluster members	Displays information about the cluster members.

show cluster members

Use the **show cluster members** privileged EXEC command to display information about the cluster members.

show cluster members [*n* | **detail**]

Syntax Description

n	(Optional) Number that identifies a cluster member. The range is 0 to 15.
detail	(Optional) Display detailed information for all cluster members.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command is available only on the cluster command switch.

If the cluster has no members, this command displays an empty line at the prompt.

Examples

This is an example of output from the **show cluster members** command. The SN in the display means *switch number.*

```
Switch# show cluster members
                                              |---Upstream---|
SN MAC Address    Name         PortIf FEC Hops   SN PortIf  FEC  State
0  0002.4b29.2e00 StLouis1                0                  Up   (Cmdr)
1  0030.946c.d740 tal-switch-1 Fa0/13      1     0  Gi0/1      Up
2  0002.b922.7180 nms-2820     10      0   2     1  Fa0/18     Up
3  0002.4b29.4400 SanJuan2     Gi0/1       2     1  Fa0/11     Up
4  0002.4b28.c480 GenieTest    Gi0/2       2     1  Fa0/9      Up
```

This is an example of output from the **show cluster members** for cluster member 3:

```
Switch# show cluster members 3
Device 'SanJuan2' with member number 3
        Device type:            cisco WS-C2918
        MAC address:            0002.4b29.4400
        Upstream MAC address:   0030.946c.d740 (Cluster member 1)
        Local port:             Gi0/1   FEC number:
        Upstream port:          Gi0/11  FEC Number:
        Hops from command device: 2
```

This is an example of output from the **show cluster members detail** command:

```
Switch# show cluster members detail
Device 'StLouis1' with member number 0 (Command Switch)
        Device type:            cisco WS-C2918
        MAC address:            0002.4b29.2e00
        Upstream MAC address:
        Local port:                     FEC number:
        Upstream port:                  FEC Number:
        Hops from command device: 0
```

```
Device 'tal-switch-14' with member number 1
        Device type:            cisco WS-C3548-XL
        MAC address:            0030.946c.d740
        Upstream MAC address:   0002.4b29.2e00 (Cluster member 0)
        Local port:             Fa0/13  FEC number:
        Upstream port:          Gi0/1   FEC Number:
        Hops from command device: 1
Device 'nms-2820' with member number 2
        Device type:            cisco 2820
        MAC address:            0002.b922.7180
        Upstream MAC address:   0030.946c.d740 (Cluster member 1)
        Local port:             10      FEC number: 0
        Upstream port:          Fa0/18  FEC Number:
        Hops from command device: 2
Device 'SanJuan2' with member number 3
        Device type:            cisco WS-C2918
        MAC address:            0002.4b29.4400
        Upstream MAC address:   0030.946c.d740 (Cluster member 1)
        Local port:             Gi0/1   FEC number:
        Upstream port:          Fa0/11  FEC Number:
        Hops from command device: 2
Device 'GenieTest' with member number 4
        Device type:            cisco SeaHorse
        MAC address:            0002.4b28.c480
        Upstream MAC address:   0030.946c.d740 (Cluster member 1)
        Local port:             Gi0/2   FEC number:
        Upstream port:          Fa0/9   FEC Number:
        Hops from command device: 2
Device 'Palpatine' with member number 5
        Device type:            cisco WS-C2924M-XL
        MAC address:            00b0.6404.f8c0
        Upstream MAC address:   0002.4b29.2e00 (Cluster member 0)
        Local port:             Gi2/1   FEC number:
        Upstream port:          Gi0/7   FEC Number:
        Hops from command device: 1
```

Related Commands

Command	Description
show cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.
show cluster candidates	Displays a list of candidate switches.

show controllers cpu-interface

Use the **show controllers cpu-interface** privileged EXEC command to display the state of the CPU network interface ASIC and the send and receive statistics for packets reaching the CPU.

show controllers cpu-interface

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This display provides information that might be useful for Cisco technical support representatives troubleshooting the switch.

Examples

This is a partial output example from the **show controllers cpu-interface** command:

```
Switch# show controllers cpu-interface
cpu-queue-frames  retrieved  dropped    invalid    hol-block
----------------- ---------- ---------- ---------- ----------
rpc               4523063    0          0          0
stp               1545035    0          0          0
ipc               1903047    0          0          0
routing protocol  96145      0          0          0
L2 protocol       79596      0          0          0
remote console    0          0          0          0
sw forwarding     5756       0          0          0
host              225646     0          0          0
broadcast         46472      0          0          0
cbt-to-spt        0          0          0          0
igmp snooping     68411      0          0          0
icmp              0          0          0          0
logging           0          0          0          0
rpf-fail          0          0          0          0
queue14           0          0          0          0
cpu heartbeat     1710501    0          0          0

Supervisor ASIC receive-queue parameters
----------------------------------------
 queue 0 maxrecevsize 5EE pakhead 1419A20 paktail 13EAED4
 queue 1 maxrecevsize 5EE pakhead 15828E0 paktail 157FBFC
 queue 2 maxrecevsize 5EE pakhead 1470D40 paktail 1470FE4
 queue 3 maxrecevsize 5EE pakhead 19CDDD0 paktail 19D02C8

<output truncated>

Supervisor ASIC Mic Registers
-----------------------------
```

```
MicDirectPollInfo               80000800
MicIndicationsReceived          00000000
MicInterruptsReceived           00000000
MicPcsInfo                      0001001F
MicPlbMasterConfiguration       00000000
MicRxFifosAvailable             00000000
MicRxFifosReady                 0000BFFF
MicTimeOutPeriod:       FrameTOPeriod: 00000EA6 DirectTOPeriod: 00004000

<output truncated>

MicTransmitFifoInfo:
Fifo0:   StartPtrs:     038C2800        ReadPtr:        038C2C38
        WritePtrs:      038C2C38        Fifo_Flag:      8A800800
        Weights:        001E001E
Fifo1:  StartPtr:       03A9BC00        ReadPtr:        03A9BC60
        WritePtrs:      03A9BC60        Fifo_Flag:      89800400
        writeHeaderPtr: 03A9BC60
Fifo2:  StartPtr:       038C8800        ReadPtr:        038C88E0
        WritePtrs:      038C88E0        Fifo_Flag:      88800200
        writeHeaderPtr: 038C88E0
Fifo3:  StartPtr:       03C30400        ReadPtr:        03C30638
        WritePtrs:      03C30638        Fifo_Flag:      89800400
        writeHeaderPtr: 03C30638
Fifo4:  StartPtr:       03AD5000        ReadPtr:        03AD50A0
        WritePtrs:      03AD50A0        Fifo_Flag:      89800400
        writeHeaderPtr: 03AD50A0
Fifo5:  StartPtr:       03A7A600        ReadPtr:        03A7A600
        WritePtrs:      03A7A600        Fifo_Flag:      88800200
        writeHeaderPtr: 03A7A600
Fifo6:  StartPtr:       03BF8400        ReadPtr:        03BF87F0
        WritePtrs:      03BF87F0        Fifo_Flag:      89800400

<output truncated>
```

Related Commands

Command	Description
show controllers ethernet-controller	Displays per-interface send and receive statistics read from the hardware or the interface internal registers.
show interfaces	Displays the administrative and operational status of all interfaces or a specified interface.

show controllers ethernet-controller

Use the **show controllers ethernet-controller** privileged EXEC command without keywords to display per-interface send and receive statistics read from the hardware. Use with the **phy** keyword to display the interface internal registers or the **port-asic** keyword to display information about the port ASIC.

show controllers ethernet-controller [*interface-id*] [**phy** [**detail**]] [**port-asic** {**configuration** | **statistics**}] [**fastethernet 0**]

Syntax Description

interface-id	The physical interface (including type, module, and port number).
phy	(Optional) Display the status of the internal registers on the switch physical layer device (PHY) for the device or the interface. This display includes the operational state of the automatic medium-dependent interface crossover (auto-MDIX) feature on an interface.
detail	(Optional) Display details about the PHY internal registers.
port-asic	(Optional) Display information about the port ASIC internal registers.
configuration	Display port ASIC internal register configuration.
statistics	Display port ASIC statistics, including the Rx/Sup Queue and miscellaneous statistics.

Command Modes

Privileged EXEC (only supported with the *interface-id* keywords in user EXEC mode)

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This display without keywords provides traffic statistics, basically the RMON statistics for all interfaces or for the specified interface.

When you enter the **phy** or **port-asic** keywords, the displayed information is useful primarily for Cisco technical support representatives troubleshooting the switch.

Examples

This is an example of output from the **show controllers ethernet-controller** command for an interface. Table 2-7 describes the *Transmit* fields, and Table 2-8 describes the *Receive* fields.

```
Switch# show controllers ethernet-controller gigabitethernet0/1
Transmit GigabitEthernet0/1              Receive
         0 Bytes                                 0 Bytes
         0 Unicast frames                        0 Unicast frames
         0 Multicast frames                      0 Multicast frames
         0 Broadcast frames                      0 Broadcast frames
         0 Too old frames                        0 Unicast bytes
         0 Deferred frames                       0 Multicast bytes
         0 MTU exceeded frames                   0 Broadcast bytes
         0 1 collision frames                    0 Alignment errors
         0 2 collision frames                    0 FCS errors
         0 3 collision frames                    0 Oversize frames
         0 4 collision frames                    0 Undersize frames
         0 5 collision frames                    0 Collision fragments
         0 6 collision frames
         0 7 collision frames                    0 Minimum size frames
         0 8 collision frames                    0 65 to 127 byte frames
         0 9 collision frames                    0 128 to 255 byte frames
         0 10 collision frames                   0 256 to 511 byte frames
         0 11 collision frames                   0 512 to 1023 byte frames
         0 12 collision frames                   0 1024 to 1518 byte frames
         0 13 collision frames                   0 Overrun frames
         0 14 collision frames                   0 Pause frames
         0 15 collision frames                   0 Symbol error frames
         0 Excessive collisions
         0 Late collisions                       0 Invalid frames, too large
         0 VLAN discard frames                   0 Valid frames, too large
         0 Excess defer frames                   0 Invalid frames, too small
         0 64 byte frames                        0 Valid frames, too small
         0 127 byte frames
         0 255 byte frames                       0 Too old frames
         0 511 byte frames                       0 Valid oversize frames
         0 1023 byte frames                      0 System FCS error frames
         0 1518 byte frames                      0 RxPortFifoFull drop frame
         0 Too large frames
         0 Good (1 coll) frames
```

Table 2-7 Transmit Field Descriptions

Field	Description
Bytes	The total number of bytes sent on an interface.
Unicast Frames	The total number of frames sent to unicast addresses.
Multicast frames	The total number of frames sent to multicast addresses.
Broadcast frames	The total number of frames sent to broadcast addresses.
Too old frames	The number of frames dropped on the egress port because the packet aged out.
Deferred frames	The number of frames that are not sent after the time exceeds 2*maximum-packet time.
MTU exceeded frames	The number of frames that are larger than the maximum allowed frame size.
1 collision frames	The number of frames that are successfully sent on an interface after one collision occurs.
2 collision frames	The number of frames that are successfully sent on an interface after two collisions occur.
3 collision frames	The number of frames that are successfully sent on an interface after three collisions occur.
4 collision frames	The number of frames that are successfully sent on an interface after four collisions occur.

Table 2-7 Transmit Field Descriptions (continued)

Field	Description
5 collision frames	The number of frames that are successfully sent on an interface after five collisions occur.
6 collision frames	The number of frames that are successfully sent on an interface after six collisions occur.
7 collision frames	The number of frames that are successfully sent on an interface after seven collisions occur.
8 collision frames	The number of frames that are successfully sent on an interface after eight collisions occur.
9 collision frames	The number of frames that are successfully sent on an interface after nine collisions occur.
10 collision frames	The number of frames that are successfully sent on an interface after ten collisions occur.
11 collision frames	The number of frames that are successfully sent on an interface after 11 collisions occur.
12 collision frames	The number of frames that are successfully sent on an interface after 12 collisions occur.
13 collision frames	The number of frames that are successfully sent on an interface after 13 collisions occur.
14 collision frames	The number of frames that are successfully sent on an interface after 14 collisions occur.
15 collision frames	The number of frames that are successfully sent on an interface after 15 collisions occur.
Excessive collisions	The number of frames that could not be sent on an interface after 16 collisions occur.
Late collisions	After a frame is sent, the number of frames dropped because late collisions were detected while the frame was sent.
VLAN discard frames	The number of frames dropped on an interface because the CFI[1] bit is set.
Excess defer frames	The number of frames that are not sent after the time exceeds the maximum-packet time.
64 byte frames	The total number of frames sent on an interface that are 64 bytes.
127 byte frames	The total number of frames sent on an interface that are from 65 to 127 bytes.
255 byte frames	The total number of frames sent on an interface that are from 128 to 255 bytes.
511 byte frames	The total number of frames sent on an interface that are from 256 to 511 bytes.
1023 byte frames	The total number of frames sent on an interface that are from 512 to 1023 bytes.
1518 byte frames	The total number of frames sent on an interface that are from 1024 to 1518 bytes.
Too large frames	The number of frames sent on an interface that are larger than the maximum allowed frame size.
Good (1 coll) frames	The number of frames that are successfully sent on an interface after one collision occurs. This value does not include the number of frames that are not successfully sent after one collision occurs.

1. CFI = Canonical Format Indicator

Table 2-8 Receive Field Descriptions

Field	Description
Bytes	The total amount of memory (in bytes) used by frames received on an interface, including the FCS[1] value and the incorrectly formed frames. This value excludes the frame header bits.
Unicast frames	The total number of frames successfully received on the interface that are directed to unicast addresses.
Multicast frames	The total number of frames successfully received on the interface that are directed to multicast addresses.
Broadcast frames	The total number of frames successfully received on an interface that are directed to broadcast addresses.

Table 2-8 Receive Field Descriptions (continued)

Field	Description
Unicast bytes	The total amount of memory (in bytes) used by unicast frames received on an interface, including the FCS value and the incorrectly formed frames. This value excludes the frame header bits.
Multicast bytes	The total amount of memory (in bytes) used by multicast frames received on an interface, including the FCS value and the incorrectly formed frames. This value excludes the frame header bits.
Broadcast bytes	The total amount of memory (in bytes) used by broadcast frames received on an interface, including the FCS value and the incorrectly formed frames. This value excludes the frame header bits.
Alignment errors	The total number of frames received on an interface that have alignment errors.
FCS errors	The total number of frames received on an interface that have a valid length (in bytes) but do not have the correct FCS values.
Oversize frames	The number of frames received on an interface that are larger than the maximum allowed frame size.
Undersize frames	The number of frames received on an interface that are smaller than 64 bytes.
Collision fragments	The number of collision fragments received on an interface.
Minimum size frames	The total number of frames that are the minimum frame size.
65 to 127 byte frames	The total number of frames that are from 65 to 127 bytes.
128 to 255 byte frames	The total number of frames that are from 128 to 255 bytes.
256 to 511 byte frames	The total number of frames that are from 256 to 511 bytes.
512 to 1023 byte frames	The total number of frames that are from 512 to 1023 bytes.
1024 to 1518 byte frames	The total number of frames that are from 1024 to 1518 bytes.
Overrun frames	The total number of overrun frames received on an interface.
Pause frames	The number of pause frames received on an interface.
Symbol error frames	The number of frames received on an interface that have symbol errors.
Invalid frames, too large	The number of frames received that were larger than maximum allowed MTU[2] size (including the FCS bits and excluding the frame header) and that have either an FCS error or an alignment error.
Valid frames, too large	The number of frames received on an interface that are larger than the maximum allowed frame size.
Invalid frames, too small	The number of frames received that are smaller than 64 bytes (including the FCS bits and excluding the frame header) and that have either an FCS error or an alignment error.
Valid frames, too small	The number of frames received on an interface that are smaller than 64 bytes (or 68 bytes for VLAN-tagged frames) and that have valid FCS values. The frame size includes the FCS bits but excludes the frame header bits.
Too old frames	The number of frames dropped on the ingress port because the packet aged out.
Valid oversize frames	The number of frames received on an interface that are larger than the maximum allowed frame size and have valid FCS values. The frame size includes the FCS value but does not include the VLAN tag.

Table 2-8 Receive Field Descriptions (continued)

Field	Description
System FCS error frames	The total number of frames received on an interface that have a valid length (in bytes) but that do not have the correct FCS values.
RxPortFifoFull drop frames	The total number of frames received on an interface that are dropped because the ingress queue is full.

1. FCS = frame check sequence
2. MTU = maximum transmission unit

This is an example of output from the **show controllers ethernet-controller phy** command for a specific interface:

```
Switch# show controllers ethernet-controller gigabitethernet0/2 phy
GigabitEthernet0/2 (gpn: 2, port-number: 2)
------------------------------------------------------------
============================================================
Port    Conf-Media   Active-Media Attached
------- ------------ ------------ -------------------------
Gi0/1   auto-select  none         0 -Not Present
Gi0/2   auto-select  none         0 -Not Present
============================================================
Other Information
------------------------------------------------------
Port asic num         : 0
Port asic port num    : 1
XCVR init completed   : 0
Embedded PHY          : not present
SFP presence index    : 0
SFP iter cnt          : 2564163d
SFP failed oper flag  : 0x00000000
IIC error cnt         : 0
IIC error dsb cnt     : 0
IIC max sts cnt       : 0
Chk for link status   : 1
Link Status           : 0
<output truncated>
```

This is an example of output from the **show controllers ethernet-controller port-asic configuration** command:

```
Switch# show controllers ethernet-controller port-asic configuration
============================================================================
Switch 1, PortASIC 0 Registers
----------------------------------------------------------------------------
DeviceType                          : 000101BC
Reset                               : 00000000
PmadMicConfig                       : 00000001
PmadMicDiag                         : 00000003
SupervisorReceiveFifoSramInfo       : 000007D0 000007D0 40000000
SupervisorTransmitFifoSramInfo      : 000001D0 000001D0 40000000
GlobalStatus                        : 00000800
IndicationStatus                    : 00000000
IndicationStatusMask                : FFFFFFFF
InterruptStatus                     : 00000000
InterruptStatusMask                 : 01FFE800
SupervisorDiag                      : 00000000
SupervisorFrameSizeLimit            : 000007C8
SupervisorBroadcast                 : 000A0F01
GeneralIO                           : 000003F9 00000000 00000004
```

```
StackPcsInfo                        : FFFF1000 860329BD 5555FFFF FFFFFFFF
                                      FF0FFF00 86020000 5555FFFF 00000000
StackRacInfo                        : 73001630 00000003 7F001644 00000003
                                      24140003 FD632B00 18E418E0 FFFFFFFF
StackControlStatus                  : 18E418E0
stackControlStatusMask              : FFFFFFFF
TransmitBufferFreeListInfo          : 00000854 00000800 00000FF8 00000000
                                      0000088A 0000085D 00000FF8 00000000
TransmitRingFifoInfo                : 00000016 00000016 40000000 00000000
                                      0000000C 0000000C 40000000 00000000
TransmitBufferInfo                  : 00012000 00000FFF 00000000 00000030
TransmitBufferCommonCount           : 00000F7A
TransmitBufferCommonCountPeak       : 0000001E
TransmitBufferCommonCommonEmpty     : 000000FF
NetworkActivity                     : 00000000 00000000 00000000 02400000
DroppedStatistics                   : 00000000
FrameLengthDeltaSelect              : 00000001
SneakPortFifoInfo                   : 00000000
MacInfo                             : 0EC0801C 00000001 0EC0801B 00000001
                                      00C0001D 00000001 00C0001E 00000001

<output truncated>
```

This is an example of output from the **show controllers ethernet-controller port-asic statistics** command:

```
Switch# show controllers ethernet-controller port-asic statistics
===============================================================================
 Switch 1, PortASIC 0 Statistics
-------------------------------------------------------------------------------
         0 RxQ-0, wt-0 enqueue frames            0 RxQ-0, wt-0 drop frames
   4118966 RxQ-0, wt-1 enqueue frames            0 RxQ-0, wt-1 drop frames
         0 RxQ-0, wt-2 enqueue frames            0 RxQ-0, wt-2 drop frames

         0 RxQ-1, wt-0 enqueue frames            0 RxQ-1, wt-0 drop frames
       296 RxQ-1, wt-1 enqueue frames            0 RxQ-1, wt-1 drop frames
   2836036 RxQ-1, wt-2 enqueue frames            0 RxQ-1, wt-2 drop frames

         0 RxQ-2, wt-0 enqueue frames            0 RxQ-2, wt-0 drop frames
         0 RxQ-2, wt-1 enqueue frames            0 RxQ-2, wt-1 drop frames
    158377 RxQ-2, wt-2 enqueue frames            0 RxQ-2, wt-2 drop frames

         0 RxQ-3, wt-0 enqueue frames            0 RxQ-3, wt-0 drop frames
         0 RxQ-3, wt-1 enqueue frames            0 RxQ-3, wt-1 drop frames
         0 RxQ-3, wt-2 enqueue frames            0 RxQ-3, wt-2 drop frames


        15 TxBufferFull Drop Count               0 Rx Fcs Error Frames
         0 TxBufferFrameDesc BadCrc16            0 Rx Invalid Oversize Frames
         0 TxBuffer Bandwidth Drop Cou           0 Rx Invalid Too Large Frames
         0 TxQueue Bandwidth Drop Coun           0 Rx Invalid Too Large Frames
         0 TxQueue Missed Drop Statist           0 Rx Invalid Too Small Frames
        74 RxBuffer Drop DestIndex Cou           0 Rx Too Old Frames
         0 SneakQueue Drop Count                 0 Tx Too Old Frames
         0 Learning Queue Overflow Fra           0 System Fcs Error Frames
         0 Learning Cam Skip Count

        15 Sup Queue 0 Drop Frames               0 Sup Queue 8 Drop Frames
         0 Sup Queue 1 Drop Frames               0 Sup Queue 9 Drop Frames
         0 Sup Queue 2 Drop Frames               0 Sup Queue 10 Drop Frames
         0 Sup Queue 3 Drop Frames               0 Sup Queue 11 Drop Frames
         0 Sup Queue 4 Drop Frames               0 Sup Queue 12 Drop Frames
         0 Sup Queue 5 Drop Frames               0 Sup Queue 13 Drop Frames
         0 Sup Queue 6 Drop Frames               0 Sup Queue 14 Drop Frames
```

```
         0 Sup Queue 7 Drop Frames                0 Sup Queue 15 Drop Frames
================================================================================
 Switch 1, PortASIC 1 Statistics
--------------------------------------------------------------------------------
         0 RxQ-0, wt-0 enqueue frames             0 RxQ-0, wt-0 drop frames
        52 RxQ-0, wt-1 enqueue frames             0 RxQ-0, wt-1 drop frames
         0 RxQ-0, wt-2 enqueue frames             0 RxQ-0, wt-2 drop frames

<output truncated>
```

Related Commands

Command	Description
show controllers cpu-interface	Displays the state of the CPU network ASIC and send and receive statistics for packets reaching the CPU.
show controllers tcam	Displays the state of registers for all ternary content addressable memory (TCAM) in the system and for TCAM interface ASICs that are CAM controllers.

show controllers tcam

Use the **show controllers tcam** privileged EXEC command to display the state of the registers for all ternary content addressable memory (TCAM) in the system and for all TCAM interface ASICs that are CAM controllers.

show controllers tcam [**asic** [**number**]] [**detail**]

Syntax Description

asic	(Optional) Display port ASIC TCAM information.
number	(Optional) Display information for the specified port ASIC number. The range is from 0 to 15.
detail	(Optional) Display detailed TCAM register information.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This display provides information that might be useful for Cisco technical support representatives troubleshooting the switch.

Examples

This is an example of output from the **show controllers tcam** command:

```
Switch# show controllers tcam
---------------------------------------------------------------------------
TCAM-0 Registers
---------------------------------------------------------------------------
  REV:    00B30103
  SIZE:   00080040
  ID:     00000000
  CCR:    00000000_F0000020

  RPID0:  00000000_00000000
  RPID1:  00000000_00000000
  RPID2:  00000000_00000000
  RPID3:  00000000_00000000

  HRR0:   00000000_E000CAFC
  HRR1:   00000000_00000000
  HRR2:   00000000_00000000
  HRR3:   00000000_00000000
  HRR4:   00000000_00000000
  HRR5:   00000000_00000000
  HRR6:   00000000_00000000
  HRR7:   00000000_00000000
<output truncated>

  GMR31:  FF_FFFFFFFF_FFFFFFFF
  GMR32:  FF_FFFFFFFF_FFFFFFFF
```

```
  GMR33:  FF_FFFFFFFF_FFFFFFFF

================================================================================
 TCAM related PortASIC 1 registers
================================================================================
LookupType:                    89A1C67D_24E35F00
LastCamIndex:                  0000FFE0
LocalNoMatch:                  000069E0
ForwardingRamBaseAddress:
                               00022A00 0002FE00 00040600 0002FE00 0000D400
                               00000000 003FBA00 00009000 00009000 00040600
                               00000000 00012800 00012900
```

Related Commands

Command	Description
show controllers cpu-interface	Displays the state of the CPU network ASIC and send and receive statistics for packets reaching the CPU.
show controllers ethernet-controller	Displays per-interface send and receive statistics read from the hardware or the interface internal registers.

show controllers utilization

Use the **show controllers utilization** user EXEC command to display bandwidth utilization on the switch or specific ports.

show controllers [*interface-id*] **utilization**

Syntax Description

interface-id	(Optional) ID of the switch interface.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show controllers utilization** command.

```
Switch> show controllers utilization
Port       Receive Utilization  Transmit Utilization
Fa0/1            0                    0
Fa0/2            0                    0
Fa0/3            0                    0
Fa0/4            0                    0
Fa0/5            0                    0
Fa0/6            0                    0
Fa0/7            0                    0
<output truncated>

<output truncated>

Switch Receive Bandwidth Percentage Utilization  : 0
Switch Transmit Bandwidth Percentage Utilization : 0

Switch Fabric Percentage Utilization : 0
```

This is an example of output from the **show controllers utilization** command on a specific port:

```
Switch> show controllers gigabitethernet0/1 utilization
Receive Bandwidth Percentage Utilization   : 0
Transmit Bandwidth Percentage Utilization  : 0
```

Table 2-9 show controllers utilization Field Descriptions

Field	Description
Receive Bandwidth Percentage Utilization	Displays the received bandwidth usage of the switch, which is the sum of the received traffic on all the ports divided by the switch receive capacity.

Table 2-9 show controllers utilization Field Descriptions

Field	Description
Transmit Bandwidth Percentage Utilization	Displays the transmitted bandwidth usage of the switch, which is the sum of the transmitted traffic on all the ports divided it by the switch transmit capacity.
Fabric Percentage Utilization	Displays the average of the transmitted and received bandwidth usage of the switch.

Related Commands

Command	Description
show controllers ethernet-controller	Displays the interface internal registers.

show dot1x

Use the **show dot1x** user EXEC command to display IEEE 802.1x statistics, administrative status, and operational status for the switch or for the specified port.

show dot1x [{**all** [**summary**] | **interface** *interface-id*} [**details** | **statistics**]]

Syntax Description

all [**summary**]	(Optional) Display the IEEE 802.1x status for all ports.
interface *interface-id*	(Optional) Display the IEEE 802.1x status for the specified port (including type, module, and port number).
details	(Optional) Display the IEEE 802.1x interface details.
statistics	(Optional) Display IEEE 802.1x statistics for the specified port.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you do not specify a port, global parameters and a summary appear. If you specify a port, details for that port appear.

If the port control is configured as unidirectional or bidirectional control and this setting conflicts with the switch configuration, the **show dot1x** {**all** | **interface** *interface-id*} privileged EXEC command output has this information:

```
ControlDirection          = In (Inactive)
```

Examples

This is an example of output from the **show dot1x** user EXEC command:

```
Switch> show dot1x
Sysauthcontrol              Enabled
Dot1x Protocol Version            2
Critical Recovery Delay         100
Critical EAPOL              Disabled
```

This is an example of output from the **show dot1x all** user EXEC command:

```
Switch> show dot1x all
Sysauthcontrol              Enabled
Dot1x Protocol Version            2
Critical Recovery Delay         100
Critical EAPOL              Disabled

Dot1x Info for GigabitEthernet0/1
----------------------------------
PAE                       = AUTHENTICATOR
PortControl               = AUTO
ControlDirection          = Both
```

```
HostMode                  = SINGLE_HOST
ReAuthentication          = Disabled
QuietPeriod               = 60
ServerTimeout             = 30
SuppTimeout               = 30
ReAuthPeriod              = 3600 (Locally configured)
ReAuthMax                 = 2
MaxReq                    = 2
TxPeriod                  = 30
RateLimitPeriod           = 0

<output truncated>
```

This is an example of output from the **show dot1x all summary** user EXEC command:

```
Interface       PAE     Client          Status
---------------------------------------------------------
Gi0/1         AUTH    none            UNAUTHORIZED
Gi0/2         AUTH    00a0.c9b8.0072  AUTHORIZED
Gi0/3         AUTH    none            UNAUTHORIZED
```

This is an example of output from the **show dot1x interface** *interface-id* user EXEC command:

```
Switch> show dot1x interface gigabitethernet0/2
Dot1x Info for GigabitEthernet0/2
-----------------------------------
PAE                       = AUTHENTICATOR
PortControl               = AUTO
ControlDirection          = In
HostMode                  = SINGLE_HOST
ReAuthentication          = Disabled
QuietPeriod               = 60
ServerTimeout             = 30
SuppTimeout               = 30
ReAuthPeriod              = 3600 (Locally configured)
ReAuthMax                 = 2
MaxReq                    = 2
TxPeriod                  = 30
RateLimitPeriod           = 0
```

This is an example of output from the **show dot1x interface** *interface-id* **details** user EXEC command:

```
Switch# show dot1x interface gigabitethernet0/2 details
Dot1x Info for GigabitEthernet0/2
-----------------------------------
PAE                       = AUTHENTICATOR
PortControl               = AUTO
ControlDirection          = Both
HostMode                  = SINGLE_HOST
ReAuthentication          = Disabled
QuietPeriod               = 60
ServerTimeout             = 30
SuppTimeout               = 30
ReAuthPeriod              = 3600 (Locally configured)
ReAuthMax                 = 2
MaxReq                    = 2
TxPeriod                  = 30
RateLimitPeriod           = 0

Dot1x Authenticator Client List Empty
```

This is an example of output from the **show dot1x interface** *interface-id* **details** commmand when a port is assigned to a guest VLAN and the host mode changes to multiple-hosts mode:

```
Switch# show dot1x interface gigabitethernet0/1 details
```

```
Dot1x Info for GigabitEthernet0/1
-----------------------------------
PAE                       = AUTHENTICATOR
PortControl               = AUTO
ControlDirection          = Both
HostMode                  = SINGLE_HOST
ReAuthentication          = Enabled
QuietPeriod               = 60
ServerTimeout             = 30
SuppTimeout               = 30
ReAuthPeriod              = 3600 (Locally configured)
ReAuthMax                 = 2
MaxReq                    = 2
TxPeriod                  = 30
RateLimitPeriod           = 0
Guest-Vlan                = 182

Dot1x Authenticator Client List Empty

Port Status               = AUTHORIZED
Authorized By             = Guest-Vlan
Operational HostMode      = MULTI_HOST
Vlan Policy               = 182
```

This is an example of output from the **show dot1x interface** *interface-id* **statistics** command. Table 2-10 describes the fields in the display.

```
Switch> show dot1x interface gigabitethernet0/2 statistics
Dot1x Authenticator Port Statistics for GigabitEthernet0/2
-------------------------------------------
RxStart = 0     RxLogoff = 0    RxResp = 1      RxRespID = 1
RxInvalid = 0   RxLenErr = 0    RxTotal = 2

TxReq = 2       TxReqID = 132   TxTotal = 134

RxVersion = 2   LastRxSrcMAC = 00a0.c9b8.0072
```

Table 2-10 show dot1x statistics Field Descriptions

Field	Description
RxStart	Number of valid EAPOL-start frames that have been received.
RxLogoff	Number of EAPOL-logoff frames that have been received.
RxResp	Number of valid EAP-response frames (other than response/identity frames) that have been received.
RxRespID	Number of EAP-response/identity frames that have been received.
RxInvalid	Number of EAPOL frames that have been received and have an unrecognized frame type.
RxLenError	Number of EAPOL frames that have been received in which the packet body length field is invalid.
RxTotal	Number of valid EAPOL frames of any type that have been received.
TxReq	Number of EAP-request frames (other than request/identity frames) that have been sent.
TxReqId	Number of Extensible Authentication Protocol (EAP)-request/identity frames that have been sent.

Table 2-10 show dot1x statistics Field Descriptions (continued)

Field	Description
TxTotal	Number of Extensible Authentication Protocol over LAN (EAPOL) frames of any type that have been sent.
RxVersion	Number of received packets in the IEEE 802.1x Version 1 format.
LastRxSrcMac	Source MAC address carried in the most recently received EAPOL frame.

Related Commands

Command	Description
dot1x default	Resets the IEEE 802.1x parameters to their default values.

show dtp

Use the **show dtp** privileged EXEC command to display Dynamic Trunking Protocol (DTP) information for the switch or for a specified interface.

show dtp [**interface** *interface-id*]

Syntax Description

interface *interface-id*	(Optional) Display port security settings for the specified interface. Valid interfaces include physical ports (including type, module, and port number).

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show dtp** command:

```
Switch# show dtp
Global DTP information
        Sending DTP Hello packets every 30 seconds
        Dynamic Trunk timeout is 300 seconds
        21 interfaces using DTP
```

This is an example of output from the **show dtp interface** command:

```
Switch# show dtp interface gigabitethernet0/1
DTP information for GigabitEthernet0/1:
  TOS/TAS/TNS:                              ACCESS/AUTO/ACCESS
  TOT/TAT/TNT:                              NATIVE/NEGOTIATE/NATIVE
  Neighbor address 1:                       000943A7D081
  Neighbor address 2:                       000000000000
  Hello timer expiration (sec/state):       1/RUNNING
  Access timer expiration (sec/state):      never/STOPPED
  Negotiation timer expiration (sec/state): never/STOPPED
  Multidrop timer expiration (sec/state):   never/STOPPED
  FSM state:                                S2:ACCESS
  # times multi & trunk                     0
  Enabled:                                  yes
  In STP:                                   no

  Statistics
  ----------
  3160 packets received (3160 good)
  0 packets dropped
      0 nonegotiate, 0 bad version, 0 domain mismatches, 0 bad TLVs, 0 other
  6320 packets output (6320 good)
      3160 native
  0 output errors
  0 trunk timeouts
  1 link ups, last link up on Mon Mar 01 1993, 01:02:29
  0 link downs
```

Related Commands

Command	Description
show interfaces trunk	Displays interface trunking information.

show eap

Use the **show eap** privileged EXEC command to display Extensible Authentication Protocol (EAP) registration and session information for the switch or for the specified port.

show eap {{**registrations** [**method** [*name*] | **transport** [*name*]]} | {**sessions** [**credentials** *name* [**interface** *interface-id*] | **interface** *interface-id* | **method** *name* | **transport** *name*]}} [**credentials** *name* | **interface** *interface-id* | **transport** *name*]

Syntax Description

registrations	Display EAP registration information.
method *name*	(Optional) Display EAP method registration information.
transport *name*	(Optional) Display EAP transport registration information.
sessions	Display EAP session information.
credentials *name*	(Optional) Display EAP method registration information.
interface *interface-id*	(Optional) Display the EAP information for the specified port (including type, module, and port number).

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you use the **show eap registrations** privileged EXEC command with these keywords, the command output shows this information:

- None—All the lower levels used by EAP and the registered EAP methods.
- **method** *name* keyword—The specified method registrations.
- **transport** *name* keyword—The specific lower-level registrations.

When you use the **show eap sessions** privileged EXEC command with these keywords, the command output shows this information:

- None—All active EAP sessions.
- **credentials** *name* keyword—The specified credentials profile.
- **interface** *interface-id* keyword—The parameters for the specified interface.
- **method** *name* keyword—The specified EAP method.
- **transport** *name* keyword—The specified lower layer.

Examples

This is an example of output from the **show eap registrations** privileged EXEC command:

```
Switch> show eap registrations
Registered EAP Methods:
  Method  Type            Name
    4     Peer            MD5

Registered EAP Lower Layers:
  Handle  Type            Name
    2     Authenticator   Dot1x-Authenticator
    1     Authenticator   MAB
```

This is an example of output from the **show eap registrations transport** privileged user EXEC command:

```
Switch> show eap registrations transport all
Registered EAP Lower Layers:
  Handle  Type            Name
    2     Authenticator   Dot1x-Authenticator
    1     Authenticator   MAB
```

This is an example of output from the **show eap sessions** privileged EXEC command:

```
Switch> show eap sessions
Role:                   Authenticator   Decision:               Fail
Lower layer:            Dot1x-AuthenticaInterface:              Gi0/1
Current method:         None            Method state:           Uninitialised
Retransmission count:   0  (max: 2)     Timer:                  Authenticator
ReqId Retransmit (timeout: 30s, remaining: 2s)
EAP handle:             0x5200000A      Credentials profile:    None
Lower layer context ID: 0x93000004      Eap profile name:       None
Method context ID:      0x00000000      Peer Identity:          None
Start timeout (s):      1               Retransmit timeout (s): 30 (30)
Current ID:             2               Available local methods: None

Role:                   Authenticator   Decision:               Fail
Lower layer:            Dot1x-AuthenticaInterface:              Gi0/2
Current method:         None            Method state:           Uninitialised
Retransmission count:   0  (max: 2)     Timer:                  Authenticator
ReqId Retransmit (timeout: 30s, remaining: 2s)
EAP handle:             0xA800000B      Credentials profile:    None
Lower layer context ID: 0x0D000005      Eap profile name:       None
Method context ID:      0x00000000      Peer Identity:          None
Start timeout (s):      1               Retransmit timeout (s): 30 (30)
Current ID:             2               Available local methods: None

<Output truncated>
```

This is an example of output from the **show eap sessions interface** *interface-id* privileged EXEC command:

```
Switch# show eap sessions gigabitethernet0/1
Role:                   Authenticator   Decision:               Fail
Lower layer:            Dot1x-AuthenticaInterface:              Gi0/1
Current method:         None            Method state:           Uninitialised
Retransmission count:   1  (max: 2)     Timer:                  Authenticator
ReqId Retransmit (timeout: 30s, remaining: 13s)
EAP handle:             0x5200000A      Credentials profile:    None
Lower layer context ID: 0x93000004      Eap profile name:       None
Method context ID:      0x00000000      Peer Identity:          None
Start timeout (s):      1               Retransmit timeout (s): 30 (30)
Current ID:             2               Available local methods: None
```

Related Commands

Command	Description
clear eap sessions	Clears EAP session information for the switch or for the specified port.

show env

Use the **show env** user EXEC command to display fan, temperature, redundant power system availability, and power information for the switch.

show env {**all** | **fan** | **power** | **rps** | **temperature**}

Syntax Description

all	Display both fan and temperature environmental status.
fan	Display the switch fan status.
power	Display the switch power status.
rps	Display whether an RPS 300 Redundant Power System is connected to the switch.
temperature	Display the switch temperature status.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show env all** command:

```
Switch> show env all
FAN is OK
TEMPERATURE is OK
POWER is OK
RPS is AVAILABLE
```

This is an example of output from the **show env fan** command:

```
Switch> show env fan
FAN is OK
```

show errdisable detect

Use the **show errdisable detect** user EXEC command to display error-disabled detection status.

show errdisable detect

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

A displayed `gbic-invalid` error reason refers to an invalid small form-factor pluggable (SFP) module.

The error-disable reasons in the command ouput are listed in alphabetical order. The mode column shows how error disable is configured for each feature.

You can configure error-disabled detection in these modes:

- port mode—The entire physical port is error disabled if a violation occurs.
- vlan mode—The VLAN is error disabled if a violation occurs.
- port/vlan mode—The entire physical port is error disabled on some ports and per-VLAN error disabled on other ports.

Examples

This is an example of output from the **show errdisable detect** command:

```
Switch> show errdisable detect
ErrDisable Reason    Detection    Mode
-----------------    ---------    ----
arp-inspection       Enabled      port
bpduguard            Enabled      vlan
channel-misconfig    Enabled      port
community-limit      Enabled      port
dhcp-rate-limit      Enabled      port
dtp-flap             Enabled      port
gbic-invalid         Enabled      port
inline-power         Enabled      port
invalid-policy       Enabled      port
l2ptguard            Enabled      port
link-flap            Enabled      port
loopback             Enabled      port
lsgroup              Enabled      port
pagp-flap            Enabled      port
psecure-violation    Enabled      port/vlan
security-violatio    Enabled      port
sfp-config-mismat    Enabled      port
storm-control        Enabled      port
udld                 Enabled      port
vmps                 Enabled      port
```

Related Commands

Command	Description
errdisable detect cause	Enables error-disabled detection for a specific cause or all causes.
show errdisable flap-values	Displays error condition recognition information.
show errdisable recovery	Displays error-disabled recovery timer information.
show interfaces status	Displays interface status or a list of interfaces in error-disabled state.

show errdisable flap-values

Use the **show errdisable flap-values** user EXEC command to display conditions that cause an error to be recognized for a cause.

show errdisable flap-values

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The *Flaps* column in the display shows how many changes to the state within the specified time interval will cause an error to be detected and a port to be disabled. For example, the display shows that an error will be assumed and the port shut down if three Dynamic Trunking Protocol (DTP)-state (port mode access/trunk) or Port Aggregation Protocol (PAgP) flap changes occur during a 30-second interval, or if 5 link-state (link up/down) changes occur during a 10-second interval.

```
ErrDisable Reason    Flaps    Time (sec)
-----------------    ------   ----------
pagp-flap              3       30
dtp-flap               3       30
link-flap              5       10
```

Examples

This is an example of output from the **show errdisable flap-values** command:

```
Switch> show errdisable flap-values
ErrDisable Reason    Flaps    Time (sec)
-----------------    ------   ----------
pagp-flap              3       30
dtp-flap               3       30
link-flap              5       10
```

Related Commands

Command	Description
errdisable detect cause	Enables error-disabled detection for a specific cause or all causes.
show errdisable detect	Displays error-disabled detection status.
show errdisable recovery	Displays error-disabled recovery timer information.
show interfaces status	Displays interface status or a list of interfaces in error-disabled state.

show errdisable recovery

Use the **show errdisable recovery** user EXEC command to display the error-disabled recovery timer information.

show errdisable recovery

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

A *gbic-invalid error-disable* reason refers to an invalid small form-factor pluggable (SFP) module interface.

Examples

This is an example of output from the **show errdisable recovery** command:

```
Switch> show errdisable recovery
ErrDisable Reason    Timer Status
-----------------    --------------
udld                 Disabled
bpduguard            Disabled
security-violatio    Disabled
channel-misconfig    Disabled
vmps                 Disabled
pagp-flap            Disabled
dtp-flap             Disabled
link-flap            Enabled
psecure-violation    Disabled
gbic-invalid         Disabled
dhcp-rate-limit      Disabled
unicast-flood        Disabled
storm-control        Disabled
loopback             Disabled

Timer interval:300 seconds

Interfaces that will be enabled at the next timeout:

Interface    Errdisable reason    Time left(sec)
---------    -----------------    --------------
Gi0/2        link-flap             279
```

Note Though visible in the output, the unicast-flood field is not valid.

Related Commands

Command	Description
errdisable recovery	Configures the recover mechanism variables.
show errdisable detect	Displays error-disabled detection status.
show errdisable flap-values	Displays error condition recognition information.
show interfaces status	Displays interface status or a list of interfaces in error-disabled state.

show etherchannel

Use the **show etherchannel** user EXEC command to display EtherChannel information for a channel.

show etherchannel [*channel-group-number* {**detail** | **port** | **port-channel** | **protocol** | **summary**}]
{**detail** | **load-balance** | **port** | **port-channel** | **protocol** | **summary**}

Syntax Description

channel-group-number	(Optional) Number of the channel group. The range is 1 to 6.
detail	Display detailed EtherChannel information.
load-balance	Display the load-balance or frame-distribution scheme among ports in the port channel.
port	Display EtherChannel port information.
port-channel	Display port-channel information.
protocol	Display the protocol that is being used in the EtherChannel.
summary	Display a one-line summary per channel-group.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you do not specify a *channel-group*, all channel groups are displayed.

Examples

This is an example of output from the **show etherchannel 1 detail** command:

```
Switch> show etherchannel 1 detail
Group state = L2
Ports: 2   Maxports = 16
Port-channels: 1 Max Port-channels = 16
Protocol:   LACP
               Ports in the group:
               -------------------
Port: Gi0/1
------------

Port state    = Up Mstr In-Bndl
Channel group = 1           Mode = Active      Gcchange = -
Port-channel  = Po1         GC   =   -         Pseudo port-channel = Po1
Port index    = 0           Load = 0x00        Protocol =   LACP

Flags:  S - Device is sending Slow LACPDUs   F - Device is sending fast LACPDU
        A - Device is in active mode.        P - Device is in passive mode.

Local information:
                            LACP port     Admin     Oper    Port     Port
Port      Flags   State     Priority      Key       Key     Number   State
Gi0/1     SA      bndl      32768         0x0       0x1     0x0      0x3D
```

```
Age of the port in the current state: 01d:20h:06m:04s

               Port-channels in the group:
               ----------------------

Port-channel: Po1    (Primary Aggregator)
------------

Age of the Port-channel   = 01d:20h:20m:26s
Logical slot/port   = 10/1          Number of ports = 2
HotStandBy port = null
Port state          = Port-channel Ag-Inuse
Protocol            =   LACP

Ports in the Port-channel:

Index   Load   Port     EC state        No of bits
------+------+------+------------------+-----------
0     00     Gi0/1    Active          0
0     00     Gi0/2    Active          0

Time since last port bundled:    01d:20h:20m:20s    Gi0/2
```

This is an example of output from the **show etherchannel 1 summary** command:

```
Switch> show etherchannel 1 summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        u - unsuitable for bundling
        U - in use      f - failed to allocate aggregator
        d - default port

Number of channel-groups in use: 1
Number of aggregators:           1

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------
1      Po1(SU)         LACP      Gi0/1(P)    Gi0/2(P)
```

This is an example of output from the **show etherchannel 1 port-channel** command:

```
Switch> show etherchannel 1 port-channel
               Port-channels in the group:
               ----------------------
Port-channel: Po1    (Primary Aggregator)

------------

Age of the Port-channel   = 01d:20h:24m:50s
Logical slot/port   = 10/1          Number of ports = 2
HotStandBy port = null
Port state          = Port-channel Ag-Inuse
Protocol            =   LACP

Ports in the Port-channel:

Index   Load   Port     EC state        No of bits
------+------+------+------------------+-----------
0     00     Gi0/1    Active          0
0     00     Gi0/2    Active          0
```

```
Time since last port bundled:    01d:20h:24m:44s    Gi0/2
```

This is an example of output from the **show etherchannel protocol** command:

```
Switch# show etherchannel protocol
                Channel-group listing:
                -----------------------
Group: 1
----------
Protocol:  LACP

Group: 2
----------
Protocol:  PAgP
```

Related Commands

Command	Description
channel-group	Assigns an Ethernet port to an EtherChannel group.
channel-protocol	Restricts the protocol used on a port to manage channeling.
interface port-channel	Accesses or creates the port channel.

show flowcontrol

Use the **show flowcontrol** user EXEC command to display the flow control status and statistics.

show flowcontrol [**interface** *interface-id* | **module** *number*]

Syntax Description

interface *interface-id*	(Optional) Display the flow control status and statistics for a specific interface.
module *number*	(Optional) Display the flow control status and statistics for all interfaces on the switch. The only valid module number is 1. This option is not available if you have entered a specific interface ID.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this command to display the flow control status and statistics on the switch or for a specific interface.

Use the **show flowcontrol** command to display information about all the switch interfaces.The output from the **show flowcontrol** command is the same as the output from the **show flowcontrol module** *number* command.

Use the **show flowcontrol interface** *interface-id* command to display information about a specific interface.

Examples

This is an example of output from the **show flowcontrol** command.

```
Switch> show flowcontrol
Port       Send FlowControl  Receive FlowControl  RxPause TxPause
           admin    oper     admin    oper
---------  -------- -------- -------- --------    ------- -------
Gio/1    Unsupp.  Unsupp.  off      off         0       0
Gi0/2    desired  off      off      off         0       0
Gi0/3    desired  off      off      off         0       0
<output truncated>
```

This is an example of output from the **show flowcontrol interface** *interface-id* command:

```
Switch> show flowcontrol gigabitethernet0/2
Port       Send FlowControl  Receive FlowControl  RxPause TxPause
           admin    oper     admin    oper
---------  -------- -------- -------- --------    ------- -------
Gi0/2      desired  off      off      off         0       0
```

Related Commands

Command	Description
flowcontrol	Sets the receive flow-control state for an interface.

show interfaces

Use the **show interfaces** privileged EXEC command to display the administrative and operational status of all interfaces or a specified interface.

show interfaces [*interface-id* | **vlan** *vlan-id*] [**accounting** | **capabilities** [**module** *number*] | **counters** | **description** | **etherchannel** | **flowcontrol** | **pruning** | **stats** | **status** [**err-disabled**] | **switchport module** *number* | **transceiver** [**properties** | **detail**] [**module** *number*] | **trunk**]

Syntax Description

interface-id	(Optional) Valid interfaces include physical ports (including type, module, and port number) and port channels. The port-channel range is 1 to 6.
vlan *vlan-id*	(Optional) VLAN identification. The range is 1 to 4094.
accounting	(Optional) Display accounting information on the interface, including active protocols and input and output packets and octets. **Note** The display shows only packets processed in software; hardware-switched packets do not appear.
capabilities	(Optional) Display the capabilities of all interfaces or the specified interface, including the features and options that you can configure on the interface. Though visible in the command line help, this option is not available for VLAN IDs.
module *number*	(Optional) Display **capabilities**, **switchport** configuration, or **transceiver** characteristics (depending on preceding keyword) of all interfaces on the switch. The only valid module number is 1. This option is not available if you entered a specific interface ID.
counters	(Optional) See the **show interfaces counters** command.
description	(Optional) Display the administrative status and description set for an interface.
etherchannel	(Optional) Display interface EtherChannel information.
flowcontrol	(Optional) Display interface flowcontrol information
pruning	(Optional) Display interface trunk VTP pruning information.
stats	(Optional) Display the input and output packets by switching path for the interface.
status	(Optional) Display the status of the interface. A status of *unsupported* in the Type field means that a non-Cisco small form-factor pluggable (SFP) module is inserted in the module slot.
err-disabled	(Optional) Display interfaces in error-disabled state.
switchport	(Optional) Display the administrative and operational status of a switching port, including port blocking and port protection settings.
transceiver [**detail** | **properties**]	(Optional) Display the physical properties of a CWDM[1] or DWDM[2] small form-factor (SFP) module interface. The keywords have these meanings: • **detail**—(Optional) Display calibration properties, including high and low numbers and any alarm information. • **properties**—(Optional) Display speed and duplex settings on an interface.
trunk	Display interface trunk information. If you do not specify an interface, only information for active trunking ports appears.

1. coarse wavelength-division multiplexer
2. dense wavelength-division multiplexer

Note Though visible in the command-line help strings, the **crb**, **fair-queue**, **irb**, **mac-accounting**, **precedence**, **random-detect**, **rate-limit**, and **shape** keywords are not supported.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **show interfaces capabilities** command with different keywords has these results:

- Use the **show interfaces capabilities module** to display the capabilities of all interfaces on the switch. Entering any other number is invalid.
- Use the **show interfaces** *interface-id* **capabilities** to display the capabilities of the specified interface.
- Use the **show interfaces capabilities** (with no module number or interface ID) to display the capabilities of all interfaces on the switch.
- Use the **show interfaces switchport module** to display the switch port characteristics of all interfaces on the switch. Entering any other number is invalid.

Examples

This is an example of output from the **show interfaces** command for an interface:

```
Switch# show interfaces gigabitethernet0/2
GigabitEthernet0/2 is down, line protocol is down
  Hardware is Gigabit Ethernet, address is 0009.43a7.d085 (bia 0009.43a7.d085)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Auto-duplex, Auto-speed
  input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00 Last input never, output never, output hang never
  Last clearing of "show interfaces" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     2 packets input, 1040 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     4 packets output, 1040 bytes, 0 underruns
     0 output errors, 0 collisions, 3 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier, 0 PAUSE output
     0 output buffer failures, 0 output buffers swapped out
```

This is an example of output from the **show interfaces accounting** command.

```
Switch# show interfaces accounting
Vlan1
                Protocol    Pkts In   Chars In   Pkts Out  Chars Out
                      IP    1094395  131900022     559555   84077157
           Spanning Tree     283896   17033760         42       2520
                     ARP      63738    3825680        231      13860
Interface Vlan2 is disabled
Vlan7
                Protocol    Pkts In   Chars In   Pkts Out  Chars Out
No traffic sent or received on this interface.
Vlan31
                Protocol    Pkts In   Chars In   Pkts Out  Chars Out
No traffic sent or received on this interface.

GigabitEthernet0/1
                Protocol    Pkts In   Chars In   Pkts Out  Chars Out
No traffic sent or received on this interface.
GigabitEthernet0/2
                Protocol    Pkts In   Chars In   Pkts Out  Chars Out
No traffic sent or received on this interface.

<output truncated>
```

This is an example of output from the **show interfaces capabilities** command for an interface.

```
Switch# show interfaces gigabitethernet0/2 capabilities
GigabitEthernet0/2
  Model:                 WS-C2918G-24TC-L
Type:                  10/100/1000BaseTX
  Speed:                 10,100,1000,auto
  Duplex:                full,auto
  Trunk encap. type:     802.1Q
  Trunk mode:            on,off,desirable,nonegotiate
  Channel:               yes
  Broadcast suppression: percentage(0-100)
  Flowcontrol:           rx-(off,on,desired),tx-(none)
  Fast Start:            yes
  QoS scheduling:        rx-(not configurable on per port basis),tx-(4q2t)
  CoS rewrite:           yes
  ToS rewrite:           yes
  UDLD:                  yes
  Inline power:          no
  SPAN:                  source/destination
  PortSecure:            yes
  Dot1x:                 yes
  Multiple Media Types:  rj45, sfp, auto-select
```

This is an example of output from the **show interfaces** *interface* **description** command when the interface has been described as *Connects to Marketing* by using the **description** interface configuration command.

```
Switch# show interfaces gigabitethernet0/2 description
Interface Status         Protocol Description
Gi0/2       up             down     Connects to Marketing
```

This is an example of output from the **show interfaces etherchannel** command when port channels are configured on the switch:

```
Switch# show interfaces etherchannel
----
Port-channel1:
Age of the Port-channel   = 03d:20h:17m:29s
```

```
Logical slot/port   = 10/1           Number of ports = 0
GC                  = 0x00000000      HotStandBy port = null
Port state          = Port-channel Ag-Not-Inuse

Port-channel2:
Age of the Port-channel   = 03d:20h:17m:29s
Logical slot/port   = 10/2           Number of ports = 0
GC                  = 0x00000000      HotStandBy port = null
Port state          = Port-channel Ag-Not-Inuse

Port-channel3:
Age of the Port-channel   = 03d:20h:17m:29s
Logical slot/port   = 10/3           Number of ports = 0
GC                  = 0x00000000      HotStandBy port = null
Port state          = Port-channel Ag-Not-Inuse
```

This is an example of output from the **show interfaces** *interface-id* **pruning** command when pruning is enabled in the VTP domain:

```
Switch# show interfaces gigibitethernet0/2 pruning
Port    Vlans pruned for lack of request by neighbor
Gi0/2     3,4

Port    Vlans traffic requested of neighbor
Gi0/2     1-3
```

This is an example of output from the **show interfaces stats** command for a specified VLAN interface.

```
Switch# show interfaces vlan 1 stats
Switching path    Pkts In   Chars In   Pkts Out  Chars Out
        Processor    1165354  136205310     570800   91731594
      Route cache          0          0          0          0
            Total    1165354  136205310     570800   91731594
```

This is an example of partial output from the **show interfaces status** command. It displays the status of all interfaces.

```
Switch# show interfaces status
Port      Name               Status       Vlan       Duplex  Speed Type
Gi0/1                        notconnect   1            auto   auto 10/100/1000BaseTX
Gi0/2                        notconnect   1            auto   auto 10/100/1000BaseTX
Gi0/3                        notconnect   1            auto   auto 10/100/1000BaseTX
Gi0/4                        notconnect   1            auto   auto 10/100/1000BaseTX
Gi0/5                        notconnect   1            auto   auto 10/100/1000BaseTX
Gi0/6                        notconnect   1            auto   auto 10/100/1000BaseTX

<output truncated>
```

This is an example of output from the **show interfaces status err-disabled** command. It displays the status of interfaces in the error-disabled state.

```
Switch# show interfaces status err-disabled
Port      Name               Status       Reason
Gi0/2                        err-disabled dtp-flap
```

This is an example of output from the **show interfaces switchport** command for a port. Table 2-11 describes the fields in the display.

Note Private VLANs are not supported in this release, so those fields are not applicable.

```
Switch# show interfaces gigabitethernet0/1 switchport
Name: Gi0/1
Switchport: Enabled
Administrative Mode: dynamic auto
Operational Mode: static access
Administrative Trunking Encapsulation: negotiate
Operational Trunking Encapsulation: native
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Administrative private-vlan host-association:10 (VLAN0010) 502 (VLAN0502)
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL

Protected: false
Unknown unicast blocked: disabled
Unknown multicast blocked: disabled

Voice VLAN: none (Inactive)
Appliance trust: none
```

Table 2-11 show interfaces switchport Field Descriptions

Field	Description
Name	Displays the port name.
Switchport	Displays the administrative and operational status of the port. In this display, the port is in switchport mode.
Administrative Mode Operational Mode	Displays the administrative and operational modes.
Administrative Trunking Encapsulation Operational Trunking Encapsulation Negotiation of Trunking	Displays the administrative and operational encapsulation method and whether trunking negotiation is enabled.
Access Mode VLAN	Displays the VLAN ID to which the port is configured.
Trunking Native Mode VLAN Trunking VLANs Enabled Trunking VLANs Active	Lists the VLAN ID of the trunk that is in native mode. Lists the allowed VLANs on the trunk. Lists the active VLANs on the trunk.

Table 2-11 show interfaces switchport Field Descriptions (continued)

Field	Description
Pruning VLANs Enabled	Lists the VLANs that are pruning-eligible.
Protected	Displays whether or not protected port is enabled (True) or disabled (False) on the interface.
Unknown unicast blocked Unknown multicast blocked	Displays whether or not unknown multicast and unknown unicast traffic is blocked on the interface.
Voice VLAN	Displays the VLAN ID on which voice VLAN is enabled.
Appliance trust	Displays the class of service (CoS) setting of the data packets of the IP phone.

This is an example of output from the **show interfaces switchport backup** command:

```
Switch# show interfaces switchport backup
Switch Backup Interface Pairs:
     Active Interface    Backup Interface    State
     ------------------------------------------------------------
     Fa0/1               Fa0/2              Active Up/Backup Standby
     Fa0/3               Fa0/5              Active Down/Backup Up
     Po1                 Po2                Active Standby/Backup Up
```

This is an example of output from the **show interfaces** *interface-id* **pruning** command:

```
Switch# show interfaces gigibitethernet0/2 pruning
Port    Vlans pruned for lack of request by neighbor
```

This is an example of output from the **show interfaces** *interface-id* **trunk** command. It displays trunking information for the port.

```
Switch# show interfaces gigabitethernet0/1 trunk
Port          Mode         Encapsulation  Status        Native vlan
Gi0/1         auto         negotiate      trunking      1

Port          Vlans allowed on trunk
Gi0/1         1-4094

Port          Vlans allowed and active in management domain
Gi0/1         1-4

Port          Vlans in spanning tree forwarding state and not pruned
Gi0/1         1-4
```

This is an example of output from the **show interfaces** *interface-id* **transceiver properties** command:

```
Switch# show interfaces gigabitethernet0/1 transceiver properties
Name : Gi0/1
Administrative Speed: auto
Operational Speed: auto
Administrative Duplex: auto
Administrative Power Inline: N/A
Operational Duplex: auto
Administrative Auto-MDIX: off
Operational Auto-MDIX: off
Configured Media: sfp
Active Media: sfp
Attached: 10/100/1000BaseTX SFP-10/100/1000BaseTX
```

This is an example of output from the **show interfaces** *interface-id* **transceiver detail** command:

```
Switch# show interfaces gigabitethernet0/3 transceiver detail
ITU Channel not available (Wavelength not available),
Transceiver is externally calibrated.
mA:milliamperes, dBm:decibels (milliwatts), N/A:not applicable.
++:high alarm, +:high warning, -:low warning, -- :low alarm.
A2D readouts (if they differ), are reported in parentheses.
The threshold values are uncalibrated.

                           High Alarm  High Warn  Low Warn   Low Alarm
        Temperature        Threshold   Threshold  Threshold  Threshold
Port     (Celsius)         (Celsius)   (Celsius)  (Celsius)  (Celsius)
------- ------------------ ----------  ---------  ---------  ---------
Gi0/3   41.5               110.0       103.0      -8.0       -12.0

                           High Alarm  High Warn  Low Warn   Low Alarm
         Voltage           Threshold   Threshold  Threshold  Threshold
Port     (Volts)           (Volts)     (Volts)    (Volts)    (Volts)
-------  ---------------   ----------  ---------  ---------  ---------
Gi0/3    3.20              4.00        3.70       3.00       2.95

                           High Alarm  High Warn  Low Warn   Low Alarm
         Current           Threshold   Threshold  Threshold  Threshold
Port     (milliamperes)    (mA)        (mA)       (mA)       (mA)
-------  ----------------  ----------  ---------  ---------  ---------
Gi0/3    31.0              84.0        70.0       4.0        2.0

         Optical           High Alarm  High Warn  Low Warn   Low Alarm
         Transmit Power    Threshold   Threshold  Threshold  Threshold
Port     (dBm)             (dBm)       (dBm)      (dBm)      (dBm)
-------  ----------------  ----------  ---------  ---------  ---------
Gi0/3    -0.0 ( -0.0)      -0.0        -0.0       -0.0       -0.0

         Optical           High Alarm  High Warn  Low Warn   Low Alarm
         Receive Power     Threshold   Threshold  Threshold  Threshold
Port     (dBm)             (dBm)       (dBm)      (dBm)      (dBm)
-------  ----------------  ----------  ---------  ---------  ---------
Gi0/3    N/A  ( -0.0) --   -0.0        -0.0       -0.0       -0.0
```

Related Commands

Command	Description
switchport access	Configures a port as a static-access or a dynamic-access port.
switchport block	Blocks unknown unicast or multicast traffic on an interface.
switchport mode	Configures the VLAN membership mode of a port.
switchport protected	Isolates unicast, multicast, and broadcast traffic at Layer 2 from other protected ports on the same switch.
switchport trunk pruning	Configures the VLAN pruning-eligible list for ports in trunking mode.

show interfaces counters

Use the **show interfaces counters** privileged EXEC command to display various counters for the switch or for a specific interface.

show interfaces [*interface-id* | **vlan** *vlan-id*] **counters** [**errors** | **etherchannel** | **protocol status** | **trunk**]

Syntax Description

interface-id	(Optional) ID of the physical interface, including type, module, and port number.
errors	(Optional) Display error counters.
etherchannel	(Optional) Display EtherChannel counters, including octets, broadcast packets, multicast packets, and unicast packets received and sent.
protocol status	(Optional) Display status of protocols enabled on interfaces.
trunk	(Optional) Display trunk counters.

Note Though visible in the command-line help string, the **vlan** *vlan-id* keyword is not supported.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you do not enter any keywords, all counters for all interfaces are included.

Examples

This is an example of partial output from the **show interfaces counters** command. It displays all counters for the switch.

```
Switch# show interfaces counters
Port            InOctets   InUcastPkts   InMcastPkts   InBcastPkts
Gi0/1                  0             0             0             0
Gi0/2                  0             0             0             0

<output truncated>
```

This is an example of partial output from the **show interfaces counters protocol status** command for all interfaces.

```
Switch# show interfaces counters protocol status
Protocols allocated:
 Vlan1: Other, IP
 Vlan20: Other, IP, ARP
 Vlan30: Other, IP, ARP
 Vlan40: Other, IP, ARP
 Vlan50: Other, IP, ARP
 Vlan60: Other, IP, ARP
 Vlan70: Other, IP, ARP
 Vlan80: Other, IP, ARP
 Vlan90: Other, IP, ARP
 Vlan900: Other, IP, ARP
 Vlan3000: Other, IP
 Vlan3500: Other, IP
 FastEthernet0/1: Other, IP, ARP, CDP
 FastEthernet0/2: Other, IP
 FastEthernet0/3: Other, IP
 FastEthernet0/4: Other, IP
 FastEthernet0/5: Other, IP
 FastEthernet0/6: Other, IP
 FastEthernet0/7: Other, IP
 FastEthernet0/8: Other, IP
 FastEthernet0/9: Other, IP
 FastEthernet0/10: Other, IP, CDP

<output truncated>
```

This is an example of output from the **show interfaces counters trunk** command. It displays trunk counters for all interfaces.

```
Switch# show interfaces counters trunk
Port        TrunkFramesTx  TrunkFramesRx  WrongEncap
Gi0/1               0              0           0
Gi0/2               0              0           0
Gi0/3           80678           4155           0
Gi0/4           82320            126           0
Gi1/0/5             0              0           0

<output truncated>
```

Related Commands

Command	Description
show interfaces	Displays additional interface characteristics.

show inventory

Use the **show inventory** user EXEC command to display product identification (PID) information for the hardware.

show inventory [*entity-name* | **raw**]

Syntax Description

entity-name	(Optional) Display the specified entity. For example, enter the interface (such as gigabitethernet0/1) into which a small form-factor pluggable (SFP) module is installed.
raw	(Optional) Display every entity in the device.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The command is case sensitive. With no arguments, the **show inventory** command produces a compact dump of all identifiable entities that have a product identifier. The compact dump displays the entity location (slot identity), entity description, and the unique device identifier (UDI) (PID, VID, and SN) of that entity.

Note If there is no PID, no output appears when you enter the **show inventory** command.

Examples

This is example output from the **show inventory** command:

```
Switch> show inventory
NAME: "1", DESCR: "WS-C2918-48TC-L"
PID: WS-C2918-24TC-L , VID: 02 , SN: FHH0923D075

NAME: "GigabitEthernet0/1", DESCR: "100BaseBX-10D SFP"
PID:                      , VID:    , SN: NEC09050251

NAME: "GigabitEthernet0/2", DESCR: "100BaseBX-10U SFP"
PID:                      , VID:    , SN: NEC09050020
```

show ip dhcp snooping

Use the **show ip dhcp snooping** user EXEC command to display the DHCP snooping configuration.

show ip dhcp snooping

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Examples

This is an example of output from the **show ip dhcp snooping** command:

```
Switch> show ip dhcp snooping
Switch DHCP snooping is enabled
DHCP snooping is configured on following VLANs:
40-42
Insertion of option 82 is enabled
Option 82 on untrusted port is allowed
Verification of hwaddr field is enabled
Interface                    Trusted     Rate limit (pps)
------------------------     -------     ----------------
GigabitEthernet0/1               yes         unlimited
GigabitEthernet0/2               yes         unlimited
```

Related Commands

Command	Description
show ip dhcp snooping binding	Displays the DHCP snooping binding information.

show ip dhcp snooping binding

Use the **show ip dhcp snooping binding** user EXEC command to display the DHCP snooping binding database and configuration information for all interfaces on a switch.

show ip dhcp snooping binding [*ip-address*] [*mac-address*] [**interface** *interface-id*] [**vlan** *vlan-id*]

Syntax Description

ip-address	(Optional) Specify the binding entry IP address.
mac-address	(Optional) Specify the binding entry MAC address.
interface *interface-id*	(Optional) Specify the binding input interface.
vlan *vlan-id*	(Optional) Specify the binding entry VLAN.

Command Modes

User EXEC

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

The **show ip dhcp snooping binding** command output shows only the dynamically configured bindings. Use the **show ip source binding** privileged EXEC command to display the dynamically and statically configured bindings in the DHCP snooping binding database.

If DHCP snooping is enabled and an interface changes to the down state, the switch does not delete the statically configured bindings.

Examples

This example shows how to display the DHCP snooping binding entries for a switch:

```
Switch> show ip dhcp snooping binding
MacAddress          IpAddress        Lease(sec)  Type           VLAN  Interface
------------------  ---------------  ----------  -------------  ----  --------------------
01:02:03:04:05:06   10.1.2.150       9837        dhcp-snooping  20    GigabitEthernet0/1
00:D0:B7:1B:35:DE   10.1.2.151       237         dhcp-snooping  20    GigabitEthernet0/2
Total number of bindings: 2
```

This example shows how to display the DHCP snooping binding entries for a specific IP address:

```
Switch> show ip dhcp snooping binding 10.1.2.150
MacAddress          IpAddress        Lease(sec)  Type           VLAN  Interface
------------------  ---------------  ----------  -------------  ----  --------------------
01:02:03:04:05:06   10.1.2.150       9810        dhcp-snooping  20    GigabitEthernet0/1
Total number of bindings: 1
```

This example shows how to display the DHCP snooping binding entries for a specific MAC address:

```
Switch> show ip dhcp snooping binding 0102.0304.0506
MacAddress          IpAddress        Lease(sec)  Type           VLAN  Interface
------------------  ---------------  ----------  -------------  ----  --------------------
01:02:03:04:05:06   10.1.2.150       9788        dhcp-snooping  20    GigabitEthernet0/2
Total number of bindings: 1
```

This example shows how to display the DHCP snooping binding entries on a port:

```
Switch> show ip dhcp snooping binding interface gigabitethernet0/2
MacAddress          IpAddress        Lease(sec)  Type           VLAN  Interface
------------------  ---------------  ----------  -------------  ----  --------------------
00:30:94:C2:EF:35   10.1.2.151       290         dhcp-snooping  20    GigabitEthernet0/2
Total number of bindings: 1
```

This example shows how to display the DHCP snooping binding entries on VLAN 20:

```
Switch> show ip dhcp snooping binding vlan 20
MacAddress          IpAddress        Lease(sec)  Type           VLAN  Interface
------------------  ---------------  ----------  -------------  ----  --------------------
01:02:03:04:05:06   10.1.2.150       9747        dhcp-snooping  20    GigabitEthernet0/1
00:00:00:00:00:02   10.1.2.151       65          dhcp-snooping  20    GigabitEthernet0/2
Total number of bindings: 2
```

Table 2-12 describes the fields in the **show ip dhcp snooping binding** command output:

Table 2-12 show ip dhcp snooping binding Command Output

Field	Description
MacAddress	Client hardware MAC address
IpAddress	Client IP address assigned from the DHCP server
Lease(sec)	Remaining lease time for the IP address
Type	Binding type
VLAN	VLAN number of the client interface
Interface	Interface that connects to the DHCP client host
Total number of bindings	Total number of bindings configured on the switch **Note** The command output might not show the total number of bindings. For example, if 200 bindings are configured on the switch and you stop the display before all the bindings appear, the total number does not change.

Related Commands

Command	Description
ip dhcp snooping binding	Configures the DHCP snooping binding database
show ip dhcp snooping	Displays the DHCP snooping configuration.

show ip dhcp snooping database

Use the **show ip dhcp snooping database** user EXEC command to display the status of the DHCP snooping binding database agent.

show ip dhcp snooping database [**detail**]

Syntax Description

detail	(Optional) Display detailed status and statistics information.

Command Modes

User EXEC

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Examples

This is an example of output from the **show ip dhcp snooping database** command:

```
Switch> show ip dhcp snooping database
Agent URL :
Write delay Timer : 300 seconds
Abort Timer : 300 seconds

Agent Running : No
Delay Timer Expiry : Not Running
Abort Timer Expiry : Not Running

Last Succeded Time : None
Last Failed Time : None
Last Failed Reason : No failure recorded.

Total Attempts       :        0   Startup Failures :        0
Successful Transfers :        0   Failed Transfers :        0
Successful Reads     :        0   Failed Reads     :        0
Successful Writes    :        0   Failed Writes    :        0
Media Failures       :        0
```

This is an example of output from the **show ip dhcp snooping database detail** command:

```
Switch# show ip dhcp snooping database detail
Agent URL : tftp://10.1.1.1/directory/file
Write delay Timer : 300 seconds
Abort Timer : 300 seconds

Agent Running : No
Delay Timer Expiry : 7 (00:00:07)
Abort Timer Expiry : Not Running

Last Succeded Time : None
Last Failed Time : 17:14:25 UTC Sat Jul 7 2001
Last Failed Reason : Unable to access URL.

Total Attempts       :       21   Startup Failures :        0
Successful Transfers :        0   Failed Transfers :       21
Successful Reads     :        0   Failed Reads     :        0
```

```
Successful Writes    :        0   Failed Writes    :       21
Media Failures       :        0

First successful access: Read

Last ignored bindings counters :
Binding Collisions    :        0   Expired leases    :        0
Invalid interfaces    :        0   Unsupported vlans :        0
Parse failures        :        0
Last Ignored Time : None

Total ignored bindings counters:
Binding Collisions    :        0   Expired leases    :        0
Invalid interfaces    :        0   Unsupported vlans :        0
Parse failures        :        0
```

Related Commands

Command	Description
ip dhcp snooping	Enables DHCP snooping on a VLAN.
ip dhcp snooping database	Configures the DHCP snooping binding database agent or the binding file.
show ip dhcp snooping	Displays DHCP snooping information.

show ip dhcp snooping statistics

Use the **show ip dhcp snooping statistics** user EXEC command to display DHCP snooping statistics in summary or detail form.

show ip dhcp snooping statistics [**detail**]

Syntax Description

detail	(Optional) Display detailed statistics information.

Command Modes

User EXEC

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Examples

This is an example of output from the **show ip dhcp snooping statistics** command:

```
Switch> show ip dhcp snooping statistics
 Packets Forwarded                                = 0
 Packets Dropped                                  = 0
 Packets Dropped From untrusted ports             = 0
```

This is an example of output from the **show ip dhcp snooping statistics detail** command:

```
Switch> show ip dhcp snooping statistics detail
 Packets Processed by DHCP Snooping               = 0
 Packets Dropped Because
   IDB not known                                  = 0
   Queue full                                     = 0
   Interface is in errdisabled                    = 0
   Rate limit exceeded                            = 0
   Received on untrusted ports                    = 0
   Nonzero giaddr                                 = 0
   Source mac not equal to chaddr                 = 0
   Binding mismatch                               = 0
   Insertion of opt82 fail                        = 0
   Interface Down                                 = 0
   Unknown output interface                       = 0
   Reply output port equal to input port          = 0
   Packet denied by platform                      = 0
```

Table 2-13 shows the DHCP snooping statistics and their descriptions:

Table 2-13 DHCP Snooping Statistics

DHCP Snooping Statistic	Description
Packets Processed by DHCP Snooping	Total number of packets handled by DHCP snooping, including forwarded and dropped packets.
Packets Dropped Because IDB not known	Number of errors when the input interface of the packet cannot be determined.

Table 2-13 DHCP Snooping Statistics (continued)

DHCP Snooping Statistic	Description
Queue full	Number of errors when an internal queue used to process the packets is full. This might happen if DHCP packets are received at an excessively high rate and rate limiting is not enabled on the ingress ports.
Interface is in errdisabled	Number of times a packet was received on a port that has been marked as error disabled. This might happen if packets are in the processing queue when a port is put into the error-disabled state and those packets are subsequently processed.
Rate limit exceeded	Number of times the rate limit configured on the port was exceeded and the interface was put into the error-disabled state.
Received on untrusted ports	Number of times a DHCP server packet (OFFER, ACK, NAK, or LEASEQUERY) was received on an untrusted port and was dropped.
Nonzero giaddr	Number of times the relay agent address field (giaddr) in the DHCP packet received on an untrusted port was not zero, or the **no ip dhcp snooping information option allow-untrusted** global configuration command is not configured and a packet received on an untrusted port contained option-82 data.
Source mac not equal to chaddr	Number of times the client MAC address field of the DHCP packet (chaddr) does not match the packet source MAC address and the **ip dhcp snooping verify mac-address** global configuration command is configured.
Binding mismatch	Number of times a RELEASE or DECLINE packet was received on a port that is different than the port in the binding for that MAC address-VLAN pair. This indicates someone might be trying to spoof the real client, or it could mean that the client has moved to another port on the switch and issued a RELEASE or DECLINE. The MAC address is taken from the chaddr field of the DHCP packet, not the source MAC address in the Ethernet header.
Insertion of opt82 fail	Number of times the option-82 insertion into a packet failed. The insertion might fail if the packet with the option-82 data exceeds the size of a single physical packet on the internet.
Interface Down	Number of times the packet is a reply to the DHCP relay agent, but the SVI interface for the relay agent is down. This is an unlikely error that occurs if the SVI goes down between sending the client request to the DHCP server and receiving the response.
Unknown output interface	Number of times the output interface for a DHCP reply packet cannot be determined by either option-82 data or a lookup in the MAC address table. The packet is dropped. This can happen if option 82 is not used and the client MAC address has aged out. If IPSG is enabled with the port-security option and option 82 is not enabled, the MAC address of the client is not learned, and the reply packets will be dropped.
Reply output port equal to input port	Number of times the output port for a DHCP reply packet is the same as the input port, causing a possible loop. Indicates a possible network misconfiguration or misuse of trust settings on ports.
Packet denied by platform	Number of times the packet has been denied by a platform-specific registry.

Related Commands

Command	Description
clear ip dhcp snooping	Clears the DHCP snooping binding database, the DHCP snooping binding database agent statistics, or the DHCP snooping statistics counters.

show ip igmp profile

Use the **show ip igmp profile** privileged EXEC command to display all configured Internet Group Management Protocol (IGMP) profiles or a specified IGMP profile.

show ip igmp profile [*profile number*]

Syntax Description

profile number	(Optional) The IGMP profile number to be displayed. The range is 1 to 4294967295. If no profile number is entered, all IGMP profiles are displayed.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

These are examples of output from the **show ip igmp profile** privileged EXEC command, with and without specifying a profile number. If no profile number is entered, the display includes all profiles configured on the switch.

```
Switch# show ip igmp profile 40
IGMP Profile 40
    permit
    range 233.1.1.1 233.255.255.255

Switch# show ip igmp profile
IGMP Profile 3
    range 230.9.9.0 230.9.9.0
IGMP Profile 4
    permit
    range 229.9.9.0 229.255.255.255
```

Related Commands

Command	Description
ip igmp profile	Configures the specified IGMP profile number.

show ip igmp snooping

Use the **show ip igmp snooping** user EXEC command to display the Internet Group Management Protocol (IGMP) snooping configuration of the switch or the VLAN.

show ip igmp snooping [**groups** | **mrouter** | **querier**] [**vlan** *vlan-id*]

Syntax Description

groups	(Optional) See the **show ip igmp snooping groups** command.
mrouter	(Optional) See the **show ip igmp snooping mrouter** command.
querier	(Optional) See the **show ip igmp snooping querier** command.
vlan *vlan-id*	(Optional) Specify a VLAN; the range is 1 to 1001 and 1006 to 4094 (available only in privileged EXEC mode).

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this command to display snooping configuration for the switch or for a specific VLAN.

VLAN IDs 1002 to 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in IGMP snooping.

Examples

This is an example of output from the **show ip igmp snooping vlan 1** command. It shows snooping characteristics for a specific VLAN.

```
Switch# show ip igmp snooping vlan 1
Global IGMP Snooping configuration:
-----------------------------------
IGMP snooping             :Enabled
IGMPv3 snooping (minimal) :Enabled
Report suppression        :Enabled
TCN solicit query         :Disabled
TCN flood query count     :2
Last member query interval : 100



Vlan 1:
--------
IGMP snooping                       :Enabled
Immediate leave                     :Disabled
Multicast router learning mode      :pim-dvmrp
Source only learning age timer      :10
CGMP interoperability mode          :IGMP_ONLY
Last member query interval : 100
```

This is an example of output from the **show ip igmp snooping** command. It displays snooping characteristics for all VLANs on the switch.

```
Switch> show ip igmp snooping
Global IGMP Snooping configuration:
-----------------------------------
IGMP snooping              : Enabled
IGMPv3 snooping (minimal)  : Enabled
Report suppression         : Enabled
TCN solicit query          : Disabled
TCN flood query count      : 2
Last member query interval : 100

Vlan 1:
--------
IGMP snooping                          :Enabled
Immediate leave                        :Disabled
Multicast router learning mode         :pim-dvmrp
Source only learning age timer         :10
CGMP interoperability mode             :IGMP_ONLY
Last member query interval             : 100

Vlan 2:
--------
IGMP snooping                          :Enabled
Immediate leave                        :Disabled
Multicast router learning mode         :pim-dvmrp
Source only learning age timer         :10
CGMP interoperability mode             :IGMP_ONLY
Last member query interval             : 333

<output truncated>
```

Related Commands

Command	Description
ip igmp snooping	Enables IGMP snooping on the switch or on a VLAN.
ip igmp snooping last-member-query-interval	Enables the IGMP snooping configurable-leave timer.
ip igmp snooping querier	Enables the IGMP querier function in Layer 2 networks.
ip igmp snooping report-suppression	Enables IGMP report suppression.
ip igmp snooping tcn	Configures the IGMP topology change notification behavior.
ip igmp snooping tcn flood	Specifies multicast flooding as the IGMP spanning-tree topology change notification behavior.
ip igmp snooping vlan immediate-leave	Enables IGMP snooping immediate-leave processing on a VLAN.
ip igmp snooping vlan mrouter	Adds a multicast router port or configures the multicast learning method.
ip igmp snooping vlan static	Statically adds a Layer 2 port as a member of a multicast group.
show ip igmp snooping groups	Displays the IGMP snooping multicast table for the switch.

Command	Description
show ip igmp snooping mrouter	Displays IGMP snooping multicast router ports for the switch or for the specified multicast VLAN.
show ip igmp snooping querier	Displays the configuration and operation information for the IGMP querier configured on a switch.

show ip igmp snooping groups

Use the **show ip igmp snooping groups** privileged EXEC command to display the Internet Group Management Protocol (IGMP) snooping multicast table for the switch or the multicast information. Use with the **vlan** keyword to display the multicast table for a specified multicast VLAN or specific multicast information.

show ip igmp snooping groups [**count** | **dynamic** [**count**] | **user** [**count**]]

show ip igmp snooping groups vlan *vlan-id* [*ip_address* | **count** | **dynamic** [**count**] | **user** [**count**]]

Syntax Description

count	(Optional) Display the total number of entries for the specified command options instead of the actual entries.
dynamic	(Optional) Display entries learned by IGMP snooping.
user	Optional) Display only the user-configured multicast entries.
ip_address	(Optional) Display characteristics of the multicast group with the specified group IP address.
vlan *vlan-id*	(Optional) Specify a VLAN; the range is 1 to 1001 and 1006 to 4094.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this command to display multicast information or the multicast table.

VLAN IDs 1002 to 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in IGMP snooping.

Examples

This is an example of output from the **show ip igmp snooping groups** command without any keywords. It displays the multicast table for the switch.

```
Switch# show ip igmp snooping groups
Vlan      Group           Type        Version     Port List
------------------------------------------------------------
104       224.1.4.2       igmp        v2          Gi0/1, Gi0/2
104       224.1.4.3       igmp        v2          Gi0/1, Gi0/2
```

This is an example of output from the **show ip igmp snooping groups count** command. It displays the total number of multicast groups on the switch.

```
Switch# show ip igmp snooping groups count
Total number of multicast groups: 2
```

This is an example of output from the **show ip igmp snooping groups dynamic** command. It shows only the entries learned by IGMP snooping.

```
Switch# show ip igmp snooping groups vlan 1 dynamic
Vlan      Group           Type        Version     Port List
------------------------------------------------------------
104       224.1.4.2       igmp        v2          Gi0/1, Fa0/15
104       224.1.4.3       igmp        v2          Gi0/1, Fa0/15
```

This is an example of output from the **show ip igmp snooping groups vlan** *vlan-id ip-address* command. It shows the entries for the group with the specified IP address.

```
Switch# show ip igmp snooping groups vlan 104 224.1.4.2
Vlan      Group           Type        Version     Port List
------------------------------------------------------------
104       224.1.4.2       igmp        v2          Gi0/1, Fa0/15
```

Related Commands

Command	Description
ip igmp snooping	Enables IGMP snooping on the switch or on a VLAN.
ip igmp snooping vlan mrouter	Configures a multicast router port.
ip igmp snooping vlan static	Statically adds a Layer 2 port as a member of a multicast group.
show ip igmp snooping	Displays the IGMP snooping configuration of the switch or the VLAN.
show ip igmp snooping mrouter	Displays IGMP snooping multicast router ports for the switch or for the specified multicast VLAN.

show ip igmp snooping mrouter

Use the **show ip igmp snooping mrouter** privileged EXEC command to display the Internet Group Management Protocol (IGMP) snooping dynamically learned and manually configured multicast router ports for the switch or for the specified multicast VLAN.

show ip igmp snooping mrouter [**vlan** *vlan-id*]

Syntax Description

vlan *vlan-id*	(Optional) Specify a VLAN; the range is 1 to 1001 and 1006 to 4094.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this command to display multicast router ports on the switch or for a specific VLAN.

VLAN IDs 1002 to 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in IGMP snooping.

Examples

This is an example of output from the **show ip igmp snooping mrouter** command. It shows how to display multicast router ports on the switch.

```
Switch# show ip igmp snooping mrouter
Vlan    ports
----    -----
   1    Gi0/1(dynamic)
```

Related Commands

Command	Description
ip igmp snooping	Enables IGMP snooping on the switch or on a VLAN.
ip igmp snooping vlan mrouter	Adds a multicast router port.
ip igmp snooping vlan static	Statically adds a Layer 2 port as a member of a multicast group.
show ip igmp snooping	Displays the IGMP snooping configuration of the switch or the VLAN
show ip igmp snooping groups	Displays IGMP snooping multicast information for the switch or for the specified parameter.

show ip igmp snooping querier

Use the **show ip igmp snooping querier detail** user EXEC command to display the configuration and operation information for the IGMP querier configured on a switch.

show ip igmp snooping querier [**detail** | **vlan** *vlan-id* [**detail**]]

Syntax Description

detail	Optional) Display detailed IGMP querier information.
vlan *vlan-id* [**detail**]	Optional) Display IGMP querier information for the specified VLAN. The range is 1 to 1001 and 1006 to 4094. Use the **detail** keyword to display detailed information.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use the **show ip igmp snooping querier** command to display the IGMP version and the IP address of a detected device, also called a *querier*, that sends IGMP query messages. A subnet can have multiple multicast routers but has only one IGMP querier. In a subnet running IGMPv2, one of the multicast routers is elected as the querier. The querier can be a Layer 3 switch.

The **show ip igmp snooping querier** command output also shows the VLAN and the interface on which the querier was detected. If the querier is the switch, the output shows the *Port* field as *Router*. If the querier is a router, the output shows the port number on which the querier is learned in the *Port* field.

The **show ip igmp snooping querier detail** user EXEC command is similar to the **show ip igmp snooping querier** command. However, the **show ip igmp snooping querier** command displays only the device IP address most recently detected by the switch querier.

The **show ip igmp snooping querier detail** command displays the device IP address most recently detected by the switch querier and this additional information:

- The elected IGMP querier in the VLAN
- The configuration and operational information pertaining to the switch querier (if any) that is configured in the VLAN

Examples

This is an example of output from the **show ip igmp snooping querier** command:

```
Switch> show ip igmp snooping querier
Vlan      IP Address     IGMP Version        Port
--------------------------------------------------
1         172.20.50.11   v3                  Gi0/1
2         172.20.40.20   v2                  Router
```

This is an example of output from the **show ip igmp snooping querier detail** command:

```
Switch> show ip igmp snooping querier detail

Vlan      IP Address     IGMP Version   Port
-----------------------------------------------------------
1         1.1.1.1        v2             Fa0/1

Global IGMP switch querier status
-----------------------------------------------------
admin state                    : Enabled
admin version                  : 2
source IP address              : 0.0.0.0
query-interval (sec)           : 60
max-response-time (sec)        : 10
querier-timeout (sec)          : 120
tcn query count                : 2
tcn query interval (sec)       : 10

Vlan 1:   IGMP switch querier status

-----------------------------------------------------
elected querier is 1.1.1.1         on port Fa0/1
-----------------------------------------------------
admin state                    : Enabled
admin version                  : 2
source IP address              : 10.1.1.65
query-interval (sec)           : 60
max-response-time (sec)        : 10
querier-timeout (sec)          : 120
tcn query count                : 2
tcn query interval (sec)       : 10
operational state              : Non-Querier
operational version            : 2
tcn query pending count        : 0
```

Related Commands

Command	Description
ip igmp snooping	Enables IGMP snooping on the switch or on a VLAN.
ip igmp snooping querier	Enables the IGMP querier function in Layer 2 networks.
show ip igmp snooping	Displays IGMP snooping multicast router ports for the switch or for the specified multicast VLAN.

show ipv6 mld snooping vlan

Use the **show ipv6 mld snooping** user EXEC command to display IPv6 Multicast Listener Discovery (MLD) snooping configuration of the switch or the VLAN.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

show ipv6 mld snooping [**vlan** *vlan-id*]

Syntax Description

vlan *vlan-id*	(Optional) Specify a VLAN; the range is from 1 to 1001 and from 1006 to 4094.

User EXEC.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

Use this command to display MLD snooping configuration for the switch or for a specific VLAN.

VLAN numbers 1002 through 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in MLD snooping.

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6** global configuration command and reload the switch.

Examples

This is an example of output from the **show ipv6 mld snooping vlan** command. It shows snooping characteristics for a specific VLAN.

```
Switch> show ipv6 mld snooping vlan 100
Global MLD Snooping configuration:
-------------------------------------------
MLD snooping                  : Enabled
MLDv2 snooping (minimal)      : Enabled
Listener message suppression  : Enabled
TCN solicit query             : Disabled
TCN flood query count         : 2
Robustness variable           : 3
Last listener query count     : 2
Last listener query interval  : 1000

Vlan 100:
--------
MLD snooping                        : Disabled
MLDv1 immediate leave               : Disabled
Explicit host tracking              : Enabled
Multicast router learning mode      : pim-dvmrp
Robustness variable                 : 3
Last listener query count           : 2
Last listener query interval        : 1000
```

This is an example of output from the **show ipv6 mld snooping** command. It displays snooping characteristics for all VLANs on the switch.

```
Switch> show ipv6 mld snooping
Global MLD Snooping configuration:
-----------------------------------------
MLD snooping                  : Enabled
MLDv2 snooping (minimal)      : Enabled
Listener message suppression  : Enabled
TCN solicit query             : Disabled
TCN flood query count         : 2
Robustness variable           : 3
Last listener query count     : 2
Last listener query interval  : 1000

Vlan 1:
--------
MLD snooping                        : Disabled
MLDv1 immediate leave               : Disabled
Explicit host tracking              : Enabled
Multicast router learning mode      : pim-dvmrp
Robustness variable                 : 1
Last listener query count           : 2
Last listener query interval        : 1000

<output truncated>

Vlan 951:
--------
MLD snooping                        : Disabled
MLDv1 immediate leave               : Disabled
Explicit host tracking              : Enabled
Multicast router learning mode      : pim-dvmrp
Robustness variable                 : 3
Last listener query count           : 2
Last listener query interval        : 1000
```

Related Commands

Command	Description
ipv6 mld snooping	Enables and configures MLD snooping on the switch or on a VLAN.
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to optimize system resources based on how the switch is being used.

show ipv6 mld snooping address

Use the **show ipv6 mld snooping address** user EXEC command to display all or specified IPv6 multicast address information maintained by Multicast Listener Discovery (MLD) snooping.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

show ipv6 mld snooping address [[**vlan** *vlan-id*] [*ipv6 address*]] [**vlan** *vlan-id*] [**count** | **dynamic** | **user**]

Syntax Description

vlan *vlan-id*	(Optional) Specify a VLAN about which to show MLD snooping multicast address information. The VLAN ID range is 1 to 1001 and 1006 to 4094.
ipv6-multicast-address	(Optional) Display information about the specified IPv6 multicast address. This keyword is only available when a VLAN ID is entered.
count	(Optional) Display the number of multicast groups on the switch or in the specified VLAN.
dynamic	(Optional) Display MLD snooping learned group information.
user	(Optional) Display MLD snooping user-configured group information.

Command Modes

User EXEC.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

Use this command to display IPv6 multicast address information.

You can enter an IPv6 multicast address only after you enter a VLAN ID.

VLAN numbers 1002 through 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in MLD snooping.

Use the **dynamic** keyword to display information only about groups that are learned. Use the **user** keyword to display information only about groups that have been configured.

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6** global configuration command and reload the switch.

Examples

This is an example of output from the **show snooping address** user EXEC command:

```
Switch> show ipv6 mld snooping address
Vlan Group   Type Version Port List
------------------------------------------------------------
2    FF12::3 user         Gi1/0/2, Gi2/0/2, Gi3/0/1,Gi3/0/3
```

This is an example of output from the **show snooping address count** user EXEC command:

```
Switch> show ipv6 mld snooping address count
Total number of multicast groups: 2
```

This is an example of output from the **show snooping address user** user EXEC command:

```
Switch> show ipv6 mld snooping address user
Vlan Group  Type Version Port List
------------------------------------------------------------
2    FF12::3 user  v2    Gi1/0/2, Gi2/0/2, Gi3/0/1,Gi4/0/3
```

Related Commands

Command	Description
ipv6 mld snooping vlan	Configures IPv6 MLD snooping on a VLAN.
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to optimize system resources based on how the switch is being used.

show ipv6 mld snooping mrouter

Use the **show ipv6 mld snooping mrouter** user EXEC command to display dynamically learned and manually configured IPv6 Multicast Listener Discovery (MLD) router ports for the switch or a VLAN.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

show ipv6 mld snooping mrouter [**vlan** *vlan-id*]

Syntax Description

vlan *vlan-id*	(Optional) Specify a VLAN; the range is 1 to 1001 and 1006 to 4094.

Command Modes

User EXEC.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

Use this command to display MLD snooping router ports for the switch or for a specific VLAN.

VLAN numbers 1002 through 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in MLD snooping.

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6** global configuration command and reload the switch.

Examples

This is an example of output from the **show ipv6 mld snooping mrouter** command. It displays snooping characteristics for all VLANs on the switch that are participating in MLD snooping.

```
Switch> show ipv6 mld snooping mrouter
Vlan    ports
----    -----
2       Gi1/0/11(dynamic)
72      Gi1/0/11(dynamic)
200     Gi1/0/11(dynamic)
```

This is an example of output from the **show ipv6 mld snooping mrouter vlan** command. It shows multicast router ports for a specific VLAN.

```
Switch> show ipv6 mld snooping mrouter vlan 100
Vlan    ports
----    -----
   2    Gi1/0/11(dynamic)
```

Related Commands

Command	Description
ipv6 mld snooping vlan	Configures IPv6 MLD snooping on a VLAN.
ipv6 mld snooping vlan mrouter interface *interface-id* | **static** *ipv6-multicast-address* **interface** *interface-id*]	Configures multicast router ports for a VLAN.
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to optimize system resources based on how the switch is being used.

show ipv6 mld snooping querier

Use the **show ipv6 mld snooping querier** user EXEC command to display IPv6 Multicast Listener Discovery (MLD) snooping querier-related information most recently received by the switch or the VLAN.

Note This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

show ipv6 mld snooping querier [**vlan** *vlan-id*] [**detail**]

Syntax Description

vlan *vlan-id*	(Optional) Specify a VLAN; the range is 1 to 1001 and 1006 to 4094.
detail	(Optional) Display MLD snooping detailed querier information for the switch or for the VLAN.

Command Modes

User EXEC.

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Usage Guidelines

Use the **show ipv6 mld snooping querier** command to display the MLD version and IPv6 address of a detected device that sends MLD query messages, which is also called a *querier*. A subnet can have multiple multicast routers but has only one MLD querier. The querier can be a Layer 3 switch.

The **show ipv6 mld snooping querier** command output also shows the VLAN and interface on which the querier was detected. If the querier is the switch, the output shows the *Port* field as *Router*. If the querier is a router, the output shows the port number on which the querier is learned in the *Port* field.

The output of the **show ipv6 mld snoop querier vlan** command displays the information received in response to a query message from an external or internal querier. It does not display user-configured VLAN values, such as the snooping robustness variable on the particular VLAN. This querier information is used only on the MASQ message that is sent by the switch. It does not override the user-configured robustness variable that is used for aging out a member that does not respond to query messages. VLAN numbers 1002 through 1005 are reserved for Token Ring and FDDI VLANs and cannot be used in MLD snooping.

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6** global configuration command and reload the switch.

Examples

This is an example of output from the **show ipv6 mld snooping querier** command:

```
Switch> show ipv6 mld snooping querier
Vlan      IP Address               MLD Version Port
------------------------------------------------------------
2         FE80::201:C9FF:FE40:6000 v1          Gi3/0/1
```

This is an example of output from the **show ipv6 mld snooping querier detail** command:

```
Switch> show ipv6 mld snooping querier detail
Vlan      IP Address               MLD Version Port
------------------------------------------------------------
2         FE80::201:C9FF:FE40:6000 v1          Gi3/0/1
```

This is an example of output from the **show ipv6 mld snooping querier vlan** command:

```
Switch> show ipv6 mld snooping querier vlan 2
IP address : FE80::201:C9FF:FE40:6000
MLD version : v1
Port : Gi3/0/1Max response time : 1000s
```

Related Commands

Command	Description
ipv6 mld snooping	Enables and configures IPv6 MLD snooping on the switch or on a VLAN.
ipv6 mld snooping last-listener-query-count	Configures the maximum number of queries that the switch sends before aging out an MLD client.
ipv6 mld snooping last-listener-query-interval	Configures the maximum response time after sending out a query that the switch waits before deleting a port from the multicast group.
ipv6 mld snooping robustness-variable	Configures the maximum number of queries that the switch sends before aging out a multicast address when there is no response.
sdm prefer dual-ipv4-and-ipv6 default	Configures an SDM template to optimize system resources based on how the switch is being used.

show lacp

Use the **show lacp** user EXEC command to display Link Aggregation Control Protocol (LACP) channel-group information.

show lacp [*channel-group-number*] {**counters** | **internal** | **neighbor** | **sys-id**}

Syntax Description

channel-group-number	(Optional) Number of the channel group. The range is 1 to 6.
counters	Display traffic information.
internal	Display internal information.
neighbor	Display neighbor information.
sys-id	Display the system identifier that is being used by LACP. The system identifier is made up of the LACP system priority and the switch MAC address.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can enter any **show lacp** command to display the active channel-group information. To display specific channel information, enter the **show lacp** command with a channel-group number.

If you do not specify a channel group, information for all channel groups appears.

You can enter the *channel-group-number* option to specify a channel group for all keywords except **sys-id**.

Examples

This is an example of output from the **show lacp counters** user EXEC command. Table 2-14 describes the fields in the display.

```
Switch> show lacp counters
              LACPDUs         Marker      Marker Response    LACPDUs
Port         Sent   Recv     Sent   Recv     Sent   Recv      Pkts Err
--------------------------------------------------------------------
Channel group:1
```

Table 2-14 show lacp counters Field Descriptions

Field	Description
LACPDUs Sent and Recv	The number of LACP packets sent and received by a port.
Marker Sent and Recv	The number of LACP marker packets sent and received by a port.

Table 2-14 show lacp counters Field Descriptions (continued)

Field	Description
Marker Response Sent and Recv	The number of LACP marker response packets sent and received by a port.
LACPDUs Pkts and Err	The number of unknown and illegal packets received by LACP for a port.

This is an example of output from the **show lacp internal** command:

```
Switch> show lacp 1 internal
Flags:  S - Device is requesting Slow LACPDUs
        F - Device is requesting Fast LACPDUs
        A - Device is in Active mode       P - Device is in Passive mode

Channel group 1
                            LACP port     Admin     Oper    Port     Port
Port        Flags   State   Priority      Key       Key     Number   State
Gi0/1       SA      bndl    32768         0x3       0x3     0x4      0x3D
Gi0/2       SA      bndl    32768         0x3       0x3     0x5      0x3D
```

Table 2-15 describes the fields in the display:

Table 2-15 show lacp internal Field Descriptions

Field	Description
State	State of the specific port. These are the allowed values: • – —Port is in an unknown state. • **bndl**—Port is attached to an aggregator and bundled with other ports. • **susp**—Port is in a suspended state; it is not attached to any aggregator. • **hot-sby**—Port is in a hot-standby state. • **indiv**—Port is incapable of bundling with any other port. • **indep**—Port is in an independent state (not bundled but able to switch data traffic. In this case, LACP is not running on the partner port). • **down**—Port is down.
LACP Port Priority	Port priority setting. LACP uses the port priority to put ports s in standby mode when there is a hardware limitation that prevents all compatible ports from aggregating.
Admin Key	Administrative key assigned to this port. LACP automatically generates an administrative key value as a hexadecimal number. The administrative key defines the ability of a port to aggregate with other ports. A port's ability to aggregate with other ports is determined by the port physical characteristics (for example, data rate and duplex capability) and configuration restrictions that you establish.
Oper Key	Runtime operational key that is being used by this port. LACP automatically generates this value as a hexadecimal number.

Table 2-15 show lacp internal Field Descriptions (continued)

Field	Description
Port Number	Port number.
Port State	State variables for the port, encoded as individual bits within a single octet with these meanings: • bit0: LACP_Activity • bit1: LACP_Timeout • bit2: Aggregation • bit3: Synchronization • bit4: Collecting • bit5: Distributing • bit6: Defaulted • bit7: Expired **Note** In the list above, bit7 is the MSB and bit0 is the LSB.

This is an example of output from the **show lacp neighbor** command:

```
Switch> show lacp neighbor
Flags:  S - Device is sending Slow LACPDUs F - Device is sending Fast LACPDUs
        A - Device is in Active mode       P - Device is in Passive mode

Channel group 3 neighbors

Partner's information:

          Partner               Partner                     Partner
Port      System ID             Port Number     Age         Flags

          LACP Partner         Partner         Partner
          Port Priority        Oper Key        Port State
          32768                0x3             0x3C

Partner's information:

          Partner               Partner                     Partner
Port      System ID             Port Number     Age         Flags

          LACP Partner         Partner         Partner
          Port Priority        Oper Key        Port State
          32768                0x3             0x3C
```

This is an example of output from the **show lacp sys-id** command:

```
Switch> show lacp sys-id
32765,0002.4b29.3a00
```

The system identification is made up of the system priority and the system MAC address. The first two bytes are the system priority, and the last six bytes are the globally administered individual MAC address associated to the system.

Related Commands

Command	Description
clear lacp	Clears the LACP channel-group information.
lacp port-priority	Configures the LACP port priority.
lacp system-priority	Configures the LACP system priority.

show location

Use the **show location** user EXEC command to display location information for an endpoint.

show location admin-tag

show location civic-location {**identifier** *id number* | **interface** *interface-id* | **static**}

show location elin-location {**identifier** *id number* | **interface** *interface-id* | **static**}

Syntax Description

admin-tag	Display administrative tag or site information.
civic-location	Display civic location information.
elin-location	Display emergency location information (ELIN).
identifier *id*	Specify the ID for the civic location or the elin location. The id range is 1 to 4095.
interface *interface-id*	(Optional) Display location information for the specified interface or all interfaces. Valid interfaces include physical ports.
static	Display static configuration information.

Command Modes

User EXEC

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

Use the **show location** command to display location information for an endpoint.

Examples

This is an example of output from the **show location civic-location** command that displays location information for an interface:

```
Switch> show location civic interface gigibitethernet0/1
Civic location information
--------------------------
Identifier             : 1
County                 : Santa Clara
Street number          : 3550
Building               : 19
Room                   : C6
Primary road name      : Cisco Way
City                   : San Jose
State                  : CA
Country                : US
```

This is an example of output from the **show location civic-location** command that displays all the civic location information:

```
Switch> show location civic-location static
```

```
Civic location information
--------------------------
Identifier              : 1
County                  : Santa Clara
Street number           : 3550
Building                : 19
Room                    : C6
Primary road name       : Cisco Way
City                    : San Jose
State                   : CA
Country                 : US
Ports                   : Gi0/1
--------------------------
Identifier              : 2
Street number           : 24568
Street number suffix    : West
Landmark                : Golden Gate Bridge
Primary road name       : 19th Ave
City                    : San Francisco
Country                 : US
--------------------------
```

This is an example of output from the **show location elin-location** command that displays the emergency location information:

```
Switch> show location elin-location identifier 1
Elin location information
--------------------------
Identifier : 1
Elin       : 14085553881
Ports      : Gi0/2
```

This is an example of output from the **show location elin static** command that displays all emergency location information:

```
Switch> show location elin static
Elin location information
--------------------------
Identifier : 1
Elin       : 14085553881
Ports      : Gi0/2
--------------------------
Identifier : 2
Elin       : 18002228999
--------------------------
```

Related Commands

Command	Description
location (global configuration)	Configures the global location information for an endpoint.
location (interface configuration)	Configures the location information for an interface.

show mac address-table

Use the **show mac address-table** user EXEC command to display a specific MAC address table static and dynamic entry or the MAC address table static and dynamic entries on a specific interface or VLAN.

show mac address-table

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show mac address-table** command:

```
Switch> show mac address-table
          Mac Address Table
-------------------------------------------
Vlan    Mac Address       Type       Ports
----    -----------       ----       -----
 All    0000.0000.0001    STATIC     CPU
 All    0000.0000.0002    STATIC     CPU
 All    0000.0000.0003    STATIC     CPU
 All    0000.0000.0009    STATIC     CPU
 All    0000.0000.0012    STATIC     CPU
 All    0180.c200.000b    STATIC     CPU
 All    0180.c200.000c    STATIC     CPU
 All    0180.c200.000d    STATIC     CPU
 All    0180.c200.000e    STATIC     CPU
 All    0180.c200.000f    STATIC     CPU
 All    0180.c200.0010    STATIC     CPU
   1    0030.9441.6327    DYNAMIC    Gi0/4
Total Mac Addresses for this criterion: 12
```

Related Commands

Command	Description
clear mac address-table dynamic	Deletes from the MAC address table a specific dynamic address, all dynamic addresses on a particular interface, or all dynamic addresses on a particular VLAN.
show mac address-table aging-time	Displays the aging time in all VLANs or the specified VLAN.
show mac address-table count	Displays the number of addresses present in all VLANs or the specified VLAN.
show mac address-table dynamic	Displays dynamic MAC address table entries only.
show mac address-table interface	Displays the MAC address table information for the specified interface.
show mac address-table notification	Displays the MAC address notification settings for all interfaces or the specified interface.
show mac address-table static	Displays static MAC address table entries only.
show mac address-table vlan	Displays the MAC address table information for the specified VLAN.

show mac address-table address

Use the **show mac address-table address** user EXEC command to display MAC address table information for the specified MAC address.

show mac address-table address *mac-address* [**interface** *interface-id*] [**vlan** *vlan-id*]

Syntax Description

mac-address	Specify the 48-bit MAC address; the valid format is H.H.H.
interface *interface-id*	(Optional) Display information for a specific interface. Valid interfaces include physical ports and port channels.
vlan *vlan-id*	(Optional) Display entries for the specific VLAN only. The range is 1 to 4094.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show mac address-table address** command:

```
Switch# show mac address-table address 0002.4b28.c482
          Mac Address Table
-------------------------------------------

Vlan    Mac Address     Type    Ports
----    -----------     ----    -----
 All    0002.4b28.c482  STATIC  CPU
Total Mac Addresses for this criterion: 1
```

Related Commands

Command	Description
show mac address-table aging-time	Displays the aging time in all VLANs or the specified VLAN.
show mac address-table count	Displays the number of addresses present in all VLANs or the specified VLAN.
show mac address-table dynamic	Displays dynamic MAC address table entries only.
show mac address-table interface	Displays the MAC address table information for the specified interface.
show mac address-table notification	Displays the MAC address notification settings for all interfaces or the specified interface.
show mac address-table static	Displays static MAC address table entries only.
show mac address-table vlan	Displays the MAC address table information for the specified VLAN.

show mac address-table aging-time

Use the **show mac address-table aging-time** user EXEC command to display the aging time of a specific address table instance, all address table instances on a specified VLAN or, if a specific VLAN is not specified, on all VLANs.

show mac address-table aging-time [**vlan** *vlan-id*]

Syntax Description

vlan *vlan-id*	(Optional) Display aging time information for a specific VLAN. The range is 1 to 4094.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If no VLAN number is specified, the aging time for all VLANs appears.

Examples

This is an example of output from the **show mac address-table aging-time** command:

```
Switch> show mac address-table aging-time
Vlan    Aging Time
----    ----------
   1     300
```

This is an example of output from the **show mac address-table aging-time vlan 10** command:

```
Switch> show mac address-table aging-time vlan 10
Vlan    Aging Time
----    ----------
  10     300
```

Related Commands

Command	Description
mac address-table aging-time	Sets the length of time that a dynamic entry remains in the MAC address table after the entry is used or updated.
show mac address-table address	Displays MAC address table information for the specified MAC address.
show mac address-table count	Displays the number of addresses present in all VLANs or the specified VLAN.
show mac address-table dynamic	Displays dynamic MAC address table entries only.
show mac address-table interface	Displays the MAC address table information for the specified interface.
show mac address-table notification	Displays the MAC address notification settings for all interfaces or the specified interface.

Command	Description
show mac address-table static	Displays static MAC address table entries only.
show mac address-table vlan	Displays the MAC address table information for the specified VLAN.

show mac address-table count

Use the **show mac address-table count** user EXEC command to display the number of addresses present in all VLANs or the specified VLAN.

show mac address-table count [**vlan** *vlan-id*]

Syntax Description

vlan *vlan-id*	(Optional) Display the number of addresses for a specific VLAN. The range is 1 to 4094.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If no VLAN number is specified, the address count for all VLANs appears.

Examples

This is an example of output from the **show mac address-table count** command:

```
Switch# show mac address-table count
Mac Entries for Vlan    : 1
---------------------------
Dynamic Address Count   : 2
Static  Address Count   : 0
Total Mac Addresses     : 2
```

Related Commands

Command	Description
show mac address-table address	Displays MAC address table information for the specified MAC address.
show mac address-table aging-time	Displays the aging time in all VLANs or the specified VLAN.
show mac address-table dynamic	Displays dynamic MAC address table entries only.
show mac address-table interface	Displays the MAC address table information for the specified interface.
show mac address-table notification	Displays the MAC address notification settings for all interfaces or the specified interface.
show mac address-table static	Displays static MAC address table entries only.
show mac address-table vlan	Displays the MAC address table information for the specified VLAN.

show mac address-table dynamic

Use the **show mac address-table dynamic** user EXEC command to display only dynamic MAC address table entries.

show mac address-table dynamic [**address** *mac-address*] [**interface** *interface-id*] [**vlan** *vlan-id*]

Syntax Description

address *mac-address*	(Optional) Specify a 48-bit MAC address; the valid format is H.H.H (available in privileged EXEC mode only).
interface *interface-id*	(Optional) Specify an interface to match; valid *interfaces* include physical ports and port channels.
vlan *vlan-id*	(Optional) Display entries for a specific VLAN; the range is 1 to 4094.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show mac address-table dynamic** command:

```
Switch> show mac address-table dynamic
          Mac Address Table
-------------------------------------------

Vlan    Mac Address     Type    Ports
----    -----------     ----    -----
   1    0030.b635.7862  DYNAMIC Gi0/2
   1    00b0.6496.2741  DYNAMIC Gi0/2
Total Mac Addresses for this criterion: 2
```

Related Commands

Command	Description
clear mac address-table dynamic	Deletes from the MAC address table a specific dynamic address, all dynamic addresses on a particular interface, or all dynamic addresses on a particular VLAN.
show mac address-table address	Displays MAC address table information for the specified MAC address.
show mac address-table aging-time	Displays the aging time in all VLANs or the specified VLAN.
show mac address-table count	Displays the number of addresses present in all VLANs or the specified VLAN.
show mac address-table interface	Displays the MAC address table information for the specified interface.
show mac address-table static	Displays static MAC address table entries only.
show mac address-table vlan	Displays the MAC address table information for the specified VLAN.

show mac address-table interface

Use the **show mac address-table interface** user command to display the MAC address table information for the specified interface in the specified VLAN.

show mac address-table interface *interface-id* [**vlan** *vlan-id*]

Syntax Description

interface-id	Specify an interface type; valid interfaces include physical ports and port channels.
vlan *vlan-id*	(Optional) Display entries for a specific VLAN; the range is 1 to 4094.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show mac address-table interface** command:

```
Switch> show mac address-table interface gigabitethernet0/2
          Mac Address Table
-------------------------------------------

Vlan    Mac Address     Type    Ports
----    -----------     ----    -----
   1    0030.b635.7862  DYNAMIC Gi0/2
   1    00b0.6496.2741  DYNAMIC Gi0/2
Total Mac Addresses for this criterion: 2
```

Related Commands

Command	Description
show mac address-table address	Displays MAC address table information for the specified MAC address.
show mac address-table aging-time	Displays the aging time in all VLANs or the specified VLAN.
show mac address-table count	Displays the number of addresses present in all VLANs or the specified VLAN.
show mac address-table dynamic	Displays dynamic MAC address table entries only.
show mac address-table notification	Displays the MAC address notification settings for all interfaces or the specified interface.
show mac address-table static	Displays static MAC address table entries only.
show mac address-table vlan	Displays the MAC address table information for the specified VLAN.

show mac address-table notification

Use the **show mac address-table notification** user EXEC command to display the MAC address notification settings for all interfaces or the specified interface.

show mac address-table notification [**interface** [*interface-id*]]

Syntax Description

interface	(Optional) Display information for all interfaces. Valid interfaces include physical ports and port channels.
interface-id	(Optional) Display information for the specified interface. Valid interfaces include physical ports and port channels.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use the **show mac address-table notification** command without any keywords to display whether the feature is enabled or disabled, the MAC notification interval, the maximum number of entries allowed in the history table, and the history table contents.

Use the **interface** keyword to display the flags for all interfaces. If the *interface-id* is included, only the flags for that interface appear.

Examples

This is an example of output from the **show mac address-table notification** command:

```
Switch> show mac address-table notification
MAC Notification Feature is Enabled on the switch
Interval between Notification Traps : 60 secs
Number of MAC Addresses Added : 4
Number of MAC Addresses Removed : 4
Number of Notifications sent to NMS : 3
Maximum Number of entries configured in History Table : 100
Current History Table Length : 3
MAC Notification Traps are Enabled



History Table contents
----------------------
History Index 0, Entry Timestamp 1032254, Despatch Timestamp 1032254
MAC Changed Message :
Operation: Added   Vlan: 2     MAC Addr: 0000.0000.0001 Module: 0   Port: 1

History Index 1, Entry Timestamp 1038254, Despatch Timestamp 1038254
MAC Changed Message :
Operation: Added   Vlan: 2     MAC Addr: 0000.0000.0000 Module: 0   Port: 1
Operation: Added   Vlan: 2     MAC Addr: 0000.0000.0002 Module: 0   Port: 1
```

```
Operation: Added   Vlan: 2     MAC Addr: 0000.0000.0003 Module: 0   Port: 1

History Index 2, Entry Timestamp 1074254, Despatch Timestamp 1074254
MAC Changed Message :
Operation: Deleted Vlan: 2     MAC Addr: 0000.0000.0000 Module: 0   Port: 1
Operation: Deleted Vlan: 2     MAC Addr: 0000.0000.0001 Module: 0   Port: 1
Operation: Deleted Vlan: 2     MAC Addr: 0000.0000.0002 Module: 0   Port: 1
Operation: Deleted Vlan: 2     MAC Addr: 0000.0000.0003 Module: 0   Port: 1
```

Related Commands

Command	Description
clear mac address-table notification	Clears the MAC address notification global counters.
show mac address-table address	Displays MAC address table information for the specified MAC address.
show mac address-table aging-time	Displays the aging time in all VLANs or the specified VLAN.
show mac address-table count	Displays the number of addresses present in all VLANs or the specified VLAN.
show mac address-table dynamic	Displays dynamic MAC address table entries only.
show mac address-table interface	Displays the MAC address table information for the specified interface.
show mac address-table static	Displays static MAC address table entries only.
show mac address-table vlan	Displays the MAC address table information for the specified VLAN.

show mac address-table static

Use the **show mac address-table static** user EXEC command to display only static MAC address table entries.

show mac address-table static [**address** *mac-address*] [**interface** *interface-id*] [**vlan** *vlan-id*]

Syntax Description

address *mac-address*	(Optional) Specify a 48-bit MAC address; the valid format is H.H.H (available in privileged EXEC mode only).
interface *interface-id*	(Optional) Specify an interface to match; valid *interfaces* include physical ports and port channels.
vlan *vlan-id*	(Optional) Display addresses for a specific VLAN. The range is 1 to 4094.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show mac address-table static** command:

```
Switch> show mac address-table static
          Mac Address Table
-------------------------------------------

Vlan    Mac Address     Type    Ports
----    -----------     ----    -----
 All    0100.0ccc.cccc  STATIC  CPU
 All    0180.c200.0000  STATIC  CPU
 All    0100.0ccc.cccd  STATIC  CPU
 All    0180.c200.0001  STATIC  CPU
 All    0180.c200.0004  STATIC  CPU
 All    0180.c200.0005  STATIC  CPU
   4    0001.0002.0004  STATIC  Drop
   6    0001.0002.0007  STATIC  Drop
Total Mac Addresses for this criterion: 8
```

Related Commands

Command	Description
mac address-table static	Adds static addresses to the MAC address table.
mac address-table static drop	Enables unicast MAC address filtering and configures the switch to drop traffic with a specific source or destination MAC address.
show mac address-table address	Displays MAC address table information for the specified MAC address.
show mac address-table aging-time	Displays the aging time in all VLANs or the specified VLAN.

Command	Description
show mac address-table count	Displays the number of addresses present in all VLANs or the specified VLAN.
show mac address-table dynamic	Displays dynamic MAC address table entries only.
show mac address-table interface	Displays the MAC address table information for the specified interface.
show mac address-table notification	Displays the MAC address notification settings for all interfaces or the specified interface.
show mac address-table vlan	Displays the MAC address table information for the specified VLAN.

show mac address-table vlan

Use the **show mac address-table vlan** user EXEC command to display the MAC address table information for the specified VLAN.

show mac address-table vlan *vlan-id*

Syntax Description

vlan-id	(Optional) Display addresses for a specific VLAN. The range is 1 to 4094.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show mac address-table vlan 1** command:

```
Switch> show mac address-table vlan 1
          Mac Address Table
-------------------------------------------

Vlan    Mac Address     Type    Ports
----    -----------     ----    -----
   1    0100.0ccc.cccc  STATIC  CPU
   1    0180.c200.0000  STATIC  CPU
   1    0100.0ccc.cccd  STATIC  CPU
   1    0180.c200.0001  STATIC  CPU
   1    0180.c200.0002  STATIC  CPU
   1    0180.c200.0003  STATIC  CPU
   1    0180.c200.0005  STATIC  CPU
   1    0180.c200.0006  STATIC  CPU
   1    0180.c200.0007  STATIC  CPU
Total Mac Addresses for this criterion: 9
```

Related Commands

Command	Description
show mac address-table address	Displays MAC address table information for the specified MAC address.
show mac address-table aging-time	Displays the aging time in all VLANs or the specified VLAN.
show mac address-table count	Displays the number of addresses present in all VLANs or the specified VLAN.
show mac address-table dynamic	Displays dynamic MAC address table entries only.
show mac address-table interface	Displays the MAC address table information for the specified interface.
show mac address-table notification	Displays the MAC address notification settings for all interfaces or the specified interface.
show mac address-table static	Displays static MAC address table entries only.

show mls qos

Use the **show mls qos** user EXEC command to display global quality of service (QoS) configuration information.

show mls qos

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show mls qos** command when QoS is enabled and DSCP transparency is enabled:

```
Switch> show mls qos
QoS is enabled
QoS ip packet dscp rewrite is enabled
```

Related Commands

Command	Description
mls qos	Enables QoS for the entire switch.

show mls qos input-queue

Use the **show mls qos input-queue** user EXEC command to display quality of service (QoS) settings for the ingress queues.

show mls qos input-queue

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show mls qos input-queue** command:

```
Switch> show mls qos input-queue
Queue     :       1       2
-------------------------------------------
buffers   :       90      10
bandwidth :       4       4
priority  :       0       10
threshold1:       100     100
threshold2:       100     100
```

Related Commands

Command	Description
mls qos srr-queue input cos-map	Maps assigned class of service (CoS) values to an ingress queue and assigns CoS values to a queue and to a threshold ID.
mls qos srr-queue input priority-queue	Configures the ingress priority queue and guarantees bandwidth.

show mls qos interface

Use the **show mls qos interface** user EXEC command to display quality of service (QoS) information at the port level.

show mls qos interface [*interface-id*] [**buffers** | **queueing** | **statistics**]

Syntax Description

interface-id	(Optional) Display QoS information for the specified port. Valid interfaces include physical ports.
buffers	(Optional) Display the buffer allocation among the queues.
queueing	(Optional) Display the queueing strategy (shared or shaped) and the weights corresponding to the queues.
statistics	(Optional) Display statistics for sent and received Differentiated Services Code Points (DSCPs) and class of service (CoS) values, the number of packets enqueued or dropped per egress queue.

Note Though visible in the command-line help string, the **policers** keyword is not supported.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show mls qos interface** *interface-id* command when VLAN-based QoS is enabled:

```
Switch> show mls qos interface gigabitethernet0/1
GigabitEthernet0/1
trust state:not trusted
trust mode:not trusted
trust enabled flag:ena
COS override:dis
default COS:0
DSCP Mutation Map:Default DSCP Mutation Map
Trust device:none
qos mode:vlan-based
```

This is an example of output from the **show mls qos interface** *interface-id* command when VLAN-based QoS is disabled:

```
Switch> show mls qos interface gigabitethernet0/2
GigabitEthernet0/2
trust state:not trusted
trust mode:not trusted
trust enabled flag:ena
COS override:dis
default COS:0
```

```
DSCP Mutation Map:Default DSCP Mutation Map
Trust device:none
qos mode:port-based
```

This is an example of output from the **show mls qos interface** *interface-id* **buffers** command:

```
Switch> show mls qos interface gigabitethernet0/2 buffers
GigabitEthernet0/2
The port is mapped to qset : 1
The allocations between the queues are : 25 25 25 25
```

This is an example of output from the **show mls qos interface** *interface-id* **queueing** command. The egress expedite queue overrides the configured shaped round robin (SRR) weights.

```
Switch> show mls qos interface gigabitethernet0/2 queueing
GigabitEthernet0/2
Egress Priority Queue :enabled
Shaped queue weights (absolute) :  25 0 0 0
Shared queue weights  :  25 25 25 25
The port bandwidth limit : 100  (Operational Bandwidth:100.0)
The port is mapped to qset : 1
```

This is an example of output from the **show mls qos interface** *interface-id* **statistics** command. Table 2-16 describes the fields in this display.

```
Switch> show mls qos interface gigabitethernet0/2 statistics
GigabitEthernet0/2

  dscp: incoming
-------------------------------

  0 -  4 :       4213          0          0          0          0
  5 -  9 :          0          0          0          0          0
 10 - 14 :          0          0          0          0          0
 15 - 19 :          0          0          0          0          0
 20 - 24 :          0          0          0          0          0
 25 - 29 :          0          0          0          0          0
 30 - 34 :          0          0          0          0          0
 35 - 39 :          0          0          0          0          0
 40 - 44 :          0          0          0          0          0
 45 - 49 :          0          0          0          6          0
 50 - 54 :          0          0          0          0          0
 55 - 59 :          0          0          0          0          0
 60 - 64 :          0          0          0          0
  dscp: outgoing
-------------------------------

  0 -  4 :     363949          0          0          0          0
  5 -  9 :          0          0          0          0          0
 10 - 14 :          0          0          0          0          0
 15 - 19 :          0          0          0          0          0
 20 - 24 :          0          0          0          0          0
 25 - 29 :          0          0          0          0          0
 30 - 34 :          0          0          0          0          0
 35 - 39 :          0          0          0          0          0
 40 - 44 :          0          0          0          0          0
 45 - 49 :          0          0          0          0          0
 50 - 54 :          0          0          0          0          0
 55 - 59 :          0          0          0          0          0
 60 - 64 :          0          0          0          0
  cos: incoming
-------------------------------

  0 -  4 :     132067          0          0          0          0
```

```
  5 -  9 :          0          0          0
  cos: outgoing
-------------------------------

  0 -  4 :     739155          0          0          0          0
  5 -  9 :         90          0          0
```

Table 2-16 show mls qos interface statistics Field Descriptions

Field		Description
DSCP	incoming	Number of packets received for each DSCP value.
	outgoing	Number of packets sent for each DSCP value.
CoS	incoming	Number of packets received for each CoS value.
	outgoing	Number of packets sent for each CoS value.

Related Commands

Command	Description
mls qos srr-queue input cos-map	Maps CoS values to an ingress queue or maps CoS values to a queue and to a threshold ID.
mls qos srr-queue input priority-queue	Configures the ingress priority queue and guarantees bandwidth.
mls qos srr-queue output cos-map	Maps CoS values to an egress queue or maps CoS values to a queue and to a threshold ID.
priority-queue	Enables the egress expedite queue on a port.

show mls qos maps

Use the **show mls qos maps** user EXEC command to display quality of service (QoS) mapping information. During classification, QoS uses the mapping tables to represent the priority of the traffic and to derive a corresponding class of service (CoS) value from the received CoS or IP precedence value.

show mls qos maps [**cos-input-q** | **cos-output-q** | **ip-prec-dscp**]

Syntax Description

cos-input-q	(Optional) Display the CoS input queue threshold map.
cos-output-q	(Optional) Display the CoS output queue threshold map.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The CoS input queue threshold and the CoS output queue threshold maps show the CoS value in the top row and the corresponding queue ID and threshold ID in the second row. For example, in the CoS input queue threshold map, a CoS value of 5 corresponds to queue 2 and threshold 1 (2-1).

Examples

This is an example of output from the **show mls qos maps** command:

```
Switch> show mls qos maps

Cos-outputq-threshold map:
              cos:  0   1   2   3   4   5   6   7
              ------------------------------------
  queue-threshold: 2-1 2-1 3-1 3-1 4-1 1-1 4-1 4-1

   Cos-inputq-threshold map:
              cos:  0   1   2   3   4   5   6   7
              ------------------------------------
  queue-threshold: 1-1 1-1 1-1 1-1 1-1 2-1 1-1 1-1
```

Related Commands

Command	Description
mls qos srr-queue input cos-map	Maps CoS values to an ingress queue or maps CoS values to a queue and to a threshold ID.
mls qos srr-queue output cos-map	Maps CoS values to an egress queue or maps CoS values to a queue and to a threshold ID.

show monitor

Use the **show monitor** user EXEC command to display information about all Switched Port Analyzer (SPAN) sessions on the switch. Use the command with keywords to show a specific session, all sessions, all local sessions, or all remote sessions.

show monitor [**session** {*session_number*} [**detail**]]

Syntax Description

session	(Optional) Display information about specified SPAN sessions.
session_number	Specify the number of the SPAN session. The range is 1 to 66.
detail	(Optional) Display detailed information about the specified sessions.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The output is the same for the **show monitor** command and the **show monitor session all** command.

Examples

This is an example of output for the **show monitor** user EXEC command:

```
Switch# show monitor
Session 1
---------
Type : Local Session
Source Ports :
RX Only : Gi0/1
Both : Gi0/2-3,Gi0/5-6
Destination Ports : Gi0/20
Encapsulation : Replicate
Ingress : Disabled
```

This is an example of output for the **show monitor** user EXEC command for SPAN source session 1:

```
Switch# show monitor session 1
Session 1
---------
Type : Local Session
Source Ports :
RX Only : Gi0/1
Both : Gi0/2-3,Gi0/5-6
Destination Ports : Gi0/20
Encapsulation : Replicate
Ingress : Disabled
```

This is an example of output for the **show monitor session all** user EXEC command when ingress traffic forwarding is enabled:

```
Switch# show monitor session all
Session 1
```

```
---------
Type : Local Session
Source Ports :
Both : Gi0/2
Destination Ports : Gi0/3
Encapsulation : Native
Ingress : Enabled, default VLAN = 5
Ingress encap : DOT1Q

Session 2
---------
Type : Local Session
Source Ports :
Both : Gi0/8
Destination Ports : Gi0/12
Encapsulation : Replicate
Ingress : Enabled, default VLAN = 4
Ingress encap : Untagged
```

Related Commands

Command	Description
monitor session	Starts or modifies a SPAN session.

show network-policy profile

Use the **show network policy profile** privileged EXEC command to display the network-policy profiles.

show network-policy profile [*profile number*] [**detail**]

Syntax Description

profile number	(Optional) Display the network-policy profile number. If no profile is entered, all network-policy profiles appear.
detail	(Optional) Display detailed status and statistics information.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Examples

This is an example of output from the **show network-policy profile** command:

```
Switch# show network-policy profile
Network Policy Profile 10
   voice vlan 17 cos 4
  Interface:
   none
Network Policy Profile 30
   voice vlan 30 cos 5
  Interface:
   none
Network Policy Profile 36
   voice vlan 4 cos 3
  Interface:
   Interface_id
```

Related Commands

Command	Description
network-policy	Applies a network-policy to an interface.
network-policy profile (global configuration)	Creates the network-policy profile.
network-policy profile (network-policy configuration)	Configures the attributes of network-policy profiles.

show pagp

Use the **show pagp** user EXEC command to display Port Aggregation Protocol (PAgP) channel-group information.

show pagp [*channel-group-number*] {**counters** | **internal** | **neighbor**}

Syntax Description

channel-group-number	(Optional) Number of the channel group. The range is 1 to 6.
counters	Display traffic information.
internal	Display internal information.
neighbor	Display neighbor information.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can enter any **show pagp** command to display the active channel-group information. To display the nonactive information, enter the **show pagp** command with a channel-group number.

Examples

This is an example of output from the **show pagp 1 counters** command:

```
Switch> show pagp 1 counters
             Information        Flush
Port         Sent   Recv     Sent   Recv
---------------------------------------
Channel group: 1
Gi0/1      45     42       0      0
Gi0/2      45     41       0      0
```

This is an example of output from the **show pagp 1 internal** command:

```
Switch> show pagp 1 internal
Flags:  S - Device is sending Slow hello.  C - Device is in Consistent state.
        A - Device is in Auto mode.
Timers: H - Hello timer is running.        Q - Quit timer is running.
        S - Switching timer is running.    I - Interface timer is running.

Channel group 1
                                Hello    Partner  PAgP     Learning  Group
Port        Flags State   Timers  Interval Count   Priority   Method  Ifindex
Gi0/1       SC    U6/S7   H       30s      1        128        Any      16
Gi0/2       SC    U6/S7   H       30s      1        128        Any      16
```

This is an example of output from the **show pagp 1 neighbor** command:

```
Switch> show pagp 1 neighbor
   Flags:  S - Device is sending Slow hello.  C - Device is in Consistent state.
           A - Device is in Auto mode.        P - Device learns on physical port.
```

```
Channel group 1 neighbors
            Partner                 Partner          Partner           Partner Group
Port        Name                    Device ID        Port         Age  Flags   Cap.
Gi0/1       switch-p2               0002.4b29.4600   Gi0/1          9s SC      10001
Gi0/2       switch-p2               0002.4b29.4600   Gi0/2         24s SC      10001
```

Related Commands

Command	Description
clear pagp	Clears PAgP channel-group information.

show port-security

Use the **show port-security** privileged EXEC command to display port-security settings for an interface or for the switch.

show port-security [**interface** *interface-id*] [**address** | **vlan**]

Syntax Description

interface *interface-id*	(Optional) Display port security settings for the specified interface. Valid interfaces include physical ports (including type, module, and port number).
address	(Optional) Display all secure MAC addresses on all ports or a specified port.
vlan	(Optional) Display port security settings for all VLANs on the specified interface. This keyword is visible only on interfaces that have the switchport mode set to **trunk**.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you enter the command without keywords, the output includes the administrative and operational status of all secure ports on the switch.

If you enter an *interface-id*, the command displays port security settings for the interface.

If you enter the **address** keyword, the command displays the secure MAC addresses for all interfaces and the aging information for each secure address.

If you enter an *interface-id* and the **address** keyword, the command displays all the MAC addresses for the interface with aging information for each secure address. You can also use this command to display all the MAC addresses for an interface even if you have not enabled port security on it.

If you enter the **vlan** keyword, the command displays the configured maximum and the current number of secure MAC addresses for all VLANs on the interface. This option is visible only on interfaces that have the switchport mode set to **trunk**.

Examples

This is an example of the output from the **show port-security** command:

```
Switch# show port-security
Secure Port      MaxSecureAddr  CurrentAddr  SecurityViolation  Security Action
                    (Count)        (Count)      (Count)
-------------------------------------------------------------------------------
     Gi0/1         1               0             0             Shutdown
-------------------------------------------------------------------------------
Total Addresses in System (excluding one mac per port)     : 1
Max Addresses limit in System (excluding one mac per port) : 6272
```

This is an example of output from the **show port-security interface** *interface-id* command:

```
Switch# show port-security interface gigabitethernet0/1
Port Security : Enabled
Port status : SecureUp
Violation mode : Shutdown
Maximum MAC Addresses : 1
Total MAC Addresses : 0
Configured MAC Addresses : 0
Aging time : 0 mins
Aging type : Absolute
SecureStatic address aging : Disabled
Security Violation count : 0
```

This is an example of output from the **show port-security address** command:

```
Switch# show port-security address
Secure Mac Address Table
-----------------------------------------------------------------------
Vlan    Mac Address       Type                Ports   Remaining Age
                                                         (mins)
----    -----------       ----                -----   -------------
   1    0006.0700.0800    SecureConfigured    Gi0/2       1
-----------------------------------------------------------------------
Total Addresses in System (excluding one mac per port)     : 1
Max Addresses limit in System (excluding one mac per port) : 6272
```

This is an example of output from the **show port-security interface gigabitethernet0/2 address** command:

```
Switch# show port-security interface gigabitethernet0/2 address
          Secure Mac Address Table
-----------------------------------------------------------------------
Vlan    Mac Address       Type                Ports   Remaining Age
                                                         (mins)
----    -----------       ----                -----   -------------
   1    0006.0700.0800    SecureConfigured    Gi0/2       1
-----------------------------------------------------------------------
Total Addresses: 1
```

This is an example of output from the **show port-security interface** *interface-id* **vlan** command:

```
Switch# show port-security interface gigabitethernet0/2 vlan
Default maximum:not set, using 5120
VLAN  Maximum    Current
    5    default          1
   10    default         54
   11    default        101
   12    default        101
   13    default        201
   14    default        501
```

Related Commands

Command	Description
clear port-security	Deletes from the MAC address table a specific type of secure address or all the secure addresses on the switch or an interface.
switchport port-security	Enables port security on a port, restricts the use of the port to a user-defined group of stations, and configures secure MAC addresses.

show psp config

To display the status of protocol storm protection configured for a specific protocol on a VLAN, use the **show psp config** privileged EXEC command.

show psp config {**arp** | **dhcp** | **igmp**}

Syntax Description

arp	Show protocol storm protection status for ARP and ARP snooping.
dhcp	Show protocol storm protection status for DHCP and DHCP snooping.
igmp	Show protocol storm protection status for IGMP and IGMP snooping.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Examples

This is an example of output from the **show psp config dhcp** command with protocol storm protection configured to drop packets when the incoming rate exceeds 35 packets per second.

```
Switch# show psp config dhcp

-----------------------------------
PSP Protocol Configuration Summary:
-----------------------------------

DHCP Rate Limit    : 35 packets/sec
PSP Action         : Packet Drop
```

Related Commands

Command	Description
psp {**arp** | **dhcp** | **igmp**} **pps** *value*	Configures protocol storm protection for ARP, DHCP, or IGMP.
show psp statistics	Displays the number of dropped packets when protocol storm protection is configured.
clear psp counter	Clears the counter of dropped packets.

show psp statistics

To display the number of packets dropped for all protocols when protocol storm protection is configured, use the **show psp statistics** privileged EXEC command.

show psp statistics [**arp** | **dhcp** | **igmp**]

Syntax Description

arp	(Optional) Show the number of packets dropped for ARP and ARP snooping.
dhcp	(Optional) Show the number of packets dropped for DHCP and DHCP snooping.
igmp	(Optional) Show the number of packets dropped for IGMP and IGMP snooping.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(58)SE	This command was introduced.

Examples

This is an example of output from the **show psp statistics dhcp** command when protocol storm protection is configured for DHCP. The output shows that 13 packets were dropped.

```
Switch# show psp statistics dhcp

---------------------------------
PSP Protocol Drop Counter Summary:
---------------------------------
DHCP Drop Counter: 13
```

Related Commands

Command	Description
psp {**arp** | **dhcp** | **igmp**} **pps** *value*	Configures protocol storm protection for ARP, DHCP, or IGMP.
show psp config	Displays the protocol storm protection configuration.
clear psp counter	Clears the counter of dropped packets.

show sdm prefer

Use the **show sdm prefer** privileged EXEC command to display information about the Switch Database Management (SDM) templates that can be used to maximize used for allocating system resources for a particular feature.

show sdm prefer [**default** | **dual-ipv4-and-ipv6 default** | **qos**]

Syntax Description

default	(Optional) Display the template that balances system resources among features.
dual-ipv4-and-ipv6 default	Allows the switch to be used in dual stack environments (supporting both IPv4 and IPv6).
qos	(Optional) Display the template that maximizes system resources for quality of service (QoS) access control entries (ACEs).

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.
12..2(50)SE	The **dual-ipv4-and-ipv6 default** keywords were added.

Usage Guidelines

When you change the SDM template by using the **sdm prefer** global configuration command, you must reload the switch for the configuration to take effect. If you enter the **show sdm prefer** command before you enter the **reload** privileged EXEC command, the **show sdm prefer** command shows the template currently in use and the template that will become active after a reload.

The numbers displayed for each template represent an approximate maximum number for each feature resource. The actual number might vary, depending on the actual number of other features configured.

Examples

This is an example of output from the **show sdm prefer** command:

```
Switch# show sdm prefer default
 "default" template:
 The selected template optimizes the resources in
 the switch to support this level of features for
 0 routed interfaces and 255 VLANs.

  number of unicast mac addresses:                8K
  number of IPv4 IGMP groups:                     256
  number of IPv4/MAC qos aces:                    128
  number of IPv4/MAC security aces:               384
```

This is an example of output from the **show sdm prefer qos** command:

```
Switch# show sdm prefer qos
 "qos" template:
 The selected template optimizes the resources in
 the switch to support this level of features for
 0 routed interfaces and 255 VLANs.

  number of unicast mac addresses:                8K
  number of IPv4 IGMP groups:                     256
  number of IPv4/MAC qos aces:                    384
  number of IPv4/MAC security aces:               128
```

Related Commands

Command	Description
sdm prefer	Sets the SDM template to maximize resources.

show setup express

Use the **show setup express** privileged EXEC command to display if Express Setup mode is active on the switch.

show setup express

Syntax Description

This command has no arguments or keywords.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show setup express co**mmand:

```
Switch# show setup express
express setup mode is active
```

Related Commands

Command	Description
setup express	Enables Express Setup mode.

show spanning-tree

Use the **show spanning-tree** user EXEC command to display spanning-tree state information.

show spanning-tree [*bridge-group* | **active** [**detail**] | **backbonefast** | **blockedports** | **bridge** | **detail** [**active**] | **inconsistentports** | **interface** *interface-id* | **mst** | **pathcost method** | **root** | **summary** [**totals**] | **uplinkfast** | **vlan** *vlan-id*]

show spanning-tree *bridge-group* [**active** [**detail**] | **blockedports** | **bridge** | **detail** [**active**] | **inconsistentports** | **interface** *interface-id* | **root** | **summary**]

show spanning-tree vlan *vlan-id* [**active** [**detail**] | **blockedports** | **bridge** | **detail** [**active**] | **inconsistentports** | **interface** *interface-id* | **root** | **summary**]

show spanning-tree {**vlan** *vlan-id* | *bridge-group*} **bridge** [**address** | **detail** | **forward-time** | **hello-time** | **id** | **max-age** | **priority** [**system-id**] | **protocol**]

show spanning-tree {**vlan** *vlan-id* | *bridge-group*} **root** [**address** | **cost** | **detail** | **forward-time** | **hello-time** | **id** | **max-age** | **port** | **priority** [**system-id**]

show spanning-tree interface *interface-id* [**active** [**detail**] | **cost** | **detail** [**active**] | **inconsistency** | **portfast** | **priority** | **rootcost** | **state**]

show spanning-tree mst [**configuration** [digest]] | [*instance-id* [**detail** | **interface** *interface-id* [**detail**]]

Syntax Description

bridge-group	(Optional) Specify the bridge group number. The range is 1 to 255.
active [**detail**]	(Optional) Display spanning-tree information only on active interfaces (available only in privileged EXEC mode).
backbonefast	(Optional) Display spanning-tree BackboneFast status.
blockedports	(Optional) Display blocked port information (available only in privileged EXEC mode).
bridge [**address** | **detail** | **forward-time** | **hello-time** | **id** | **max-age** | **priority** [**system-id**] | **protocol**]	(Optional) Display status and configuration of this switch (optional keywords available only in privileged EXEC mode).
detail [**active**]	(Optional) Display a detailed summary of interface information (**active** keyword available only in privileged EXEC mode).
inconsistentports	(Optional) Display inconsistent port information (available only in privileged EXEC mode).
interface *interface-id* [**active** [**detail**] | **cost** | **detail** [**active**] | **inconsistency** | **portfast** | **priority** | **rootcost** | **state**]	(Optional) Display spanning-tree information for the specified interface (all options except **portfast** and **state** available only in privileged EXEC mode). Enter each interface separated by a space. Ranges are not supported. Valid interfaces include physical ports, VLANs, and port channels. The VLAN range is 1 to 4094. The port-channel range is 1 to 6.

mst [**configuration** [**digest**]] [*instance-id* [**detail** | **interface** *interface-id* [**detail**]]	(Optional) Display the multiple spanning-tree (MST) region configuration and status (available only in privileged EXEC mode). The keywords have these meanings: • **digest**—(Optional) Display the MD5 digest included in the current MST configuration identifier (MSTCI). Two separate digests, one for standard and one for prestandard switches, appear (available only in privileged EXEC mode). The terminology was updated for the implementation of the IEEE standard, and the *txholdcoun*t field was added. The new master role appears for boundary ports. The word *pre-standard* or *Pre-STD* appears when an IEEE standard bridge sends prestandard BPDUs on a port. The word *pre-standard (config)* or *Pre-STD-Cf* appears when a port has been configured to transmit prestandard BPDUs and no prestandard BPDU has been received on that port. The word *pre-standard (rcvd)* or *Pre-STD-Rx* appears when a prestandard BPDU has been received on a port that has not been configured to transmit prestandard BPDUs. A *dispute* flag appears when a designated port receives inferior designated information until the port returns to the forwarding state or ceases to be designated. • *instance-id*—You can specify a single instance ID, a range of IDs separated by a hyphen, or a series of IDs separated by a comma. The range is 1 to 4094. The display shows the number of currently configured instances. • **interface** *interface-id*—(Optional) Valid interfaces include physical ports, VLANs, and port channels. The VLAN range is 1 to 4094. The port-channel range is 1 to 6. • **detail**—(Optional) Display detailed information for the instance or interface.
pathcost method	(Optional) Display the default path cost method (available only in privileged EXEC mode).
root [**address** | **cost** | **detail** | **forward-time** | **hello-time** | **id** | **max-age** | **port** | **priority** [**system-id**]]	(Optional) Display root switch status and configuration (all keywords available only in privileged EXEC mode).
summary [**totals**]	(Optional) Display a summary of port states or the total lines of the spanning-tree state section. The words *IEEE Standard* identify the MST version running on a switch.
uplinkfast	(Optional) Display spanning-tree UplinkFast status.
vlan *vlan-id* [**active** [**detail**] | **backbonefast** | **blockedports** | **bridge** [**address** | **detail** | **forward-time** | **hello-time** | **id** | **max-age** | **priority** [**system-id**] | **protocol**]	(Optional) Display spanning-tree information for the specified VLAN (some keywords available only in privileged EXEC mode). You can specify a single VLAN identified by VLAN ID number, a range of VLANs separated by a hyphen, or a series of VLANs separated by a comma. The range is 1 to 4094.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If the *vlan-id* variable is omitted, the command applies to the spanning-tree instance for all VLANs.

Examples

This is an example of output from the **show spanning-tree active** command:

```
Switch# show spanning-tree active
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    32768
             Address     0001.42e2.cdd0
             Cost        3038
             Port        24 (GigabitEthernet0/1)
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    49153  (priority 49152 sys-id-ext 1)
             Address     0003.fd63.9580
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time 300
  Uplinkfast enabled

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Gi0/1            Root FWD 3019      128.24   P2p
<output truncated>
```

This is an example of output from the **show spanning-tree detail** command:

```
Switch# show spanning-tree detail
VLAN0001 is executing the ieee compatible Spanning Tree protocol
  Bridge Identifier has priority 49152, sysid 1, address 0003.fd63.9580
  Configured hello time 2, max age 20, forward delay 15
  Current root has priority 32768, address 0001.42e2.cdd0
  Root port is 1 (GigabitEthernet0/1), cost of root path is 3038
  Topology change flag not set, detected flag not set
  Number of topology changes 0 last change occurred 1d16h ago
  Times:  hold 1, topology change 35, notification 2
          hello 2, max age 20, forward delay 15
  Timers: hello 0, topology change 0, notification 0, aging 300
  Uplinkfast enabled

 Port 1 (GigabitEthernet0/1) of VLAN0001 is forwarding
   Port path cost 3019, Port priority 128, Port Identifier 128.24.
   Designated root has priority 32768, address 0001.42e2.cdd0
   Designated bridge has priority 32768, address 00d0.bbf5.c680
   Designated port id is 128.25, designated path cost 19
   Timers: message age 2, forward delay 0, hold 0
   Number of transitions to forwarding state: 1
   Link type is point-to-point by default
   BPDU: sent 0, received 72364
<output truncated>
```

This is an example of output from the **show spanning-tree interface** *interface-id* command:

```
Switch# show spanning-tree interface gigabitethernet0/1
Vlan             Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
VLAN0001         Root FWD 3019      128.24   P2p

Switch# show spanning-tree summary
Switch is in pvst mode
Root bridge for: none
EtherChannel misconfiguration guard is enabled
Extended system ID   is enabled
Portfast             is disabled by default
PortFast BPDU Guard  is disabled by default
Portfast BPDU Filter is disabled by default
Loopguard            is disabled by default
UplinkFast           is enabled
BackboneFast         is enabled
Pathcost method used is short

Name                   Blocking Listening Learning Forwarding STP Active
---------------------- -------- --------- -------- ---------- ----------
VLAN0001                  1        0         0        11         12
VLAN0002                  3        0         0        1          4
VLAN0004                  3        0         0        1          4
VLAN0006                  3        0         0        1          4
VLAN0031                  3        0         0        1          4
VLAN0032                  3        0         0        1          4
<output truncated>
---------------------- -------- --------- -------- ---------- ----------
37 vlans                  109      0         0        47         156
Station update rate set to 150 packets/sec.

UplinkFast statistics
-----------------------
Number of transitions via uplinkFast (all VLANs)            : 0
Number of proxy multicast addresses transmitted (all VLANs) : 0

BackboneFast statistics
-----------------------
Number of transition via backboneFast (all VLANs)           : 0
Number of inferior BPDUs received (all VLANs)               : 0
Number of RLQ request PDUs received (all VLANs)             : 0
Number of RLQ response PDUs received (all VLANs)            : 0
Number of RLQ request PDUs sent (all VLANs)                 : 0
Number of RLQ response PDUs sent (all VLANs)                : 0
```

This is an example of output from the **show spanning-tree mst configuration** command:

```
Switch# show spanning-tree mst configuration
Name      [region1]
Revision  1
Instance  Vlans Mapped
--------  ------------------
0         1-9,21-4094
1         10-20
----------------------------
```

This is an example of output from the **show spanning-tree mst interface** *interface-id* command:

```
Switch# show spanning-tree mst interface gigabitethernet0/1
GigabitEthernet0/1 of MST00 is root forwarding
Edge port: no             (default)        port guard : none        (default)
Link type: point-to-point (auto)           bpdu filter: disable     (default)
Boundary : boundary       (STP)            bpdu guard : disable     (default)
Bpdus sent 5, received 74

Instance role state cost      prio vlans mapped
0        root FWD   200000    128  1,12,14-4094
```

This is an example of output from the **show spanning-tree mst 0** command:

```
Switch# show spanning-tree mst 0
###### MST00        vlans mapped: 1-9,21-4094
Bridge      address 0002.4b29.7a00  priority  32768 (32768 sysid 0)
Root        address 0001.4297.e000  priority  32768 (32768 sysid 0)
 port    Gi0/1           path cost 200038

IST master *this switch
Operational hello time 2, forward delay 15, max age 20, max hops 20
Configured  hello time 2, forward delay 15, max age 20, max hops 20

Interface              role state cost      prio type
--------------------   ---- ----- --------- ---- --------------------------------
GigabitEthernet0/1     root FWD   200000    128  P2P bound(STP)
GigabitEthernet0/2     desg FWD   200000    128  P2P bound(STP)
Port-channel1          desg FWD   200000    128  P2P bound(STP)
```

Related Commands

Command	Description
clear spanning-tree counters	Clears the spanning-tree counters.
clear spanning-tree detected-protocols	Restarts the protocol migration process.
spanning-tree backbonefast	Enables the BackboneFast feature.
spanning-tree bpdufilter	Prevents an interface from sending or receiving bridge protocol data units (BPDUs).
spanning-tree bpduguard	Puts an interface in the error-disabled state when it receives a BPDU.
spanning-tree cost	Sets the path cost for spanning-tree calculations.
spanning-tree extend system-id	Enables the extended system ID feature.
spanning-tree guard	Enables the root guard or the loop guard feature for all the VLANs associated with the selected interface.
spanning-tree link-type	Overrides the default link-type setting for rapid spanning-tree transitions to the forwarding state.

Command	Description
spanning-tree loopguard default	Prevents alternate or root ports from becoming the designated port because of a failure that leads to a unidirectional link.
spanning-tree mst configuration	Enters multiple spanning-tree (MST) configuration mode through which the MST region configuration occurs.
spanning-tree mst cost	Sets the path cost for MST calculations.
spanning-tree mst forward-time	Sets the forward-delay time for all MST instances.
spanning-tree mst hello-time	Sets the interval between hello BPDUs sent by root switch configuration messages.
spanning-tree mst max-age	Sets the interval between messages that the spanning tree receives from the root switch.
spanning-tree mst max-hops	Sets the number of hops in an MST region before the BPDU is discarded and the information held for an interface is aged.
spanning-tree mst port-priority	Configures an interface priority.
spanning-tree mst priority	Configures the switch priority for the specified spanning-tree instance.
spanning-tree mst root	Configures the MST root switch priority and timers based on the network diameter.
spanning-tree port-priority	Configures an interface priority.
spanning-tree portfast (global configuration)	Globally enables the BPDU filtering or the BPDU guard feature on Port Fast-enabled interfaces or enables the Port Fast feature on all nontrunking interfaces.
spanning-tree portfast (interface configuration)	Enables the Port Fast feature on an interface and all its associated VLANs.
spanning-tree uplinkfast	Accelerates the choice of a new root port when a link or switch fails or when the spanning tree reconfigures itself.
spanning-tree vlan	Configures spanning tree on a per-VLAN basis.

show storm-control

Use the **show storm-control** user EXEC command to display broadcast, multicast, or unicast storm control settings on the switch or on the specified interface or to display storm-control history.

show storm-control [*interface-id*] [**broadcast** | **multicast** | **unicast**]

Syntax Description

interface-id	(Optional) Interface ID for the physical port (including type, module, and port number).
broadcast	(Optional) Display broadcast storm threshold setting.
multicast	(Optional) Display multicast storm threshold setting.
unicast	(Optional) Display unicast storm threshold setting.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you enter an *interface-id*, the storm control thresholds appear for the specified interface.

If you do not enter an *interface-id*, settings appear for one traffic type for all ports on the switch.

If you do not enter a traffic type, settings appear for broadcast storm control.

Examples

This is an example of a partial output from the **show storm-control** command when no keywords are entered. Because no traffic-type keyword was entered, the broadcast storm control settings appear.

```
Switch> show storm-control
Interface    Filter State   Upper       Lower      Current
---------    -------------  ----------  ---------  ---------
Gi0/1        Forwarding     20 pps      10 pps     5 pps
Gi0/2        Forwarding     50.00%      40.00%     0.00%
<output truncated>
```

This is an example of output from the **show storm-control** command for a specified interface. Because no traffic-type keyword was entered, the broadcast storm control settings appear.

```
Switch> show storm-control gigabitethernet0/1
Interface    Filter State   Upper       Lower      Current
---------    -------------  ----------  ---------  ---------
Gi0/1        Forwarding     20 pps      10 pps     5 pps
```

Table 2-17 describes the fields in the **show storm-control** display.

Table 2-17 show storm-control Field Descriptions

Field	Description
Interface	Displays the ID of the interface.
Filter State	Displays the status of the filter: • Blocking—Storm control is enabled, and a storm has occurred. • Forwarding—Storm control is enabled, and no storms have occurred. • Inactive—Storm control is disabled.
Upper	Displays the rising suppression level as a percentage of total available bandwidth in packets per second or in bits per second.
Lower	Displays the falling suppression level as a percentage of total available bandwidth in packets per second or in bits per second.
Current	Displays the bandwidth usage of broadcast traffic or the specified traffic type (broadcast, multicast, or unicast) as a percentage of total available bandwidth. This field is only valid when storm control is enabled.

Related Commands

Command	Description
storm-control	Sets the broadcast, multicast, or unicast storm control levels for the switch.

show system mtu

Use the **show system mtu** privileged EXEC command to display the global maximum transmission unit (MTU) or maximum packet size set for the switch.

show system mtu

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you have used the **system mtu** or **system mtu jumbo** global configuration command to change the MTU setting, the new setting does not take effect until you reset the switch.

The system MTU refers to ports operating at 10/100 Mb/s; the system jumbo MTU refers to Gigabit ports; the system routing MTU refers to routed ports.

Examples

This is an example of output from the **show system mtu** command:

```
Switch# show system mtu
System MTU size is 1500 bytes
System Jumbo MTU size is 1550 bytes
```

Related Commands

Command	Description
system mtu	Sets the MTU size for the Fast Ethernet, Gigabit Ethernet, or routed ports.

show udld

Use the **show udld** user EXEC command to display UniDirectional Link Detection (UDLD) administrative and operational status for all ports or the specified port.

show udld [*interface-id*]

Syntax Description

interface-id	(Optional) ID of the interface and port number. Valid interfaces include physical ports and VLANs. The VLAN range is 1 to 4094.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you do not enter an *interface-id*, administrative and operational UDLD status for all interfaces appear.

Examples

This is an example of output from the **show udld** *interface-id* command. For this display, UDLD is enabled on both ends of the link, and UDLD detects that the link is bidirectional. Table 2-18 describes the fields in this display.

```
Switch> show udld gigabitethernet0/1
Interface gi0/1
---
Port enable administrative configuration setting: Follows device default
Port enable operational state: Enabled
Current bidirectional state: Bidirectional
Current operational state: Advertisement - Single Neighbor detected
Message interval: 60
Time out interval: 5
    Entry 1
    Expiration time: 146
    Device ID: 1
    Current neighbor state: Bidirectional
    Device name: Switch-A
    Port ID: Gi0/1
    Neighbor echo 1 device: Switch-B
    Neighbor echo 1 port: Gi0/2
    Message interval: 5
    CDP Device name: Switch-A
```

Table 2-18 show udld Field Descriptions

Field	Description
Interface	The interface on the local device configured for UDLD.
Port enable administrative configuration setting	How UDLD is configured on the port. If UDLD is enabled or disabled, the port enable configuration setting is the same as the operational enable state. Otherwise, the enable operational setting depends on the global enable setting.
Port enable operational state	Operational state that shows whether UDLD is actually running on this port.
Current bidirectional state	The bidirectional state of the link. An unknown state appears if the link is down or if it is connected to an UDLD-incapable device. A bidirectional state appears if the link is a normal two-way connection to a UDLD-capable device. All other values mean miswiring.
Current operational state	The current phase of the UDLD state machine. For a normal bidirectional link, the state machine is most often in the Advertisement phase.
Message interval	How often advertisement messages are sent from the local device. Measured in seconds.
Time out interval	The time period, in seconds, that UDLD waits for echoes from a neighbor device during the detection window.
Entry 1	Information from the first cache entry, which contains a copy of echo information received from the neighbor.
Expiration time	The amount of time in seconds remaining before this cache entry is aged out.
Device ID	The neighbor device identification.
Current neighbor state	The neighbor's current state. If both the local and neighbor devices are running UDLD normally, the neighbor state and local state should be bidirectional. If the link is down or the neighbor is not UDLD-capable, no cache entries appear.
Device name	The device name or the system serial number of the neighbor. The system serial number appears if the device name is not set or is set to the default (Switch).
Port ID	The neighbor port ID enabled for UDLD.
Neighbor echo 1 device	The device name of the neighbors' neighbor from which the echo originated.
Neighbor echo 1 port	The port number ID of the neighbor from which the echo originated.
Message interval	The rate, in seconds, at which the neighbor is sending advertisement messages.
CDP device name	The CDP device name or the system serial number. The system serial number appears if the device name is not set or is set to the default (Switch).

Related Commands

Command	Description
udld	Enables aggressive or normal mode in UDLD or sets the configurable message timer time.
udld port	Enables UDLD on an individual interface or prevents a fiber-optic interface from being enabled by the **udld** global configuration command.
udld reset	Resets all interfaces shutdown by UDLD and permits traffic to begin passing through them again.

show version

Use the **show version** user EXEC command to display version information for the hardware and firmware.

show version

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show version** command:

Note Though visible in the **show version** output, the *configuration register* information is not supported on the switch.

```
Switch> show version | include IOS
Cisco IOS Software, C2918 Software (C2918-LANLITE-M), Version 12.2(0.0.44)SE, CISCO
DEVELOPMENT TEST VERSION
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Tue 17-May-05 01:43 by yenanh

ROM: Bootstrap program is C2918 boot loader
BOOTLDR: C2918 Boot Loader (C2918-HBOOT-M), Version 12.2 [lqian-flo_pilsner 100]

 Switch uptime is 3 days, 20 hours, 8 minutes
System returned to ROM by power-on
System image file is "flash:c2918-lanlite-mz.122-0.0.44.SE.bin"

cisco WS-C2918-24TC-L (PowerPC405) processor with 61440K/4088K bytes of memory.
Processor board ID FHH0916001J
Last reset from power-on
Target IOS Version 12.2(55)EZ
1 Virtual Ethernet interface
24 FastEthernet interfaces
2 Gigabit Ethernet interfaces
The password-recovery mechanism is enabled.
64K bytes of flash-simulated non-volatile configuration memory.
Base ethernet MAC Address       : 00:0B:FC:FF:E8:80
Motherboard assembly number     : 73-9832-02
Motherboard serial number       : FHH0916001J
Motherboard revision number     : 01
System serial number            : FHH0916001J
Hardware Board Revision Number  : 0x01
```

```
Switch   Ports  Model              SW Version              SW Image
------   -----  -----              ----------              ----------
*    1   26     WS-C2918-24TC-L    12.2(0.0.44)SE C2918-LANLITE-M

Configuration register is 0xF
```

show vlan

Use the **show vlan** user EXEC command to display the parameters for all configured VLANs or one VLAN (if the VLAN ID or name is specified) on the switch.

Note The LAN Lite image does not support remote SPAN.

show vlan [**brief** | **id** *vlan-id* | **mtu** | **name** *vlan-name* **summary**]

Syntax Description

brief	(Optional) Display one line for each VLAN with the VLAN name, status, and its ports.
id *vlan-id*	(Optional) Display information about a single VLAN identified by VLAN ID number. For *vlan-id*, the range is 1 to 4094.
mtu	(Optional) Display a list of VLANs and the minimum and maximum transmission unit (MTU) sizes configured on ports in the VLAN.
name *vlan-name*	(Optional) Display information about a single VLAN identified by VLAN name. The VLAN name is an ASCII string from 1 to 32 characters.
summary	(Optional) Display VLAN summary information.

Note Though visible in the command-line help string, the **ifindex**, **internal usage**, and **private-vlan** keywords are not supported.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

In the **show vlan mtu** command output, the MTU_Mismatch column shows whether all the ports in the VLAN have the same MTU. When *yes* appears in this column, it means that the VLAN has ports with different MTUs, and packets that are switched from a port with a larger MTU to a port with a smaller MTU might be dropped. If the VLAN does not have an SVI, the hyphen (-) symbol appears in the SVI_MTU column. If the MTU-Mismatch column displays *yes*, the names of the port with the MinMTU and the port with the MaxMTU appear.

Examples

This is an example of output from the **show vlan** command. Table 2-19 describes the fields in the display.

```
Switch> show vlan
VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Gi0/1, Gi0/2, Gi0/3, Gi0/4
                                                Gi0/5, Gi0/6, Gi0/7, Gi0/8
```

```
                                                 Gi0/9, Gi0/10, Gi0/11, Gi0/12
                                                 Gi0/13, Gi0/14, Gi0/15, Gi0/16
<output truncated>

2    VLAN0002                         active
3    VLAN0003                         active

<output truncated>

1000 VLAN1000                         active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        1002   1003
2    enet  100002     1500  -      -      -        -    -        0      0
3    enet  100003     1500  -      -      -        -    -        0      0

<output truncated>

1005 trnet 101005     1500  -      -      -        ibm  -        0      0

Remote SPAN VLANs
------------------------------------------------------------------------------

Primary Secondary Type              Ports
------- --------- ----------------- ------------------------------------------

<output truncated>
```

Table 2-19 show vlan Command Output Fields

Field	Description
VLAN	VLAN number.
Name	Name, if configured, of the VLAN.
Status	Status of the VLAN (active or suspend).
Ports	Ports that belong to the VLAN.
Type	Media type of the VLAN.
SAID	Security association ID value for the VLAN.
MTU	Maximum transmission unit size for the VLAN.
Parent	Parent VLAN, if one exists.
RingNo	Ring number for the VLAN, if applicable.
BrdgNo	Bridge number for the VLAN, if applicable.
Stp	Spanning Tree Protocol type used on the VLAN.
BrdgMode	Bridging mode for this VLAN—possible values are source-route bridging (SRB) and source-route transparent (SRT); the default is SRB.
Trans1	Translation bridge 1.

Table 2-19 show vlan Command Output Fields (continued)

Field	Description
Trans2	Translation bridge 2.
Primary/Secondary/ Type/Ports	—

This is an example of output from the **show vlan summary** command:

```
Switch> show vlan summary
Number of existing VLANs           : 45
 Number of existing VTP VLANs      : 45
 Number of existing extended VLANs : 0
```

This is an example of output from the **show vlan id** command.

```
Switch# show vlan id 2
VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------

2    VLAN0200                         active    Gi0/1, Gi0/2

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
2    enet  100002     1500  -      -      -        -    -        0      0

Remote SPAN VLAN
----------------
Disabled
```

Related Commands

Command	Description
switchport mode	Configures the VLAN membership mode of a port.
vlan	Enables VLAN configuration mode where you can configure VLANs 1 to 4094.

show vmps

Use the **show vmps** user EXEC command without keywords to display the VLAN Query Protocol (VQP) version, reconfirmation interval, retry count, VLAN Membership Policy Server (VMPS) IP addresses, and the current and primary servers, or use the **statistics** keyword to display client-side statistics.

show vmps [**statistics**]

Syntax Description

statistics	(Optional) Display VQP client-side statistics and counters.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show vmps** command:

```
Switch> show vmps
VQP Client Status:
-------------------
VMPS VQP Version:   1
Reconfirm Interval: 60 min
Server Retry Count: 3
VMPS domain server:

Reconfirmation status
---------------------
VMPS Action:         other
```

This is an example of output from the **show vmps statistics** command. Table 2-20 describes each field in the display.

```
Switch> show vmps statistics
VMPS Client Statistics
----------------------
VQP  Queries:               0
VQP  Responses:             0
VMPS Changes:               0
VQP  Shutdowns:             0
VQP  Denied:                0
VQP  Wrong Domain:          0
VQP  Wrong Version:         0
VQP  Insufficient Resource: 0
```

Table 2-20 show vmps statistics Field Descriptions

Field	Description
VQP Queries	Number of queries sent by the client to the VMPS.
VQP Responses	Number of responses sent to the client from the VMPS.

Table 2-20 show vmps statistics Field Descriptions (continued)

Field	Description
VMPS Changes	Number of times that the VMPS changed from one server to another.
VQP Shutdowns	Number of times the VMPS sent a response to shut down the port. The client disables the port and removes all dynamic addresses on this port from the address table. You must administratively re-enable the port to restore connectivity.
VQP Denied	Number of times the VMPS denied the client request for security reasons. When the VMPS response denies an address, no frame is forwarded to or from the workstation with that address (broadcast or multicast frames are delivered to the workstation if the port has been assigned to a VLAN). The client keeps the denied address in the address table as a blocked address to prevent more queries from being sent to the VMPS for each new packet received from this workstation. The client ages the address if no new packets are received from this workstation on this port within the aging time period.
VQP Wrong Domain	Number of times the management domain in the request does not match the one for the VMPS. Any previous VLAN assignments of the port are not changed. This response means that the server and the client have not been configured with the same VTP management domain.
VQP Wrong Version	Number of times the version field in the query packet contains a value that is higher than the version supported by the VMPS. The VLAN assignment of the port is not changed. The switches send only VMPS Version 1 requests.
VQP Insufficient Resource	Number of times the VMPS is unable to answer the request because of a resource availability problem. If the retry limit has not yet been reached, the client repeats the request with the same server or with the next alternate server, depending on whether the per-server retry count has been reached.

Related Commands

Command	Description
clear vmps statistics	Clears the statistics maintained by the VQP client.
vmps reconfirm (privileged EXEC)	Sends VQP queries to reconfirm all dynamic VLAN assignments with the VMPS.
vmps retry	Configures the per-server retry count for the VQP client.
vmps server	Configures the primary VMPS and up to three secondary servers.

show vtp

Use the **show vtp** user EXEC command to display general information about the VLAN Trunking Protocol (VTP) management domain, status, and counters.

show vtp {**counters** | **password** | **status**}

Syntax Description

counters	Display the VTP statistics for the switch.
password	Display the configured VTP password.
status	Display general information about the VTP management domain status.

Command Modes

User EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This is an example of output from the **show vtp counters** command. Table 2-21 describes each field in the display.

```
Switch> show vtp counters

VTP statistics:
Summary advertisements received    : 0
Subset advertisements received     : 0
Request advertisements received    : 0
Summary advertisements transmitted : 0
Subset advertisements transmitted  : 0
Request advertisements transmitted : 0
Number of config revision errors   : 0
Number of config digest errors     : 0
Number of V1 summary errors        : 0

VTP pruning statistics:
Trunk            Join Transmitted Join Received    Summary advts received from
                                                   non-pruning-capable device
---------------- ---------------- ---------------- ---------------------------
Fa0/47            0                0                0
Fa0/48            0                0                0
Gi0/1             0                0                0
Gi0/2             0                0                0
```

Table 2-21 show vtp counters Field Descriptions

Field	Description
Summary advertisements received	Number of summary advertisements received by this switch on its trunk ports. Summary advertisements contain the management domain name, the configuration revision number, the update timestamp and identity, the authentication checksum, and the number of subset advertisements to follow.
Subset advertisements received	Number of subset advertisements received by this switch on its trunk ports. Subset advertisements contain all the information for one or more VLANs.
Request advertisements received	Number of advertisement requests received by this switch on its trunk ports. Advertisement requests normally request information on all VLANs. They can also request information on a subset of VLANs.
Summary advertisements transmitted	Number of summary advertisements sent by this switch on its trunk ports. Summary advertisements contain the management domain name, the configuration revision number, the update timestamp and identity, the authentication checksum, and the number of subset advertisements to follow.
Subset advertisements transmitted	Number of subset advertisements sent by this switch on its trunk ports. Subset advertisements contain all the information for one or more VLANs.
Request advertisements transmitted	Number of advertisement requests sent by this switch on its trunk ports. Advertisement requests normally request information on all VLANs. They can also request information on a subset of VLANs.
Number of configuration revision errors	Number of revision errors. Whenever you define a new VLAN, delete an existing one, suspend or resume an existing VLAN, or modify the parameters on an existing VLAN, the configuration revision number of the switch increments. Revision errors increment whenever the switch receives an advertisement whose revision number matches the revision number of the switch, but the MD5 digest values do not match. This error means that the VTP password in the two switches is different or that the switches have different configurations. These errors means that the switch is filtering incoming advertisements, which causes the VTP database to become unsynchronized across the network.
Number of configuration digest errors	Number of MD5 digest errors. Digest errors increment whenever the MD5 digest in the summary packet and the MD5 digest of the received advertisement calculated by the switch do not match. This error usually means that the VTP password in the two switches is different. To solve this problem, make sure the VTP password on all switches is the same. These errors mean that the switch is filtering incoming advertisements, which causes the VTP database to become unsynchronized across the network.

Table 2-21 show vtp counters Field Descriptions (continued)

Field	Description
Number of V1 summary errors	Number of Version 1 errors. Version 1 summary errors increment whenever a switch in VTP V2 mode receives a VTP Version 1 frame. These errors mean that at least one neighboring switch is either running VTP Version 1 or VTP Version 2 with V2-mode disabled. To solve this problem, change the configuration of the switches in VTP V2-mode to disabled.
Join Transmitted	Number of VTP pruning messages sent on the trunk.
Join Received	Number of VTP pruning messages received on the trunk.
Summary Advts Received from non-pruning-capable device	Number of VTP summary messages received on the trunk from devices that do not support pruning.

This is an example of output from the **show vtp status** command. Table 2-22 describes each field in the display.

```
Switch> show vtp status
VTP Version                     : 2
Configuration Revision          : 0
Maximum VLANs supported locally : 1005
Number of existing VLANs        : 45
VTP Operating Mode              : Transparent
VTP Domain Name                 : shared_testbed1
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Disabled
VTP Traps Generation            : Enabled
MD5 digest                      : 0x3A 0x29 0x86 0x39 0xB4 0x5D 0x58 0xD7
```

Table 2-22 show vtp status Field Descriptions

Field	Description
VTP Version	Displays the VTP version operating on the switch. By default, the switch implements Version 1 but can be set to Version 2.
Configuration Revision	Current configuration revision number on this switch.
Maximum VLANs Supported Locally	Maximum number of VLANs supported locally.
Number of Existing VLANs	Number of existing VLANs.

Table 2-22 show vtp status Field Descriptions (continued)

Field	Description
VTP Operating Mode	Displays the VTP operating mode, which can be server, client, or transparent. Server: a switch in VTP server mode is enabled for VTP and sends advertisements. You can configure VLANs on it. The switch guarantees that it can recover all the VLAN information in the current VTP database from NVRAM after reboot. By default, every switch is a VTP server. **Note** The switch automatically changes from VTP server mode to VTP client mode if it detects a failure while writing the configuration to NVRAM and cannot return to server mode until the NVRAM is functioning. Client: a switch in VTP client mode is enabled for VTP, can send advertisements, but does not have enough nonvolatile storage to store VLAN configurations. You cannot configure VLANs on it. When a VTP client starts up, it does not send VTP advertisements until it receives advertisements to initialize its VLAN database. Transparent: a switch in VTP transparent mode is disabled for VTP, does not send or learn from advertisements sent by other devices, and cannot affect VLAN configurations on other devices in the network. The switch receives VTP advertisements and forwards them on all trunk ports except the one on which the advertisement was received.
VTP Domain Name	Name that identifies the administrative domain for the switch.
VTP Pruning Mode	Displays whether pruning is enabled or disabled. Enabling pruning on a VTP server enables pruning for the entire management domain. Pruning restricts flooded traffic to those trunk links that the traffic must use to access the appropriate network devices.
VTP V2 Mode	Displays if VTP Version 2 mode is enabled. All VTP Version 2 switches operate in Version 1 mode by default. Each VTP switch automatically detects the capabilities of all the other VTP devices. A network of VTP devices should be configured to Version 2 only if all VTP switches in the network can operate in Version 2 mode.
VTP Traps Generation	Displays whether VTP traps are sent to a network management station.
MD5 Digest	A 16-byte checksum of the VTP configuration.
Configuration Last Modified	Displays the date and time of the last configuration modification. Displays the IP address of the switch that caused the configuration change to the database.

Related Commands

Command	Description
clear vtp counters	Clears the VTP and pruning counters.
vtp (global configuration)	Configures the VTP filename, interface name, domain name, and mode.

shutdown

Use the **shutdown** interface configuration command to disable an interface. Use the **no** form of this command to restart a disabled interface.

shutdown

no shutdown

Syntax Description

This command has no arguments or keywords.

Defaults

The port is enabled (not shut down).

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **shutdown** command causes a port to stop forwarding. You can enable the port with the **no shutdown** command.

The **no shutdown** command has no effect if the port is a static-access port assigned to a VLAN that has been deleted, suspended, or shut down. The port must first be a member of an active VLAN before it can be re-enabled.

The **shutdown** command disables all functions on the specified interface.

This command also marks the interface as unavailable. To see if an interface is disabled, use the **show interfaces** privileged EXEC command. An interface that has been shut down is shown as administratively down in the display.

Examples

These examples show how to disable and re-enable a port:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# shutdown

Switch(config)# interface gigabitethernet0/2
Switch(config-if)# no shutdown
```

You can verify your settings by entering the **show interfaces** privileged EXEC command.

Related Commands

Command	Description
show interfaces	Displays the statistical information specific to all interfaces or to a specific interface.

shutdown vlan

Use the **shutdown vlan** global configuration command to shut down (suspend) local traffic on the specified VLAN. Use the **no** form of this command to restart local traffic on the VLAN.

shutdown vlan *vlan-id*

no shutdown vlan *vlan-id*

Syntax Description

vlan-id	ID of the VLAN to be locally shut down. The range is 2 to 1001. VLANs defined as default VLANs under the VLAN Trunking Protocol (VTP), as well as extended-range VLANs (greater than 1005) cannot be shut down. The default VLANs are 1 and 1002 to 1005.

Defaults

No default is defined.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **shutdown vlan** command does not change the VLAN information in the VTP database. The command shuts down local traffic, but the switch still advertises VTP information.

Examples

This example shows how to shut down traffic on VLAN 2:

```
Switch(config)# shutdown vlan 2
```

You can verify your setting by entering the **show vlan** privileged EXEC command.

Related Commands

Command	Description
shutdown (config-vlan mode)	Shuts down local traffic on the VLAN when in config-VLAN mode (accessed by the **vlan** *vlan-id* global configuration command).
vmps reconfirm (privileged EXEC)	Enters VLAN configuration mode.

small-frame violation rate

Use the **small-frame violation rate** *pps* interface configuration command on the switch stack or on a standalone switch to configure the rate (threshold) for an interface to be error disabled when it receives VLAN-tagged packets that are small frames (67 bytes or less) at the specified rate. Use the **no** form of this command to return to the default setting.

small-frame violation rate *pps*

no small-frame violation rate *pps*

Syntax Description

pps	Specify the threshold at which an interface receiving small frames will be error disabled. The range is 1 to 10,000 packets per second (pps).

Defaults

This feature is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command enables the rate (threshold) for a port to be error disabled when it receives small frames. Small frames are considered packets that are 67 frames or less.

Use the **errdisable detect cause small-frame** global configuration command to globally enable the small-frames threshold for each port.

You can configure the port to be automatically re-enabled by using the **errdisable recovery cause small-frame** global configuration command. You configure the recovery time by using the **errdisable recovery interval** *interval global configuration command.*

Examples

This example shows how to enable the small-frame arrival rate feature so that the port is error disabled if incoming small frames arrived at 10,000 pps.

```
Switch(config)# interface gigabitethernet2/0/1
Switch(config-if)# small-frame violation rate 10000
```

You can verify your setting by entering the privileged EXEC command.

Related Commands

Command	Description
errdisable detect cause small-frame	Allows any switch port to be put into the error-disabled state if an incoming frame is smaller than the minimum size and arrives at the specified rate (threshold).
errdisable recovery cause small-frame	Enables the recovery timer.
show interfaces	Displays the interface settings on the switch, including input and output flow control.

snmp-server enable traps

Use the **snmp-server enable traps** global configuration command to enable the switch to send Simple Network Management Protocol (SNMP) notifications for various traps or inform requests to the network management system (NMS). Use the **no** form of this command to return to the default setting.

snmp-server enable traps [**bridge** [**newroot**] [**topologychange**] | **cluster** | **config** | **copy-config** | **entity** | **envmon** [**fan** | **shutdown** | **status** | **supply** | **temperature**] | **errdisable** [*notification-rate value*] | **flash** | **hsrp** | **ipmulticast** | **mac-notification** | **msdp** | **ospf** [**cisco-specific** | **errors** | **lsa** | **rate-limit** | **retransmit** | **state-change**] | **pim** [**invalid-pim-message** | **neighbor-change** | **rp-mapping-change**] | **port-security** [**trap-rate** *value*] | **rtr** | **snmp** [**authentication** | **coldstart** | **linkdown** | **linkup** | **warmstart**] | **storm-control trap-rate** *value* | **stpx** [**inconsistency**] [**root-inconsistency**] [**loop-inconsistency**] | **syslog** | **tty** | **vlan-membership** | **vlancreate** | **vlandelete** | **vtp**]

no snmp-server enable traps [**bridge** [**newroot**] [**topologychange**] | **cluster** | **config** | **copy-config** | **entity** | **envmon** [**fan** | **shutdown** | **status** | **supply** | **temperature**] | **errdisable** [*notification-rate value*] | **flash** | **hsrp** | **ipmulticast** | **mac-notification** | **msdp** | **ospf** [**cisco-specific** | **errors** | **lsa** | **rate-limit** | **retransmit** | **state-change**] | **pim** [**invalid-pim-message** | **neighbor-change** | **rp-mapping-change**] | **port-security** [**trap-rate**] | **rtr** | **snmp** [**authentication** | **coldstart** | **linkdown** | **linkup** | **warmstart**] | **storm-control trap-rate** | **stpx** [**inconsistency**] [**root-inconsistency**] [**loop-inconsistency**] | **syslog** | **tty** | **vlan-membership** | **vlancreate** | **vlandelete** | **vtp**]

Syntax Description

bridge [**newroot**] [**topologychange**]	(Optional) Generate STP bridge MIB traps. The keywords have these meanings: • **newroot**—(Optional) Enable SNMP STP Bridge MIB new root traps. • **topologychange**—(Optional) Enable SNMP STP Bridge MIB topology change traps.
cluster	(Optional) Enable cluster traps.
config	(Optional) Enable SNMP configuration traps.
copy-config	(Optional) Enable SNMP copy-configuration traps.
entity	(Optional) Enable SNMP entity traps.
envmon [**fan** | **shutdown** | **status** | **supply** | **temperature**]	Optional) Enable SNMP environmental traps. The keywords have these meanings: • **fan**—(Optional) Enable fan traps. • **shutdown**—(Optional) Enable environmental monitor shutdown traps. • **status**—(Optional) Enable SNMP environmental status-change traps. • **supply**—(Optional) Enable environmental monitor power-supply traps. • **temperature**—(Optional) Enable environmental monitor temperature traps.
errdisable [*notification-rate value*]	(Optional) Enable errdisable traps. Use notification-rate keyword to set the maximum value of errdisable traps sent per minute. The range is 0 to 10000; the default is 0 (no limit imposed; a trap is sent at every occurrence).
flash	(Optional) Enable SNMP FLASH notifications.
hsrp	(Optional) Enable Hot Standby Router Protocol (HSRP) traps.

ipmulticast	(Optional) Enable IP multicast routing traps.
mac-notification	(Optional) Enable MAC address notification traps.
msdp	(Optional) Enable Multicast Source Discovery Protocol (MSDP) traps.
ospf [**cisco-specific** | **errors** | **lsa** | **rate-limit** | **retransmit** | **state-change**]	(Optional) Enable Open Shortest Path First (OSPF) traps. The keywords have these meanings: • **cisco-specific**—(Optional) Enable Cisco-specific traps. • **errors**—(Optional) Enable error traps. • **lsa**—(Optional) Enable link-state advertisement (LSA) traps. • **rate-limit**—(Optional) Enable rate-limit traps. • **retransmit**—(Optional) Enable packet-retransmit traps. • **state-change**—(Optional) Enable state-change traps.
pim [**invalid-pim-message** | **neighbor-change** | **rp-mapping-change**]	(Optional) Enable Protocol-Independent Multicast (PIM) traps. The keywords have these meanings: • **invalid-pim-message**—(Optional) Enable invalid PIM message traps. • **neighbor-change**—(Optional) Enable PIM neighbor-change traps. • **rp-mapping-change**—(Optional) Enable rendezvous point (RP)-mapping change traps.
port-security [**trap-rate** *value*]	(Optional) Enable port security traps. Use the **trap-rat**e keyword to set the maximum number of port-security traps sent per second. The range is from 0 to 1000; the default is 0 (no limit imposed; a trap is sent at every occurrence).
rtr	(Optional) Enable SNMP Response Time Reporter traps.
snmp [**authentication** | **coldstart** | **linkdown** | **linkup** | **warmstart**]	(Optional) Enable SNMP traps. The keywords have these meanings: • **authentication**—(Optional) Enable authentication trap. • **coldstart**—(Optional) Enable cold start trap. • **linkdown**—(Optional) Enable linkdown trap. • **linkup**—(Optional) Enable linkup trap. • **warmstart**—(Optional) Enable warmstart trap.
storm-control trap-rate *value*	(Optional) Enable storm-control traps. Use the **trap-rat**e keyword to set the maximum number of storm-control traps sent per second. The range is 0 to 1000; the default is 0 (no limit is imposed; a trap is sent at every occurrence).
stpx	(Optional) Enable SNMP STPX MIB traps. The keywords have these meanings: • **inconsistency**—(Optional) Enable SNMP STPX MIB Inconsistency Update traps. • **root-inconsistency**—(Optional) Enable SNMP STPX MIB Root Inconsistency Update traps. • **loop-inconsistency**—(Optional) Enable SNMP STPX MIB Loop Inconsistency Update traps.
syslog	(Optional) Enable SNMP syslog traps.
tty	(Optional) Send TCP connection traps. This is enabled by default.
vlan-membership	(Optional) Enable SNMP VLAN membership traps.

vlancreate	(Optional) Enable SNMP VLAN-created traps.
vlandelete	(Optional) Enable SNMP VLAN-deleted traps.
vtp	(Optional) Enable VLAN Trunking Protocol (VTP) traps.

Note Though visible in the command-line help strings, the **cpu** [**threshold**], **insertion**, and **removal** keywords are not supported. The **snmp-server enable informs** global configuration command is not supported. To enable the sending of SNMP inform notifications, use the **snmp-server enable traps** global configuration command combined with the **snmp-server host** *host-addr* **informs** global configuration command.

Defaults

The sending of SNMP traps is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Specify the host (NMS) that receives the traps by using the **snmp-server host** global configuration command. If no trap types are specified, all trap types are sent.

When supported, use the **snmp-server enable traps** command to enable sending of traps or informs.

Note Informs are not supported in SNMPv1.

To enable more than one type of trap, you must enter a separate **snmp-server enable traps** command for each trap type.

Examples

This example shows how to send VTP traps to the NMS:

```
Switch(config)# snmp-server enable traps vtp
```

You can verify your setting by entering the **show vtp status** or the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the running configuration on the switch.
snmp-server host	Specifies the host that receives SNMP traps.

snmp-server host

Use the **snmp-server host** global configuration command to specify the recipient (host) of a Simple Network Management Protocol (SNMP) notification operation. Use the **no** form of this command to remove the specified host.

snmp-server host *host-addr* [**informs | traps**] [**version** {**1 | 2c | 3** {**auth | noauth| priv**}] [**vrf** *vrf-instance*] {*community-string* [*notification-type*]}

no snmp-server host *host-addr* [**informs | traps**] [**version** {**1 | 2c | 3** {**auth | noauth | priv**}] [**vrf** *vrf-instance*] *community-string*

Syntax Description

host-addr	Name or Internet address of the host (the targeted recipient).
udp-port *port*	(Optional) Configure the User Datagram Protocol (UDP) port number of the host to receive the traps. The range is 0 to 65535.
**informs	traps**	(Optional) Send SNMP traps or informs to this host.
**version 1	2c	3**	(Optional) Version of the SNMP used to send the traps. These keywords are supported: **1**—SNMPv1. This option is not available with informs. **2c**—SNMPv2C. **3**—SNMPv3. These optional keywords can follow the Version 3 keyword: • **auth** (Optional). Enables Message Digest 5 (MD5) and Secure Hash Algorithm (SHA) packet authentication. • **noauth** (Default). The noAuthNoPriv security level. This is the default if the [**auth	noauth	priv**] keyword choice is not specified. • **priv** (Optional). Enables Data Encryption Standard (DES) packet encryption (also called *privacy*). **Note** The **priv** keyword is available only when the cryptographic (encrypted) software image is installed.
vrf *vrf-instance*	(Optional) Virtual private network (VPN) routing instance and name for this host.
community-string	Password-like community string sent with the notification operation. Though you can set this string by using the **snmp-server host** command, we recommend that you define this string by using the **snmp-server community** global configuration command before using the **snmp-server host** command.

notification-type	(Optional) Type of notification to be sent to the host. If no type is specified, all notifications are sent. The notification type can be one or more of the these keywords: • **bridge**—Send SNMP Spanning Tree Protocol (STP) bridge MIB traps. • **cluster**—Send cluster member status traps. • **config**—Send SNMP configuration traps. • **copy-config**—Send SNMP copy configuration traps. • **entity**— Send SNMP entity traps. • **envmon**—Send environmental monitor traps. • **errdisable**—Send SNMP errdisable notifications. • **flash**—Send SNMP FLASH notifications. • **hsrp—**Send SNMP Hot Standby Router Protocol (HSRP) traps. • **ipmulticast—**Send SNMP IP multicast routing traps. • **mac-notification—**Send SNMP MAC notification traps. • **msdp—**Send SNMP Multicast Source Discovery Protocol (MSDP) traps. • **ospf—**Send Open Shortest Path First (OSPF) traps. • **pim—**Send SNMP Protocol-Independent Multicast (PIM) traps. • **port-security—**Send SNMP port-security traps. • **rtr—**Send SNMP Response Time Reporter traps. • **snmp—**Send SNMP-type traps. • **storm-control—**Send SNMP storm-control traps. • **stpx—**Send SNMP STP extended MIB traps. • **syslog—**Send SNMP syslog traps. • **tty—**Send TCP connection traps. • **udp-port** *port***—**Configure the User Datagram Protocol (UDP) port number of the host to receive the traps. The range is from 0 to 65535. • **vlan-membership—** Send SNMP VLAN membership traps. • **vlancreate—**Send SNMP VLAN-created traps. • **vlandelete—**Send SNMP VLAN-deleted traps. • **vtp—**Send SNMP VLAN Trunking Protocol (VTP) traps.

Defaults

This command is disabled by default. No notifications are sent.

If you enter this command with no keywords, the default is to send all trap types to the host. No informs are sent to this host.

If no **version** keyword is present, the default is Version 1.

If Version 3 is selected and no authentication keyword is entered, the default is the **noauth** (noAuthNoPriv) security level.

Command Modes Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

SNMP notifications can be sent as traps or inform requests. Traps are unreliable because the receiver does not send acknowledgments when it receives traps. The sender cannot determine if the traps were received. However, an SNMP entity that receives an inform request acknowledges the message with an SNMP response PDU. If the sender never receives the response, the inform request can be sent again. Thus, informs are more likely to reach their intended destinations.

However, informs consume more resources in the agent and in the network. Unlike a trap, which is discarded as soon as it is sent, an inform request must be held in memory until a response is received or the request times out. Traps are also sent only once, but an inform might be retried several times. The retries increase traffic and contribute to a higher overhead on the network.

If you do not enter an **snmp-server host** command, no notifications are sent. To configure the switch to send SNMP notifications, you must enter at least one **snmp-server host** command. If you enter the command with no keywords, all trap types are enabled for the host. To enable multiple hosts, you must enter a separate **snmp-server host** command for each host. You can specify multiple notification types in the command for each host.

If a local user is not associated with a remote host, the switch does not send informs for the **auth** (authNoPriv) and the **priv** (authPriv) authentication levels.

When multiple **snmp-server host** commands are given for the same host and kind of notification (trap or inform), each succeeding command overwrites the previous command. Only the last **snmp-server host** command is in effect. For example, if you enter an **snmp-server host inform** command for a host and then enter another **snmp-server host inform** command for the same host, the second command replaces the first.

The **snmp-server host** command is used with the **snmp-server enable traps** global configuration command. Use the **snmp-server enable traps** command to specify which SNMP notifications are sent globally. For a host to receive most notifications, at least one **snmp-server enable traps** command and the **snmp-server host** command for that host must be enabled. Some notification types cannot be controlled with the **snmp-server enable traps** command. For example, some notification types are always enabled. Other notification types are enabled by a different command.

The **no snmp-server host** command with no keywords disables traps, but not informs, to the host. To disable informs, use the **no snmp-server host informs** command.

Examples

This example shows how to configure a unique SNMP community string named *comaccess* for traps:

```
Switch(config)# snmp-server community comaccess ro 10
Switch(config)# snmp-server host 172.20.2.160 comaccess
```

This example shows how to send the SNMP traps to the host specified by the name *myhost.cisco.com*. The community string is defined as *comaccess*:

```
Switch(config)# snmp-server enable traps
Switch(config)# snmp-server host myhost.cisco.com comaccess snmp
```

This example shows how to enable the switch to send all traps to the host *myhost.cisco.com* by using the community string *public*:

```
Switch(config)# snmp-server enable traps
Switch(config)# snmp-server host myhost.cisco.com public
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the running configuration on the switch.
snmp-server enable traps	Enables SNMP notification for various trap types or inform requests.

snmp trap mac-notification

Use the **snmp trap mac-notification** interface configuration command to enable the Simple Network Management Protocol (SNMP) MAC address notification trap on a specific Layer 2 interface. Use the **no** form of this command to return to the default setting.

snmp trap mac-notification {**added** | **removed**}

no snmp trap mac-notification {**added** | **removed**}

Syntax Description

added	Enable the MAC notification trap whenever a MAC address is added on this interface.
removed	Enable the MAC notification trap whenever a MAC address is removed from this interface.

Defaults

By default, the traps for both address addition and address removal are disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Even though you enable the notification trap for a specific interface by using the **snmp trap mac-notification** command, the trap is generated only when you enable the **snmp-server enable traps mac-notification** and the **mac address-table notification** global configuration commands.

Examples

This example shows how to enable the MAC notification trap when a MAC address is added to a port:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# snmp trap mac-notification added
```

You can verify your settings by entering the **show mac address-table notification interface** privileged EXEC command.

Related Commands

Command	Description
clear mac address-table notification	Clears the MAC address notification global counters.
mac address-table notification	Enables the MAC address notification feature.

Command	Description
show mac address-table notification	Displays the MAC address notification settings for all interfaces or on the specified interface when the **interface** keyword is appended.
snmp-server enable traps	Sends the SNMP MAC notification traps when the **mac-notification** keyword is appended.

spanning-tree backbonefast

Use the **spanning-tree backbonefast** global configuration command to enable the BackboneFast feature. Use the **no** form of the command to return to the default setting.

spanning-tree backbonefast

no spanning-tree backbonefast

Syntax Description

This command has no arguments or keywords.

Defaults

BackboneFast is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can configure the BackboneFast feature for rapid PVST+ or for multiple spanning-tree (MST) mode, but the feature remains disabled (inactive) until you change the spanning-tree mode to PVST+.

BackboneFast starts when a root port or blocked port on a switch receives inferior BPDUs from its designated switch. An inferior BPDU identifies a switch that declares itself as both the root bridge and the designated switch. When a switch receives an inferior BPDU, it means that a link to which the switch is not directly connected (an *indirect* link) has failed (that is, the designated switch has lost its connection to the root switch. If there are alternate paths to the root switch, BackboneFast causes the maximum aging time on the interfaces on which it received the inferior BPDU to expire and allows a blocked port to move immediately to the listening state. BackboneFast then transitions the interface to the forwarding state. For more information, see the software configuration guide for this release.

Enable BackboneFast on all supported switches to allow the detection of indirect link failures and to start the spanning-tree reconfiguration sooner.

Examples

This example shows how to enable BackboneFast on the switch:

```
Switch(config)# spanning-tree backbonefast
```

You can verify your setting by entering the **show spanning-tree summary** privileged EXEC command.

Related Commands

Command	Description
show spanning-tree summary	Displays a summary of the spanning-tree interface states.

spanning-tree bpdufilter

Use the **spanning-tree bpdufilter** interface configuration command to prevent an interface from sending or receiving bridge protocol data units (BPDUs). Use the **no** form of this command to return to the default setting.

spanning-tree bpdufilter {**disable** | **enable**}

no spanning-tree bpdufilter

Syntax Description

disable	Disable BPDU filtering on the specified interface.
enable	Enable BPDU filtering on the specified interface.

Defaults

BPDU filtering is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can enable the BPDU filtering feature when the switch is operating in the per-VLAN spanning-tree plus (PVST+), rapid-PVST+, or the multiple spanning-tree (MST) mode.

Caution Enabling BPDU filtering on an interface is the same as disabling spanning tree on it and can result in spanning-tree loops.

You can globally enable BPDU filtering on all Port Fast-enabled interfaces by using the **spanning-tree portfast bpdufilter default** global configuration command.

You can use the **spanning-tree bpdufilter** interface configuration command to override the setting of the **spanning-tree portfast bpdufilter default** global configuration command.

Examples

This example shows how to enable the BPDU filtering feature on a port:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# spanning-tree bpdufilter enable
```

You can verify your setting by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the current operating configuration.
spanning-tree portfast (global configuration)	Globally enables the BPDU filtering or the BPDU guard feature on Port Fast-enabled interface or enables the Port Fast feature on all nontrunking interfaces.
spanning-tree portfast (interface configuration)	Enables the Port Fast feature on an interface and all its associated VLANs.

spanning-tree bpduguard

Use the **spanning-tree bpduguard** interface configuration command to put an interface in the error-disabled state when it receives a bridge protocol data unit (BPDU). Use the **no** form of this command to return to the default setting.

spanning-tree bpduguard {**disable** | **enable**}

no spanning-tree bpduguard

Syntax Description

disable	Disable BPDU guard on the specified interface.
enable	Enable BPDU guard on the specified interface.

Defaults

BPDU guard is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The BPDU guard feature provides a secure response to invalid configurations because you must manually put the interface back in service. Use the BPDU guard feature in a service-provider network to prevent an interface from being included in the spanning-tree topology.

You can enable the BPDU guard feature when the switch is operating in the per-VLAN spanning-tree plus (PVST+), rapid-PVST+, or the multiple spanning-tree (MST) mode.

You can globally enable BPDU guard on all Port Fast-enabled interfaces by using the **spanning-tree portfast bpduguard default** global configuration command.

You can use the **spanning-tree bpduguard** interface configuration command to override the setting of the **spanning-tree portfast bpduguard default** global configuration command.

Examples

This example shows how to enable the BPDU guard feature on a port:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# spanning-tree bpduguard enable
```

You can verify your setting by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the current operating configuration.
spanning-tree portfast (global configuration)	Globally enables the BPDU filtering or the BPDU guard feature on Port Fast-enabled interfaces or enables the Port Fast feature on all nontrunking interfaces.
spanning-tree portfast (interface configuration)	Enables the Port Fast feature on an interface and all its associated VLANs.

spanning-tree cost

Use the **spanning-tree cost** interface configuration command to set the path cost for spanning-tree calculations. If a loop occurs, spanning tree considers the path cost when selecting an interface to place in the forwarding state. Use the **no** form of this command to return to the default setting.

spanning-tree [**vlan** *vlan-id*] **cost** *cost*

no spanning-tree [**vlan** *vlan-id*] **cost**

Syntax Description

vlan *vlan-id*	(Optional) VLAN range associated with a spanning-tree instance. You can specify a single VLAN identified by VLAN ID number, a range of VLANs separated by a hyphen, or a series of VLANs separated by a comma. The range is 1 to 4094.
cost	Path cost. The range is 1 to 200000000, with higher values meaning higher costs.

Defaults

The default path cost is computed from the interface bandwidth setting. These are the IEEE default path cost values:

- 1000 Mb/s—4
- 100 Mb/s—19
- 10 Mb/s—100

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you configure the cost, higher values represent higher costs.

If you configure an interface with both the **spanning-tree vlan** *vlan-id* **cost** *cost* command and the **spanning-tree cost** *cost* command, the **spanning-tree vlan** *vlan-id* **cost** *cost* command takes effect.

Examples

This example shows how to set the path cost to 250 on a port:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# spanning-tree cost 250
```

This example shows how to set a path cost to 300 for VLANs 10, 12 to 15, and 20:

```
Switch(config-if)# spanning-tree vlan 10,12-15,20 cost 300
```

You can verify your settings by entering the **show spanning-tree interface** *interface-id* privileged EXEC command.

Related Commands

Command	Description
show spanning-tree interface *interface-id*	Displays spanning-tree information for the specified interface.
spanning-tree port-priority	Configures an interface priority.
spanning-tree vlan priority	Sets the switch priority for the specified spanning-tree instance.

spanning-tree etherchannel guard misconfig

Use the **spanning-tree etherchannel guard misconfig** global configuration command to display an error message when the switch detects an EtherChannel misconfiguration. Use the **no** form of this command to disable the feature.

spanning-tree etherchannel guard misconfig

no spanning-tree etherchannel guard misconfig

Syntax Description

This command has no arguments or keywords.

Defaults

EtherChannel guard is enabled on the switch.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When the switch detects an EtherChannel misconfiguration, this error message appears:

```
PM-4-ERR_DISABLE: Channel-misconfig error detected on [chars], putting [chars] in
err-disable state.
```

To show switch ports that are in the misconfigured EtherChannel, use the **show interfaces status err-disabled** privileged EXEC command. To verify the EtherChannel configuration on a remote device, use the **show etherchannel summary** privileged EXEC command on the remote device.

When a port is in the error-disabled state because of an EtherChannel misconfiguration, you can bring it out of this state by entering the **errdisable recovery cause channel-misconfig** global configuration command, or you can manually re-enable it by entering the **shutdown** and **no shut down** interface configuration commands.

Examples

This example shows how to enable the EtherChannel guard misconfiguration feature:

```
Switch(config)# spanning-tree etherchannel guard misconfig
```

You can verify your settings by entering the **show spanning-tree summary** privileged EXEC command.

Related Commands

Command	Description
errdisable recovery cause channel-misconfig	Enables the timer to recover from the EtherChannel misconfiguration error-disabled state.
show etherchannel summary	Displays EtherChannel information for a channel as a one-line summary per channel-group.
show interfaces status err-disabled	Displays the interfaces in the error-disabled state.

spanning-tree extend system-id

Use the **spanning-tree extend system-id** global configuration command to enable the extended system ID feature.

spanning-tree extend system-id

Note Though visible in the command-line help strings, the **no** version of this command is not supported. You cannot disable the extended system ID feature.

Syntax Description

This command has no arguments or keywords.

Defaults

The extended system ID is enabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The switch supports the IEEE 802.1t spanning-tree extensions. Some of the bits previously used for the switch priority are now used for the extended system ID (VLAN identifier for the per-VLAN spanning-tree plus [PVST+] and rapid PVST+ or as an instance identifier for the multiple spanning tree [MST]).

The spanning tree uses the extended system ID, the switch priority, and the allocated spanning-tree MAC address to make the bridge ID unique for each VLAN or multiple spanning-tree instance.

Support for the extended system ID affects how you manually configure the root switch, the secondary root switch, and the switch priority of a VLAN. For more information, see the "spanning-tree mst root" and the "spanning-tree vlan" sections.

If your network consists of switches that do not support the extended system ID and switches that do support it, it is unlikely that the switch with the extended system ID support will become the root switch. The extended system ID increases the switch priority value every time the VLAN number is greater than the priority of the connected switches.

Related Commands

Command	Description
show spanning-tree summary	Displays a summary of spanning-tree interface states.
spanning-tree mst root	Configures the MST root switch priority and timers based on the network diameter.
spanning-tree vlan priority	Sets the switch priority for the specified spanning-tree instance.

spanning-tree guard

Use the **spanning-tree guard** interface configuration command to enable root guard or loop guard on all the VLANs associated with the selected interface. Root guard restricts which interface is allowed to be the spanning-tree root port or the path-to-the root for the switch. Loop guard prevents alternate or root ports from becoming designated ports when a failure creates a unidirectional link. Use the **no** form of this command to return to the default setting.

spanning-tree guard {**loop** | **none** | **root**}

no spanning-tree guard

Syntax Description

loop	Enable loop guard.
none	Disable root guard or loop guard.
root	Enable root guard.

Defaults

Root guard is disabled.

Loop guard is configured according to the **spanning-tree loopguard default** global configuration command (globally disabled).

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can enable root guard or loop guard when the switch is operating in the per-VLAN spanning-tree plus (PVST+), rapid-PVST+, or the multiple spanning-tree (MST) mode.

When root guard is enabled, if spanning-tree calculations cause an interface to be selected as the root port, the interface transitions to the root-inconsistent (blocked) state to prevent the customer's switch from becoming the root switch or being in the path to the root. The root port provides the best path from the switch to the root switch.

When the **no spanning-tree guard** or the **no spanning-tree guard none** command is entered, root guard is disabled for all VLANs on the selected interface. If this interface is in the root-inconsistent (blocked) state, it automatically transitions to the listening state.

Do not enable root guard on interfaces that will be used by the UplinkFast feature. With UplinkFast, the backup interfaces (in the blocked state) replace the root port in the case of a failure. However, if root guard is also enabled, all the backup interfaces used by the UplinkFast feature are placed in the root-inconsistent state (blocked) and prevented from reaching the forwarding state. The UplinkFast feature is not available when the switch is operating in the rapid-PVST+ or MST mode.

Loop guard is most effective when it is configured on the entire switched network. When the switch is operating in PVST+ or rapid-PVST+ mode, loop guard prevents alternate and root ports from becoming designated ports, and spanning tree does not send bridge protocol data units (BPDUs) on root or alternate ports. When the switch is operating in MST mode, BPDUs are not sent on nonboundary interfaces if the interface is blocked by loop guard in all MST instances. On a boundary interface, loop guard blocks the interface in all MST instances.

To disable root guard or loop guard, use the **spanning-tree guard none** interface configuration command. You cannot enable both root guard and loop guard at the same time.

You can override the setting of the **spanning-tree loopguard default** global configuration command by using the **spanning-tree guard loop** interface configuration command.

Examples

This example shows how to enable root guard on all the VLANs associated with the specified port:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# spanning-tree guard root
```

This example shows how to enable loop guard on all the VLANs associated with the specified port:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# spanning-tree guard loop
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the current operating configuration.
spanning-tree cost	Sets the path cost for spanning-tree calculations.
spanning-tree loopguard default	Prevents alternate or root ports from becoming designated ports because of a failure that leads to a unidirectional link.
spanning-tree mst cost	Configures the path cost for MST calculations.
spanning-tree mst port-priority	Configures an interface priority.
spanning-tree mst root	Configures the MST root switch priority and timers based on the network diameter.
spanning-tree port-priority	Configures an interface priority.
spanning-tree vlan priority	Sets the switch priority for the specified spanning-tree instance.

spanning-tree link-type

Use the **spanning-tree link-type** interface configuration command to override the default link-type setting, which is determined by the duplex mode of the interface, and to enable rapid spanning-tree transitions to the forwarding state. Use the **no** form of this command to return to the default setting.

spanning-tree link-type {**point-to-point** | **shared**}

no spanning-tree link-type

Syntax Description

point-to-point	Specify that the link type of an interface is point-to-point.
shared	Specify that the link type of an interface is shared.

Defaults

The switch derives the link type of an interface from the duplex mode. A full-duplex interface is considered a point-to-point link, and a half-duplex interface is considered a shared link.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can override the default setting of the link type by using the **spanning-tree link-type** command. For example, a half-duplex link can be physically connected point-to-point to a single interface on a remote switch running the Multiple Spanning Tree Protocol (MSTP) or the rapid per-VLAN spanning-tree plus (rapid-PVST+) protocol and be enabled for rapid transitions.

Examples

This example shows how to specify the link type as shared (regardless of the duplex setting) and to prevent rapid transitions to the forwarding state:

```
Switch(config-if)# spanning-tree link-type shared
```

You can verify your setting by entering the **show spanning-tree mst interface** *interface-id* or the show **spanning-tree interface** *interface-id* privileged EXEC command.

Related Commands

Command	Description
clear spanning-tree detected-protocols	Restarts the protocol migration process (force the renegotiation with neighboring switches) on all interfaces or on the specified interface.
show spanning-tree interface *interface-id*	Displays spanning-tree state information for the specified interface.
show spanning-tree mst interface *interface-id*	Displays MST information for the specified interface.

spanning-tree loopguard default

Use the **spanning-tree loopguard default** global configuration command to prevent alternate or root ports from becoming designated ports because of a failure that leads to a unidirectional link. Use the **no** form of this command to return to the default setting.

spanning-tree loopguard default

no spanning-tree loopguard default

Syntax Description

This command has no arguments or keywords.

Defaults

Loop guard is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can enable the loop guard feature when the switch is operating in the per-VLAN spanning-tree plus (PVST+), rapid-PVST+, or the multiple spanning-tree (MST) mode.

Loop guard is most effective when it is configured on the entire switched network. When the switch is operating in PVST+ or rapid-PVST+ mode, loop guard prevents alternate and root ports from becoming designated ports, and spanning tree does not send bridge protocol data units (BPDUs) on root or alternate ports. When the switch is operating in MST mode, BPDUs are not sent on nonboundary interfaces if the interface is blocked by loop guard in all MST instances. On a boundary interface, loop guard blocks the interface in all MST instances.

Loop guard operates only on interfaces that the spanning tree identifies as point-to-point.

You can override the setting of the **spanning-tree loopguard default** global configuration command by using the **spanning-tree guard loop** interface configuration command.

Examples

This example shows how to globally enable loop guard:

```
Switch(config)# spanning-tree loopguard default
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the current operating configuration.
spanning-tree guard loop	Enables the loop guard feature on all the VLANs associated with the specified interface.

spanning-tree mode

Use the **spanning-tree mode** global configuration command to enable per-VLAN spanning-tree plus (PVST+), rapid PVST+, or multiple spanning tree (MST) on your switch. Use the **no** form of this command to return to the default setting.

spanning-tree mode {**mst** | **pvst** | **rapid-pvst**}

no spanning-tree mode

Syntax Description

mst	Enable MST and Rapid Spanning Tree Protocol (RSTP) (based on IEEE 802.1s and IEEE 802.1w).
pvst	Enable PVST+ (based on IEEE 802.1D).
rapid-pvst	Enable rapid PVST+ (based on IEEE 802.1w).

Defaults

The default mode is PVST+.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The switch supports PVST+, rapid PVST+, and MSTP, but only one version can be active at any time: All VLANs run PVST+, all VLANs run rapid PVST+, or all VLANs run MSTP.

When you enable the MST mode, RSTP is automatically enabled.

Caution Changing spanning-tree modes can disrupt traffic because all spanning-tree instances are stopped for the previous mode and restarted in the new mode.

Examples

This example shows to enable MST and RSTP on the switch:

```
Switch(config)# spanning-tree mode mst
```

This example shows to enable rapid PVST+ on the switch:

```
Switch(config)# spanning-tree mode rapid-pvst
```

You can verify your setting by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the current operating configuration.

spanning-tree mst configuration

Use the **spanning-tree mst configuration** global configuration command to enter multiple spanning-tree (MST) configuration mode through which you configure the MST region. Use the **no** form of this command to return to the default settings.

spanning-tree mst configuration

no spanning-tree mst configuration

Syntax Description

This command has no arguments or keywords.

Defaults

The default mapping is that all VLANs are mapped to the common and internal spanning-tree (CIST) instance (instance 0).

The default name is an empty string.

The revision number is 0.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **spanning-tree mst configuration** command enables the MST configuration mode. These configuration commands are available:

- **abort**: exits the MST region configuration mode without applying configuration changes.
- **exit**: exits the MST region configuration mode and applies all configuration changes.
- **instance** *instance-id* **vlan** *vlan-range*: maps VLANs to an MST instance. The range for the *instance-id* is 1 to 4094. The range for *vlan-range* is 1 to 4094. You can specify a single VLAN identified by VLAN ID number, a range of VLANs separated by a hyphen, or a series of VLANs separated by a comma.
- **name** *name*: sets the configuration name. The *name* string has a maximum length of 32 characters and is case sensitive.
- **no**: negates the **instance**, **name**, and **revision** commands or sets them to their defaults.
- **private-vlan**: Though visible in the command-line help strings, this command is not supported.
- **revision** *version*: sets the configuration revision number. The range is 0 to 65535.
- **show** [**current** | **pending**]: displays the current or pending MST region configuration.

In MST mode, the switch supports up to 65 MST instances. The number of VLANs that can be mapped to a particular MST instance is unlimited.

When you map VLANs to an MST instance, the mapping is incremental, and VLANs specified in the command are added to or removed from the VLANs that were previously mapped. To specify a range, use a hyphen; for example, **instance 1 vlan 1-63** maps VLANs 1 to 63 to MST instance 1. To specify a series, use a comma; for example, **instance 1 vlan 10, 20, 30** maps VLANs 10, 20, and 30 to MST instance 1.

All VLANs that are not explicitly mapped to an MST instance are mapped to the common and internal spanning tree (CIST) instance (instance 0) and cannot be unmapped from the CIST by using the **no** form of the command.

For two or more switches to be in the same MST region, they must have the same VLAN mapping, the same configuration revision number, and the same name.

Examples

This example shows how to enter MST configuration mode, map VLANs 10 to 20 to MST instance 1, name the region *region1*, set the configuration revision to 1, display the pending configuration, apply the changes, and return to global configuration mode:

```
Switch# spanning-tree mst configuration
Switch(config-mst)# instance 1 vlan 10-20
Switch(config-mst)# name region1
Switch(config-mst)# revision 1
Switch(config-mst)# show pending
Pending MST configuration
Name      [region1]
Revision  1
Instance  Vlans Mapped
--------  ---------------------
0         1-9,21-4094
1         10-20
-------------------------------

Switch(config-mst)# exit
Switch(config)#
```

This example shows how to add VLANs 1 to 100 to the ones already mapped (if any) to instance 2, to move VLANs 40 to 60 that were previously mapped to instance 2 to the CIST instance, to add VLAN 10 to instance 10, and to remove all the VLANs mapped to instance 2 and map them to the CIST instance:

```
Switch(config-mst)# instance 2 vlan 1-100
Switch(config-mst)# no instance 2 vlan 40-60
Switch(config-mst)# instance 10 vlan 10
Switch(config-mst)# no instance 2
```

You can verify your settings by entering the **show pending** MST configuration command.

Related Commands

Command	Description
show spanning-tree mst configuration	Displays the MST region configuration.

spanning-tree mst cost

Use the **spanning-tree mst cost** interface configuration command to set the path cost for multiple spanning-tree (MST) calculations. If a loop occurs, spanning tree considers the path cost when selecting an interface to put in the forwarding state. Use the **no** form of this command to return to the default setting.

spanning-tree mst *instance-id* **cost** *cost*

no spanning-tree mst *instance-id* **cost**

Syntax Description

instance-id	Range of spanning-tree instances. You can specify a single instance, a range of instances separated by a hyphen, or a series of instances separated by a comma. The range is 0 to 4094.
cost	Path cost is 1 to 200000000, with higher values meaning higher costs.

Defaults

The default path cost is computed from the interface bandwidth setting. These are the IEEE default path cost values:

- 1000 Mb/s—20000
- 100 Mb/s—200000
- 10 Mb/s—2000000

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you configure the cost, higher values represent higher costs.

Examples

This example shows how to set a path cost of 250 on a port associated with instances 2 and 4:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# spanning-tree mst 2,4 cost 250
```

You can verify your settings by entering the **show spanning-tree mst interface** *interface-id* privileged EXEC command.

Related Commands

Command	Description
show spanning-tree mst interface *interface-id*	Displays MST information for the specified interface.
spanning-tree mst port-priority	Configures an interface priority.
spanning-tree mst priority	Configures the switch priority for the specified spanning-tree instance.

spanning-tree mst forward-time

Use the **spanning-tree mst forward-time** global configuration command to set the forward-delay time for all multiple spanning-tree (MST) instances. The forwarding time specifies how long each of the listening and learning states last before the interface begins forwarding. Use the **no** form of this command to return to the default setting.

spanning-tree mst forward-time *seconds*

no spanning-tree mst forward-time

Syntax Description

seconds	Length of the listening and learning states. The range is 4 to 30 seconds.

Defaults

The default is 15 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Changing the **spanning-tree mst forward-time** command affects all spanning-tree instances.

Examples

This example shows how to set the spanning-tree forwarding time to 18 seconds for all MST instances:

```
Switch(config)# spanning-tree mst forward-time 18
```

You can verify your setting by entering the **show spanning-tree mst** privileged EXEC command.

Related Commands

Command	Description
show spanning-tree mst	Displays MST information.
spanning-tree mst hello-time	Sets the interval between hello bridge protocol data units (BPDUs) sent by root switch configuration messages.
spanning-tree mst max-age	Sets the interval between messages that the spanning tree receives from the root switch.
spanning-tree mst max-hops	Sets the number of hops in a region before the BPDU is discarded.

spanning-tree mst hello-time

Use the **spanning-tree mst hello-time** global configuration command to set the interval between hello bridge protocol data units (BPDUs) sent by root switch configuration messages. Use the **no** form of this command to return to the default setting.

spanning-tree mst hello-time *seconds*

no spanning-tree mst hello-time

Syntax Description

seconds	Interval between hello BPDUs sent by root switch configuration messages. The range is 1 to 10 seconds.

Defaults

The default is 2 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

After you set the **spanning-tree mst max-age** *seconds* global configuration command, if a switch does not receive BPDUs from the root switch within the specified interval, the switch recomputes the spanning-tree topology. The **max-age** setting must be greater than the **hello-time** setting.

Changing the **spanning-tree mst hello-time** command affects all spanning-tree instances.

Examples

This example shows how to set the spanning-tree hello time to 3 seconds for all multiple spanning-tree (MST) instances:

```
Switch(config)# spanning-tree mst hello-time 3
```

You can verify your setting by entering the **show spanning-tree mst** privileged EXEC command.

Related Commands

Command	Description
show spanning-tree mst	Displays MST information.
spanning-tree mst forward-time	Sets the forward-delay time for all MST instances.
spanning-tree mst max-age	Sets the interval between messages that the spanning tree receives from the root switch.
spanning-tree mst max-hops	Sets the number of hops in a region before the BPDU is discarded.

spanning-tree mst max-age

Use the **spanning-tree mst max-age** global configuration command to set the interval between messages that the spanning tree receives from the root switch. If a switch does not receive a bridge protocol data unit (BPDU) message from the root switch within this interval, it recomputes the spanning-tree topology. Use the **no** form of this command to return to the default setting.

spanning-tree mst max-age *seconds*

no spanning-tree mst max-age

Syntax Description

seconds	Interval between messages the spanning tree receives from the root switch. The range is 6 to 40 seconds.

Defaults

The default is 20 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

After you set the **spanning-tree mst max-age** *seconds* global configuration command, if a switch does not receive BPDUs from the root switch within the specified interval, the switch recomputes the spanning-tree topology. The **max-age** setting must be greater than the **hello-time** setting.

Changing the **spanning-tree mst max-age** command affects all spanning-tree instances.

Examples

This example shows how to set the spanning-tree max-age to 30 seconds for all multiple spanning-tree (MST) instances:

```
Switch(config)# spanning-tree mst max-age 30
```

You can verify your setting by entering the **show spanning-tree mst** privileged EXEC command.

Related Commands

Command	Description
show spanning-tree mst	Displays MST information.
spanning-tree mst forward-time	Sets the forward-delay time for all MST instances.
spanning-tree mst hello-time	Sets the interval between hello BPDUs sent by root switch configuration messages.
spanning-tree mst max-hops	Sets the number of hops in a region before the BPDU is discarded.

spanning-tree mst max-hops

Use the **spanning-tree mst max-hops** global configuration command to set the number of hops in a region before the bridge protocol data unit (BPDU) is discarded and the information held for an interface is aged. Use the **no** form of this command to return to the default setting.

spanning-tree mst max-hops *hop-count*

no spanning-tree mst max-hops

Syntax Description

hop-count	Number of hops in a region before the BPDU is discarded. The range is 1 to 255 hops.

Defaults

The default is 20 hops.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The root switch of the instance always sends a BPDU (or M-record) with a cost of 0 and the hop count set to the maximum value. When a switch receives this BPDU, it decrements the received remaining hop count by one and propagates the decremented count as the remaining hop count in the generated M-records. A switch discards the BPDU and ages the information held for the interface when the count reaches 0.

Changing the **spanning-tree mst max-hops** command affects all spanning-tree instances.

Examples

This example shows how to set the spanning-tree max-hops to 10 for all multiple spanning-tree (MST) instances:

```
Switch(config)# spanning-tree mst max-hops 10
```

You can verify your setting by entering the **show spanning-tree mst** privileged EXEC command.

Related Commands

Command	Description
show spanning-tree mst	Displays MST information.
spanning-tree mst forward-time	Sets the forward-delay time for all MST instances.
spanning-tree mst hello-time	Sets the interval between hello BPDUs sent by root switch configuration messages.
spanning-tree mst max-age	Sets the interval between messages that the spanning tree receives from the root switch.

spanning-tree mst port-priority

Use the **spanning-tree mst port-priority** interface configuration command to configure an interface priority. If a loop occurs, the Multiple Spanning Tree Protocol (MSTP) can find the interface to put in the forwarding state. Use the **no** form of this command to return to the default setting.

spanning-tree mst *instance-id* **port-priority** *priority*

no spanning-tree mst *instance-id* **port-priority**

Syntax Description

instance-id	Range of spanning-tree instances. You can specify a single instance, a range of instances separated by a hyphen, or a series of instances separated by a comma. The range is 0 to 4094.
priority	The range is 0 to 240 in increments of 16. Valid priority values are 0, 16, 32, 48, 64, 80, 96, 112, 128, 144, 160, 176, 192, 208, 224, and 240. All other values are rejected. The lower the number, the higher the priority.

Defaults

The default is 128.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can assign higher priority values (lower numerical values) to interfaces that you want selected first and lower priority values (higher numerical values) that you want selected last. If all interfaces have the same priority value, the multiple spanning tree (MST) puts the interface with the lowest interface number in the forwarding state and blocks other interfaces.

Examples

This example shows how to increase the likelihood that the interface associated with spanning-tree instances 20 and 22 is placed into the forwarding state if a loop occurs:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# spanning-tree mst 20,22 port-priority 0
```

You can verify your settings by entering the **show spanning-tree mst interface** *interface-id* privileged EXEC command.

Related Commands

Command	Description
show spanning-tree mst interface *interface-id*	Displays MST information for the specified interface.
spanning-tree mst cost	Sets the path cost for MST calculations.
spanning-tree mst priority	Sets the switch priority for the specified spanning-tree instance.

spanning-tree mst pre-standard

Use the **spanning-tree mst pre-standard** interface configuration command to configure a port to send only prestandard bridge protocol data units (BPDUs).

spanning-tree mst pre-standard

no spanning-tree mst pre-standard

Syntax Description

This command has no arguments or keywords.

Command Default

The default state is automatic detection of prestandard neighbors.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The port can accept both prestandard and standard BPDUs. If the neighbor types are mismatched, only the common and internal spanning tree (CIST) runs on this interface.

Note If a switch port is connected to a switch running prestandard Cisco IOS software, you *must* use the **spanning-tree mst pre-standard** interface configuration command on the port. If you do not configure the port to send only prestandard BPDUs, the Multiple STP (MSTP) performance might diminish.

When the port is configured to automatically detect prestandard neighbors, the *prestandard* flag always appears in the **show spanning-tree mst** commands.

Examples

This example shows how to configure a port to send only prestandard BPDUs:

```
Switch(config-if)# spanning-tree mst pre-standard
```

You can verify your settings by entering the **show spanning-tree mst** privileged EXEC command.

Related Commands

Command	Description
show spanning-tree mst *instance-id*	Displays multiple spanning-tree (MST) information, including the *prestandard* flag, for the specified interface.

spanning-tree mst priority

Use the **spanning-tree mst priority** global configuration command to set the switch priority for the specified spanning-tree instance. Use the **no** form of this command to return to the default setting.

spanning-tree mst *instance-id* **priority** *priority*

no spanning-tree mst *instance-id* **priority**

Syntax Description

instance-id	Range of spanning-tree instances. You can specify a single instance, a range of instances separated by a hyphen, or a series of instances separated by a comma. The range is 0 to 4094.
priority	Set the switch priority for the specified spanning-tree instance. This setting affects the likelihood that the switch is selected as the root switch. A lower value increases the probability that the switch is selected as the root switch. The range is 0 to 61440 in increments of 4096. Valid priority values are 0, 4096, 8192, 12288, 16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152, 53248, 57344, and 61440. All other values are rejected.

Defaults

The default is 32768.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to set the spanning-tree priority to 8192 for multiple spanning-tree instances (MST) 20 to 21:

```
Switch(config)# spanning-tree mst 20-21 priority 8192
```

You can verify your settings by entering the **show spanning-tree mst** *instance-id* privileged EXEC command.

Related Commands

Command	Description
show spanning-tree mst *instance-id*	Displays MST information for the specified interface.
spanning-tree mst cost	Sets the path cost for MST calculations.
spanning-tree mst port-priority	Configures an interface priority.

spanning-tree mst root

Use the **spanning-tree mst root** global configuration command to configure the multiple spanning-tree (MST) root switch priority and timers based on the network diameter. Use the **no** form of this command to return to the default settings.

spanning-tree mst *instance-id* **root** {**primary** | **secondary**} [**diameter** *net-diameter* [**hello-time** *seconds*]]

no spanning-tree mst *instance-id* **root**

Syntax Description

instance-id	Range of spanning-tree instances. You can specify a single instance, a range of instances separated by a hyphen, or a series of instances separated by a comma. The range is 0 to 4094.
root primary	Force this switch to be the root switch.
root secondary	Set this switch to be the root switch should the primary root switch fail.
diameter *net-diameter*	(Optional) Set the maximum number of switches between any two end stations. The range is 2 to 7. This keyword is available only for MST instance 0.
hello-time *seconds*	(Optional) Set the interval between hello bridge protocol data units (BPDUs) sent by the root switch configuration messages. The range is 1 to 10 seconds. This keyword is available only for MST instance 0.

Defaults

The primary root switch priority is 24576.

The secondary root switch priority is 28672.

The hello time is 2 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use the **spanning-tree mst** *instance-id* **root** command only on backbone switches.

When you enter the **spanning-tree mst** *instance-id* **root** command, the software tries to set a high enough priority to make this switch the root of the spanning-tree instance. Because of the extended system ID support, the switch sets the switch priority for the instance to 24576 if this value will cause this switch to become the root for the specified instance. If any root switch for the specified instance has a switch priority lower than 24576, the switch sets its own priority to 4096 less than the lowest switch priority. (4096 is the value of the least-significant bit of a 4-bit switch priority value.)

When you enter the **spanning-tree mst** *instance-id* **root secondary** command, because of support for the extended system ID, the software changes the switch priority from the default value (32768) to 28672. If the root switch fails, this switch becomes the next root switch (if the other switches in the network use the default switch priority of 32768 and are therefore unlikely to become the root switch).

Examples

This example shows how to configure the switch as the root switch for instance 10 with a network diameter of 4:

```
Switch(config)# spanning-tree mst 10 root primary diameter 4
```

This example shows how to configure the switch as the secondary root switch for instance 10 with a network diameter of 4:

```
Switch(config)# spanning-tree mst 10 root secondary diameter 4
```

You can verify your settings by entering the **show spanning-tree mst** *instance-id* privileged EXEC command.

Related Commands

Command	Description
show spanning-tree mst *instance-id*	Displays MST information for the specified instance.
spanning-tree mst forward-time	Sets the forward-delay time for all MST instances.
spanning-tree mst hello-time	Sets the interval between hello BPDUs sent by root switch configuration messages.
spanning-tree mst max-age	Sets the interval between messages that the spanning tree receives from the root switch.
spanning-tree mst max-hops	Sets the number of hops in a region before the BPDU is discarded.

spanning-tree port-priority

Use the **spanning-tree port-priority** interface configuration command to configure an interface priority. If a loop occurs, spanning tree can find the interface to put in the forwarding state. Use the **no** form of this command to return to the default setting.

spanning-tree [**vlan** *vlan-id*] **port-priority** *priority*

no spanning-tree [**vlan** *vlan-id*] **port-priority**

Syntax Description

vlan *vlan-id*	(Optional) VLAN range associated with a spanning-tree instance. You can specify a single VLAN identified by VLAN ID number, a range of VLANs separated by a hyphen, or a series of VLANs separated by a comma. The range is 1 to 4094.
priority	Number from 0 to 240, in increments of 16. Valid values are 0, 16, 32, 48, 64, 80, 96, 112, 128, 144, 160, 176, 192, 208, 224, and 240. All other values are rejected. The lower the number, the higher the priority.

Defaults

The default is 128.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If the variable *vlan-id* is omitted, the command applies to the spanning-tree instance associated with VLAN 1.

You can set the priority on a VLAN that has no interfaces assigned to it. The setting takes effect when you assign the interface to the VLAN.

If you configure an interface with both the **spanning-tree vlan** *vlan-id* **port-priority** *priority* command and the **spanning-tree port-priority** *priority* command, the **spanning-tree vlan** *vlan-id* **port-priority** *priority* command takes effect.

Examples

This example shows how to increase the likelihood that a port will be put in the forwarding state if a loop occurs:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# spanning-tree vlan 20 port-priority 0
```

This example shows how to set the port-priority value on VLANs 20 to 25:

```
Switch(config-if)# spanning-tree vlan 20-25 port-priority 0
```

You can verify your settings by entering the **show spanning-tree interface** *interface-id* privileged EXEC command.

Related Commands

Command	Description
show spanning-tree interface *interface-id*	Displays spanning-tree information for the specified interface.
spanning-tree cost	Sets the path cost for spanning-tree calculations.
spanning-tree vlan priority	Sets the switch priority for the specified spanning-tree instance.

spanning-tree portfast (global configuration)

Use the **spanning-tree portfast** global configuration command to globally enable bridge protocol data unit (BPDU) filtering on Port Fast-enabled interfaces, the BPDU guard feature on Port Fast-enabled interfaces, or the Port Fast feature on all nontrunking interfaces. The BPDU filtering feature prevents the switch interface from sending or receiving BPDUs. The BPDU guard feature puts Port Fast-enabled interfaces that receive BPDUs in an error-disabled state. Use the **no** form of this command to return to the default settings.

spanning-tree portfast {**bpdufilter default** | **bpduguard default** | **default**}

no spanning-tree portfast {**bpdufilter default** | **bpduguard default** | **default**}

Syntax Description

bpdufilter default	Globally enable BPDU filtering on Port Fast-enabled interfaces and prevent the switch interface connected to end stations from sending or receiving BPDUs.
bpduguard default	Globally enable the BPDU guard feature on Port Fast-enabled interfaces and place the interfaces that receive BPDUs in an error-disabled state.
default	Globally enable the Port Fast feature on all nontrunking interfaces. When the Port Fast feature is enabled, the interface changes directly from a blocking state to a forwarding state without making the intermediate spanning-tree state changes.

Defaults

The BPDU filtering, the BPDU guard, and the Port Fast features are disabled on all interfaces unless they are individually configured.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can enable these features when the switch is operating in the per-VLAN spanning-tree plus (PVST+) rapid-PVST+, or the multiple spanning-tree (MST) mode.

Use the **spanning-tree portfast bpdufilter default** global configuration command to globally enable BPDU filtering on interfaces that are Port Fast-enabled (the interfaces are in a Port Fast-operational state). The interfaces still send a few BPDUs at link-up before the switch begins to filter outbound BPDUs. You should globally enable BPDU filtering on a switch so that hosts connected to switch interfaces do not receive BPDUs. If a BPDU is received on a Port Fast-enabled interface, the interface loses its Port Fast-operational status and BPDU filtering is disabled.

You can override the **spanning-tree portfast bpdufilter default** global configuration command by using the **spanning-tree bdpufilter** interface configuration command.

Caution Enabling BPDU filtering on an interface is the same as disabling spanning tree on it and can result in spanning-tree loops.

Use the **spanning-tree portfast bpduguard default** global configuration command to globally enable BPDU guard on interfaces that are in a Port Fast-operational state. In a valid configuration, Port Fast-enabled interfaces do not receive BPDUs. Receiving a BPDU on a Port Fast-enabled interface signals an invalid configuration, such as the connection of an unauthorized device, and the BPDU guard feature puts the interface in the error-disabled state. The BPDU guard feature provides a secure response to invalid configurations because you must manually put the interface back in service. Use the BPDU guard feature in a service-provider network to prevent an access port from participating in the spanning tree.

You can override the **spanning-tree portfast bpduguard default** global configuration command by using the **spanning-tree bdpuguard** interface configuration command.

Use the **spanning-tree portfast default** global configuration command to globally enable the Port Fast feature on all nontrunking interfaces. Configure Port Fast only on interfaces that connect to end stations; otherwise, an accidental topology loop could cause a data packet loop and disrupt switch and network operation. A Port Fast-enabled interface moves directly to the spanning-tree forwarding state when linkup occurs without waiting for the standard forward-delay time.

You can override the **spanning-tree portfast default** global configuration command by using the **spanning-tree portfast** interface configuration command. You can use the **no spanning-tree portfast default** global configuration command to disable Port Fast on all interfaces unless they are individually configured with the **spanning-tree portfast** interface configuration command.

Examples

This example shows how to globally enable the BPDU filtering feature:

```
Switch(config)# spanning-tree portfast bpdufilter default
```

This example shows how to globally enable the BPDU guard feature:

```
Switch(config)# spanning-tree portfast bpduguard default
```

This example shows how to globally enable the Port Fast feature on all nontrunking interfaces:

```
Switch(config)# spanning-tree portfast default
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the current operating configuration.
spanning-tree bpdufilter	Prevents an interface from sending or receiving BPDUs.
spanning-tree bpduguard	Puts an interface in the error-disabled state when it receives a BPDU.
spanning-tree portfast (interface configuration)	Enables the Port Fast feature on an interface in all its associated VLANs.

spanning-tree portfast (interface configuration)

Use the **spanning-tree portfast** interface configuration command to enable the Port Fast feature on an interface in all its associated VLANs. When the Port Fast feature is enabled, the interface changes directly from a blocking state to a forwarding state without making the intermediate spanning-tree state changes. Use the **no** form of this command to return to the default setting.

spanning-tree portfast [**disable** | **trunk**]

no spanning-tree portfast

Syntax Description

disable	(Optional) Disable the Port Fast feature on the specified interface.
trunk	(Optional) Enable the Port Fast feature on a trunking interface.

Defaults

The Port Fast feature is disabled on all interfaces; however, it is automatically enabled on dynamic-access ports.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this feature only on interfaces that connect to end stations; otherwise, an accidental topology loop could cause a data packet loop and disrupt switch and network operation.

To enable Port Fast on trunk ports, you must use the **spanning-tree portfast trunk** interface configuration command. The **spanning-tree portfast** command is not supported on trunk ports.

You can enable this feature when the switch is operating in the per-VLAN spanning-tree plus (PVST+), rapid-PVST+, or the multiple spanning-tree (MST) mode.

This feature affects all VLANs on the interface.

An interface with the Port Fast feature enabled is moved directly to the spanning-tree forwarding state without the standard forward-time delay.

You can use the **spanning-tree portfast default** global configuration command to globally enable the Port Fast feature on all nontrunking interfaces. However, the **spanning-tree portfast** interface configuration command can override the global setting.

If you configure the **spanning-tree portfast default** global configuration command, you can disable Port Fast on an interface that is not a trunk interface by using the **spanning-tree portfast disable** interface configuration command.

Examples

This example shows how to enable the Port Fast feature on a port:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# spanning-tree portfast
```

You can verify your settings by entering the **show running-config** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the current operating configuration.
spanning-tree bpdufilter	Prevents an interface from sending or receiving bridge protocol data units (BPDUs).
spanning-tree bpduguard	Puts an interface in the error-disabled state when it receives a BPDU.
spanning-tree portfast (global configuration)	Globally enables the BPDU filtering or the BPDU guard feature on Port Fast-enabled interfaces or enables the Port Fast feature on all nontrunking interfaces.

spanning-tree transmit hold-count

Use the **spanning-tree transmit hold-count** global configuration command to configure the number of bridge protocol data units (BPDUs) sent every second. Use the **no** form of this command to return to the default setting.

spanning-tree transmit hold-count [*value*]

no spanning-tree transmit hold-count [*value*]

Syntax Description

value	(Optional) Number of BPDUs sent every second. The range is 1 to 20.

Defaults

The default is 6.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Increasing the transmit hold-count value can have a significant impact on CPU utilization when the switch is in rapid-per-VLAN spanning-tree plus (rapid-PVST+) mode. Decreasing this value might slow down convergence. We recommend using the default setting.

Examples

This example shows how to set the transmit hold count to 8:

```
Switch(config)# spanning-tree transmit hold-count 8
```

You can verify your setting by entering the **show spanning-tree mst** privileged EXEC command.

Related Commands

Command	Description
show spanning-tree mst	Displays the multiple spanning-tree (MST) region configuration and status, including the transmit hold count.

spanning-tree uplinkfast

Use the **spanning-tree uplinkfast** global configuration command to accelerate the choice of a new root port when a link or switch fails or when the spanning tree reconfigures itself. Use the **no** form of this command to return to the default setting.

spanning-tree uplinkfast [**max-update-rate** *pkts-per-second*]

no spanning-tree uplinkfast [**max-update-rate**]

Syntax Description

max-update-rate *pkts-per-second*	(Optional) The number of packets per second at which update packets are sent. The range is 0 to 32000.

Defaults

UplinkFast is disabled.

The update rate is 150 packets per second.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this command only on access switches.

You can configure the UplinkFast feature for rapid PVST+ or for multiple spanning-tree (MST) mode, but the feature remains disabled (inactive) until you change the spanning-tree mode to PVST+.

When you enable UplinkFast, it is enabled for the entire switch and cannot be enabled for individual VLANs.

When UplinkFast is enabled, the switch priority of all VLANs is set to 49152. If you change the path cost to a value less than 3000 and you enable UplinkFast or UplinkFast is already enabled, the path cost of all interfaces and VLAN trunks is increased by 3000 (if you change the path cost to 3000 or above, the path cost is not altered). The changes to the switch priority and the path cost reduces the chance that a switch will become the root switch.

When UplinkFast is disabled, the switch priorities of all VLANs and path costs of all interfaces are set to default values if you did not modify them from their defaults.

When spanning tree detects that the root port has failed, UplinkFast immediately changes to an alternate root port, changing the new root port directly to forwarding state. During this time, a topology change notification is sent.

Do not enable the root guard on interfaces that will be used by the UplinkFast feature. With UplinkFast, the backup interfaces (in the blocked state) replace the root port in the case of a failure. However, if root guard is also enabled, all the backup interfaces used by the UplinkFast feature are placed in the root-inconsistent state (blocked) and prevented from reaching the forwarding state.

If you set the max-update-rate to 0, station-learning frames are not generated, so the spanning-tree topology converges more slowly after a loss of connectivity.

Examples

This example shows how to enable UplinkFast:

```
Switch(config)# spanning-tree uplinkfast
```

You can verify your setting by entering the **show spanning-tree summary** privileged EXEC command.

Related Commands

Command	Description
show spanning-tree summary	Displays a summary of the spanning-tree interface states.
spanning-tree vlan root primary	Forces this switch to be the root switch.

spanning-tree vlan

Use the **spanning-tree vlan** global configuration command to configure spanning tree on a per-VLAN basis. Use the **no** form of this command to return to the default setting.

spanning-tree vlan *vlan-id* [**forward-time** *seconds* | **hello-time** *seconds* | **max-age** *seconds* | **priority** *priority* | **root** {**primary** | **secondary**} [**diameter** *net-diameter* [**hello-time** *seconds*]]]

no spanning-tree vlan *vlan-id* [**forward-time** | **hello-time** | **max-age** | **priority** | **root**]

Syntax Description

vlan-id	VLAN range associated with a spanning-tree instance. You can specify a single VLAN identified by VLAN ID number, a range of VLANs separated by a hyphen, or a series of VLANs separated by a comma. The range is 1 to 4094.
forward-time *seconds*	(Optional) Set the forward-delay time for the specified spanning-tree instance. The forwarding time specifies how long each of the listening and learning states last before the interface begins forwarding. The range is 4 to 30 seconds.
hello-time *seconds*	(Optional) Set the interval between hello bridge protocol data units (BPDUs) sent by the root switch configuration messages. The range is 1 to 10 seconds.
max-age *seconds*	(Optional) Set the interval between messages the spanning tree receives from the root switch. If a switch does not receive a BPDU message from the root switch within this interval, it recomputes the spanning-tree topology. The range is 6 to 40 seconds.
priority *priority*	(Optional) Set the switch priority for the specified spanning-tree instance. This setting affects the likelihood that this switch is selected as the root switch. A lower value increases the probability that the switch is selected as the root switch. The range is 0 to 61440 in increments of 4096. Valid priority values are 4096, 8192, 12288, 16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152, 53248, 57344, and 61440. All other values are rejected.
root primary	(Optional) Force this switch to be the root switch.
root secondary	(Optional) Set this switch to be the root switch should the primary root switch fail.
diameter *net-diameter*	(Optional) Set the maximum number of switches between any two end stations. The range is 2 to 7.

Defaults

Spanning tree is enabled on all VLANs.

The forward-delay time is 15 seconds.

The hello time is 2 seconds.

The max-age is 20 seconds.

The primary root switch priority is 24576.

The secondary root switch priority is 28672.

Command Modes Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Disabling the STP causes the VLAN to stop participating in the spanning-tree topology. Interfaces that are administratively down remain down. Received BPDUs are forwarded like other multicast frames. The VLAN does not detect and prevent loops when STP is disabled.

You can disable the STP on a VLAN that is not currently active and verify the change by using the **show running-config** or the **show spanning-tree vlan** *vlan-id* privileged EXEC command. The setting takes effect when the VLAN is activated.

When disabling or re-enabling the STP, you can specify a range of VLANs that you want to disable or enable.

When a VLAN is disabled and then enabled, all assigned VLANs continue to be its members. However, all spanning-tree bridge parameters are returned to their previous settings (the last setting before the VLAN was disabled).

You can enable spanning-tree options on a VLAN that has no interfaces assigned to it. The setting takes effect when you assign interfaces to it.

When setting the **max-age** *seconds,* if a switch does not receive BPDUs from the root switch within the specified interval, it recomputes the spanning-tree topology. The **max-age** setting must be greater than the **hello-time** setting.

The **spanning-tree vlan** *vlan-id* **root** command should be used only on backbone switches.

When you enter the **spanning-tree vlan** *vlan-id* **root** command, the software checks the switch priority of the current root switch for each VLAN. Because of the extended system ID support, the switch sets the switch priority for the specified VLAN to 24576 if this value will cause this switch to become the root for the specified VLAN. If any root switch for the specified VLAN has a switch priority lower than 24576, the switch sets its own priority for the specified VLAN to 4096 less than the lowest switch priority. (4096 is the value of the least-significant bit of a 4-bit switch priority value.)

When you enter the **spanning-tree vlan** *vlan-id* **root secondary** command, because of support for the extended system ID, the software changes the switch priority from the default value (32768) to 28672. If the root switch should fail, this switch becomes the next root switch (if the other switches in the network use the default switch priority of 32768, and therefore, are unlikely to become the root switch).

Examples

This example shows how to disable the STP on VLAN 5:

```
Switch(config)# no spanning-tree vlan 5
```

You can verify your setting by entering the **show spanning-tree** privileged EXEC command. In this instance, VLAN 5 does not appear in the list.

This example shows how to set the spanning-tree forwarding time to 18 seconds for VLANs 20 and 25:

```
Switch(config)# spanning-tree vlan 20,25 forward-time 18
```

This example shows how to set the spanning-tree hello-delay time to 3 seconds for VLANs 20 to 24:

```
Switch(config)# spanning-tree vlan 20-24 hello-time 3
```

This example shows how to set spanning-tree max-age to 30 seconds for VLAN 20:

```
Switch(config)# spanning-tree vlan 20 max-age 30
```

This example shows how to reset the **max-age** parameter to the default value for spanning-tree instance 100 and 105 to 108:

```
Switch(config)# no spanning-tree vlan 100, 105-108 max-age
```

This example shows how to set the spanning-tree priority to 8192 for VLAN 20:

```
Switch(config)# spanning-tree vlan 20 priority 8192
```

This example shows how to configure the switch as the root switch for VLAN 10 with a network diameter of 4:

```
Switch(config)# spanning-tree vlan 10 root primary diameter 4
```

This example shows how to configure the switch as the secondary root switch for VLAN 10 with a network diameter of 4:

```
Switch(config)# spanning-tree vlan 10 root secondary diameter 4
```

You can verify your settings by entering the **show spanning-tree vlan** *vlan-id* privileged EXEC command.

Related Commands

Command	Description
show spanning-tree vlan	Displays spanning-tree information.
spanning-tree cost	Sets the path cost for spanning-tree calculations.
spanning-tree guard	Enables the root guard or the loop guard feature for all the VLANs associated with the selected interface.
spanning-tree port-priority	Sets an interface priority.
spanning-tree portfast (global configuration)	Globally enables the BPDU filtering or the BPDU guard feature on Port Fast-enabled interfaces or enables the Port Fast feature on all nontrunking interfaces.
spanning-tree portfast (interface configuration)	Enables the Port Fast feature on an interface in all its associated VLANs.
spanning-tree uplinkfast	Enables the UplinkFast feature, which accelerates the choice of a new root port.

speed

Use the **speed** interface configuration command to specify the speed of a 10/100 Mb/s or 10/100/1000 Mb/s port. Use the **no** or **default** form of this command to return the port to its default value.

speed {**10** | **100** | **1000** | **auto** [**10** | **100** | **1000**] | **nonegotiate**}

no speed

Syntax Description

10	Port runs at 10 Mb/s.
100	Port runs at 100 Mb/s.
1000	Port runs at 1000 Mb/s. This option is valid and visible only on 10/100/1000 Mb/s-ports.
auto	Port automatically detects the speed it should run at based on the port at the other end of the link. If you use the **10**, **100**, or **1000** keywords with the **auto** keyword, the port only autonegotiates at the specified speeds.
nonegotiate	Autonegotiation is disabled, and the port runs at 1000 Mb/s. (The 1000BASE-T SFP does not support the nonegotiate keyword.)

Defaults

The default is **auto**.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If an SFP module port is connected to a device that does not support autonegotiation, you can configure the speed to not negotiate (**nonegotiate**).

If the speed is set to **auto**, the switch negotiates with the device at the other end of the link for the speed setting and then forces the speed setting to the negotiated value. The duplex setting remains as configured on each end of the link, which could result in a duplex setting mismatch.

If both ends of the line support autonegotiation, we highly recommend the default autonegotiation settings. If one interface supports autonegotiation and the other end does not, do use the **auto** setting on the supported side, but set the duplex and speed on the other side.

Caution Changing the interface speed and duplex mode configuration might shut down and re-enable the interface during the reconfiguration.

For guidelines on setting the switch speed and duplex parameters, see the “Configuring Interface Characteristics” chapter in the software configuration guide for this release.

Examples

This example shows how to set the speed on a port to 100 Mb/s:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# speed 100
```

This example shows how to set a port to autonegotiate at only 10 Mb/s:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# speed auto 10
```

This example shows how to set a port to autonegotiate at only 10 or 100 Mb/s:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# speed auto 10 100
```

You can verify your settings by entering the **show interfaces** privileged EXEC command.

Related Commands

Command	Description
duplex	Specifies the duplex mode of operation.
show interfaces	Displays the statistical information specific to all interfaces or to a specific interface.

storm-control

Use the **storm-control** interface configuration command to enable broadcast, multicast, or unicast storm control and to set threshold levels on an interface. Use the **no** form of this command to return to the default setting.

storm-control {{**broadcast** | **multicast** | **unicast**} **level** {*level* [*level-low*] | **bps** *bps* [*bps-low*] | **pps** *pps* [*pps-low*]}} | {**action** {**shutdown** | **trap**}}

no storm-control {{**broadcast** | **multicast** | **unicast**} **level**} | {**action** {**shutdown** | **trap**}}

Syntax Description

broadcast	Enable broadcast storm control on the interface.
multicast	Enable multicast storm control on the interface.
unicast	Enable unicast storm control on the interface.
level *level* [*level-low*]	Specify the rising and falling suppression levels as a percentage of total bandwidth of the port. • *level*—Rising suppression level, up to two decimal places. The range is 0.00 to 100.00. Block the flooding of storm packets when the value specified for *level* is reached. • *level-low*—(Optional) Falling suppression level, up to two decimal places. The range is 0.00 to 100.00. This value must be less than or equal to the rising suppression value. If you do not configure a falling suppression level, it is set to the rising suppression level.
level bps *bps* [*bps-low*]	Specify the rising and falling suppression levels as a rate in bits per second at which traffic is received on the port. • *bps*—Rising suppression level, up to 1 decimal place. The range is 0.0 to 10000000000.0. Block the flooding of storm packets when the value specified for *bps* is reached. • *bps-low*—(Optional) Falling suppression level, up to 1 decimal place. The range is 0.0 to 10000000000.0. This value must be equal to or less than the rising suppression value. You can use metric suffixes such as k, m, and g for large number thresholds.

level pps *pps* [*pps-low*]	Specify the rising and falling suppression levels as a rate in packets per second at which traffic is received on the port. • *pps*—Rising suppression level, up to 1 decimal place. The range is 0.0 to 10000000000.0. Block the flooding of storm packets when the value specified for *pps* is reached. • *pps-low*—(Optional) Falling suppression level, up to 1 decimal place. The range is 0.0 to 10000000000.0. This value must be equal to or less than the rising suppression value. You can use metric suffixes such as k, m, and g for large number thresholds.
action {**shutdown** | **trap**}	Action taken when a storm occurs on a port. The default action is to filter traffic and to not send an Simple Network Management Protocol (SNMP) trap. The keywords have these meanings: • **shutdown**—Disables the port during a storm. • **trap**—Sends an SNMP trap when a storm occurs.

Defaults

Broadcast, multicast, and unicast storm control are disabled.

The default action is to filter traffic and to not send an SNMP trap.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Storm control is supported only on physical interfaces. It is not supported on EtherChannel port channels, even though it is available in the command-line interface (CLI).

The storm-control suppression level can be entered as a percentage of total bandwidth of the port, as a rate in packets per second at which traffic is received, or as a rate in bits per second at which traffic is received.

When specified as a percentage of total bandwidth, a suppression value of 100 percent means that no limit is placed on the specified traffic type. A value of **level 0 0** means that all broadcast, multicast, or unicast traffic on that port is blocked. Storm control is enabled only when the rising suppression level is less than 100 percent. If no other storm-control configuration is specified, the default action is to filter the traffic causing the storm and to send no SNMP traps.

Note When the storm control threshold for multicast traffic is reached, all multicast traffic except control traffic, such as bridge protocol data unit (BDPU) and Cisco Discovery Protocol (CDP) frames, are blocked.

The **trap** and **shutdown** options are independent of each other.

If you configure the action to be taken as shutdown (the port is error-disabled during a storm) when a packet storm is detected, you must use the **no shutdown** interface configuration command to bring the interface out of this state. If you do not specify the **shutdown** action, specify the action as **trap** (the switch generates a trap when a storm is detected).

When a storm occurs and the action is to filter traffic, if the falling suppression level is not specified, the switch blocks all traffic until the traffic rate drops below the rising suppression level. If the falling suppression level is specified, the switch blocks traffic until the traffic rate drops below this level.

Note Storm control is supported on physical interfaces. You can also configure storm control on an EtherChannel. When storm control is configured on an EtherChannel, the storm control settings propagate to the EtherChannel physical interfaces.

When a broadcast storm occurs and the action is to filter traffic, the switch blocks only broadcast traffic.

For more information, see the software configuration guide for this release.

Examples

This example shows how to enable broadcast storm control with a 75.5-percent rising suppression level:

```
Switch(config-if)# storm-control broadcast level 75.5
```

This example shows how to enable unicast storm control on a port with a 87-percent rising suppression level and a 65-percent falling suppression level:

```
Switch(config-if)# storm-control unicast level 87 65
```

This example shows how to enable multicast storm control on a port with a 2000-packets-per-second rising suppression level and a 1000-packets-per-second falling suppression level:

```
Switch(config-if)# storm-control multicast level pps 2k 1k
```

This example shows how to enable the **shutdown** action on a port:

```
Switch(config-if)# storm-control action shutdown
```

You can verify your settings by entering the **show storm-control** privileged EXEC command.

Related Commands

Command	Description
show storm-control	Displays broadcast, multicast, or unicast storm control settings on all interfaces or on a specified interface.

switchport access

Use the **switchport access** interface configuration command to configure a port as a static-access or dynamic-access port. If the switchport mode is set to **access**, the port operates as a member of the specified VLAN. If set to **dynamic**, the port starts discovery of VLAN assignment based on the incoming packets it receives. Use the **no** form of this command to reset the access mode to the default VLAN for the switch.

switchport access vlan {*vlan-id* | **dynamic**}

no switchport access vlan

Syntax Description

vlan *vlan-id*	Configure the interface as a static access port with the VLAN ID of the access mode VLAN; the range is 1 to 4094.
vlan dynamic	Specify that the access mode VLAN is dependent on the VLAN Membership Policy Server (VMPS) protocol. The port is assigned to a VLAN based on the source MAC address of a host (or hosts) connected to the port. The switch sends every new MAC address received to the VMPS server to get the VLAN name to which the dynamic-access port should be assigned. If the port already has a VLAN assigned and the source has already been approved by the VMPS, the switch forwards the packet to the VLAN.

Defaults

The default access VLAN and trunk interface native VLAN is a default VLAN corresponding to the platform or interface hardware.

A dynamic-access port is initially a member of no VLAN and receives its assignment based on the packet it receives.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **no switchport access** command resets the access mode VLAN to the appropriate default VLAN for the device.

The port must be in access mode before the **switchport access vlan** command can take effect.

An access port can be assigned to only one VLAN.

The VMPS server (such as a Catalyst 6000 series switch) must be configured before a port is configured as dynamic.

These restrictions apply to dynamic-access ports:

- The software implements the VLAN Query Protocol (VQP) client, which can query a VMPS such as a Catalyst 6000 series switch. The Catalyst 2918 switches are not VMPS servers. The VMPS server must be configured before a port is configured as dynamic.
- Use dynamic-access ports only to connect end stations. Connecting them to switches or routers (that use bridging protocols) can cause a loss of connectivity.
- Configure the network so that STP does not put the dynamic-access port into an STP blocking state. The Port Fast feature is automatically enabled on dynamic-access ports.
- Dynamic-access ports can only be in one VLAN and do not use VLAN tagging.
- Dynamic-access ports cannot be configured as
  - Members of an EtherChannel port group (dynamic-access ports cannot be grouped with any other port, including other dynamic ports).
  - Source or destination ports in a static address entry.
  - Monitor ports.

Examples

This example shows how to change a switched port interface that is operating in access mode to operate in VLAN 2 instead of the default VLAN:

```
Switch(config-if)# switchport access vlan 2
```

You can verify your setting by entering the **show interfaces** *interface-id* **switchport** privileged EXEC command and examining information in the Administrative Mode and Operational Mode rows.

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching port, including port blocking and port protection settings.
switchport mode	Configures the VLAN membership mode of a port.

switchport block

Use the **switchport block** interface configuration command to prevent unknown multicast or unicast packets from being forwarded. Use the **no** form of this command to allow forwarding unknown multicast or unicast packets.

switchport block {**multicast** | **unicast**}

no switchport block {**multicast** | **unicast**}

Syntax Description

multicast	Specify that unknown multicast traffic should be blocked.
unicast	Specify that unknown unicast traffic should be blocked.

Defaults

Unknown multicast and unicast traffic is not blocked.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

By default, all traffic with unknown MAC addresses is sent to all ports. You can block unknown multicast or unicast traffic on protected or nonprotected ports. If unknown multicast or unicast traffic is not blocked on a protected port, there could be security issues.

Blocking unknown multicast or unicast traffic is not automatically enabled on protected ports; you must explicitly configure it.

For more information about blocking packets, see the software configuration guide for this release.

Examples

This example shows how to block unknown multicast traffic on an interface:

```
Switch(config-if)# switchport block multicast
```

You can verify your setting by entering the **show interfaces** *interface-id* **switchport** privileged EXEC command.

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching port, including port blocking and port protection settings.

switchport host

Use the **switchport host** interface configuration command to optimize a port for a host connection. The **no** form of this command has no affect on the system.

switchport host

Syntax Description

This command has no arguments or keywords.

Defaults

The default is for the port to not be optimized for a host connection.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

To optimize the port for a host connection, the **switchport host** command sets switch port mode to access, enables spanning tree Port Fast, and disables channel grouping. Only an end station can accept this configuration.

Because spanning tree Port Fast is enabled, you should enter the **switchport host** command only on ports that are connected to a single host. Connecting other switches, hubs, concentrators, or bridges to a fast-start port can cause temporary spanning-tree loops.

Enable the **switchport host** command to decrease the time that it takes to start up packet forwarding.

Examples

This example shows how to optimize the port configuration for a host connection:

```
Switch(config-if)# switchport host
switchport mode will be set to access
spanning-tree portfast will be enabled
channel group will be disabled
Switch(config-if)#
```

You can verify your setting by entering the **show interfaces** *interface-id* **switchport** privileged EXEC command.

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching port, including switchport mode.

switchport mode

Use the **switchport mode** interface configuration command to configure the VLAN membership mode of a port. Use the **no** form of this command to reset the mode to the appropriate default for the device.

switchport mode {**access** | **dynamic** {**auto** | **desirable**} | **trunk**}

no switchport mode {**access** | **dynamic** | **trunk**}

Syntax Description

access	Set the port to access mode (either static-access or dynamic-access depending on the setting of the **switchport access vlan** interface configuration command). The port is set to access unconditionally and operates as a nontrunking, single VLAN interface that sends and receives nonencapsulated (non-tagged) frames. An access port can be assigned to only one VLAN.
dynamic auto	Set the interface trunking mode dynamic parameter to auto to specify that the interface convert the link to a trunk link. This is the default switchport mode.
dynamic desirable	Set the interface trunking mode dynamic parameter to desirable to specify that the interface actively attempt to convert the link to a trunk link.
trunk	Set the port to trunk unconditionally. The port is a trunking VLAN Layer 2 interface. The port sends and receives encapsulated (tagged) frames that identify the VLAN of origination. A trunk is a point-to-point link between two switches or between a switch and a router.

Defaults

The default mode is **dynamic auto**.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

A configuration that uses the **access** or **trunk** keywords takes effect only when you configure the port in the appropriate mode by using the **switchport mode** command. The static-access and trunk configuration are saved, but only one configuration is active at a time.

When you enter **access** mode, the interface changes to permanent nontrunking mode and negotiates to convert the link into a nontrunk link even if the neighboring interface does not agree to the change.

When you enter **trunk** mode, the interface changes to permanent trunking mode and negotiates to convert the link into a trunk link even if the interface connecting to it does not agree to the change.

When you enter **dynamic auto** mode, the interface converts the link to a trunk link if the neighboring interface is set to **trunk** or **desirable** mode.

When you enter **dynamic desirable** mode, the interface becomes a trunk interface if the neighboring interface is set to **trunk**, **desirable**, or **auto** mode.

To autonegotiate trunking, the interfaces must be in the same VLAN Trunking Protocol (VTP) domain. Trunk negotiation is managed by the Dynamic Trunking Protocol (DTP), which is a point-to-point protocol. However, some internetworking devices might forward DTP frames improperly, which could cause misconfigurations. To avoid this, you should configure interfaces connected to devices that do not support DTP to not forward DTP frames, which turns off DTP.

- If you do not intend to trunk across those links, use the **switchport mode access** interface configuration command to disable trunking.
- To enable trunking to a device that does not support DTP, use the **switchport mode trunk** and **switchport nonegotiate** interface configuration commands to cause the interface to become a trunk but to not generate DTP frames.

Access ports and trunk ports are mutually exclusive.

The IEEE 802.1x feature interacts with switchport modes in these ways:

- If you try to enable IEEE 802.1x on a trunk port, an error message appears, and IEEE 802.1x is not enabled. If you try to change the mode of an IEEE 802.1x-enabled port to trunk, the port mode is not changed.
- If you try to enable IEEE 802.1x on a port set to **dynamic auto** or **dynamic desirable**, an error message appears, and IEEE 802.1x is not enabled. If you try to change the mode of an IEEE 802.1x-enabled port to **dynamic auto** or **dynamic desirable**, the port mode is not changed.
- If you try to enable IEEE 802.1x on a dynamic-access (VLAN Query Protocol [VQP]) port, an error message appears, and IEEE 802.1x is not enabled. If you try to change an IEEE 802.1x-enabled port to dynamic VLAN assignment, an error message appears, and the VLAN configuration is not changed.

Examples

This example shows how to configure a port for access mode:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# switchport mode access
```

This example shows how set the port to dynamic desirable mode:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# switchport mode dynamic desirable
```

This example shows how to configure a port for trunk mode:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# switchport mode trunk
```

You can verify your settings by entering the **show interfaces** *interface-id* **switchport** privileged EXEC command and examining information in the Administrative Mode and Operational Mode rows.

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching port, including port blocking and port protection settings.
switchport access	Configures a port as a static-access or dynamic-access port.
switchport trunk	Configures the trunk characteristics when an interface is in trunking mode.

switchport nonegotiate

Use the **switchport nonegotiate** interface configuration command to specify that Dynamic Trunking Protocol (DTP) negotiation packets are not sent on the Layer 2 interface. The switch does not engage in DTP negotiation on this interface. Use the **no** form of this command to return to the default setting.

switchport nonegotiate

no switchport nonegotiate

Syntax Description

This command has no arguments or keywords.

Defaults

The default is to use DTP negotiation to learn the trunking status.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **no** form of the **switchport nonegotiate** command removes **nonegotiate** status.

This command is valid only when the interface switchport mode is access or trunk (configured by using the **switchport mode access** or the **switchport mode trunk** interface configuration command). This command returns an error if you attempt to execute it in **dynamic** (**auto** or **desirable**) mode.

Internetworking devices that do not support DTP might forward DTP frames improperly and cause misconfigurations. To avoid this, you should turn off DTP by using the **switchport no negotiate** command to configure the interfaces connected to devices that do not support DTP to not forward DTP frames.

When you enter the **switchport nonegotiate** command, DTP negotiation packets are not sent on the interface. The device does or does not trunk according to the **mode** parameter: **access** or **trunk**.

- If you do not intend to trunk across those links, use the **switchport mode access** interface configuration command to disable trunking.
- To enable trunking on a device that does not support DTP, use the **switchport mode trunk** and **switchport nonegotiate** interface configuration commands to cause the interface to become a trunk but to not generate DTP frames.

Examples

This example shows how to cause a port to refrain from negotiating trunking mode and to act as a trunk or access port (depending on the mode set):

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# switchport nonegotiate
```

You can verify your setting by entering the **show interfaces** *interface-id* **switchport** privileged EXEC command.

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching port, including port blocking and port protection settings.
switchport mode	Configures the VLAN membership mode of a port.

switchport port-security

Use the **switchport port-security** interface configuration command without keywords to enable port security on the interface. Use the keywords to configure secure MAC addresses, sticky MAC address learning, a maximum number of secure MAC addresses, or the violation mode. Use the **no** form of this command to disable port security or to set the parameters to their default states.

switchport port-security [**mac-address** *mac-address* [**vlan** {*vlan-id* | {**access** | **voice**}}] | **mac-address sticky** [*mac-address* | **vlan** {*vlan-id* | {**access** | **voice**}}]] [**maximum** *value* [**vlan** {*vlan-list* | {**access** | **voice**}}]]

no switchport port-security [**mac-address** *mac-address* [**vlan** {*vlan-id* | {**access** | **voice**}}] | **mac-address sticky** [*mac-address* | **vlan** {*vlan-id* | {**access** | **voice**}}]] [**maximum** *value* [**vlan** {*vlan-list* | {**access** | **voice**}}]]

switchport port-security [**aging**] [**violation** {**protect** | **restrict** | **shutdown** | shutdown vlan}]

no switchport port-security [**aging**] [**violation** {**protect** | **restrict** | **shutdown** | shutdown vlan}]

Syntax Description

aging	(Optional) See the **switchport port-security aging** command.
mac-address *mac-address*	(Optional) Specify a secure MAC address for the interface by entering a 48-bit MAC address. You can add additional secure MAC addresses up to the maximum value configured.
vlan *vlan-id*	(Optional) On a trunk port only, specify the VLAN ID and the MAC address. If no VLAN ID is specified, the native VLAN is used.
vlan access	(Optional) On an access port only, specify the VLAN as an access VLAN.
vlan voice	(Optional) On an access port only, specify the VLAN as a voice VLAN. **Note** The **voice** keyword is available only if voice VLAN is configured on a port and if that port is not the access VLAN.
mac-address sticky [*mac-address*]	(Optional) Enable the interface for *sticky learning* by entering only the **mac-address sticky** keywords. When sticky learning is enabled, the interface adds all secure MAC addresses that are dynamically learned to the running configuration and converts these addresses to sticky secure MAC addresses. (Optional) Enter a *mac-address* to specify a sticky secure MAC address.
maximum *value*	(Optional) Set the maximum number of secure MAC addresses for the interface.The maximum number of secure MAC addresses that you can configure on a switch is set by the maximum number of available MAC addresses allowed in the system. For more information, see the global configuration command. This number represents the total of available MAC addresses, including those used for other Layer 2 functions and any other secure MAC addresses configured on interfaces. The default setting is 1.

vlan [*vlan-list*]	(Optional) For trunk ports, you can set the maximum number of secure MAC addresses on a VLAN. If the **vlan** keyword is not entered, the default value is used. • **vlan**—set a per-VLAN maximum value. • **vlan** *vlan-list*—set a per-VLAN maximum value on a range of VLANs separated by a hyphen or a series of VLANs separated by commas. For nonspecified VLANs, the per-VLAN maximum value is used.
violation	(Optional) Set the security violation mode or the action to be taken if port security is violated. The default is **shutdown**.
protect	Set the security violation protect mode. In this mode, when the number of port secure MAC addresses reaches the maximum limit allowed on the port, packets with unknown source addresses are dropped until you remove a sufficient number of secure MAC addresses to drop below the maximum value or increase the number of maximum allowable addresses. You are not notified that a security violation has occurred. **Note** We do not recommend configuring the protect mode on a trunk port. The protect mode disables learning when any VLAN reaches its maximum limit, even if the port has not reached its maximum limit.
restrict	Set the security violation restrict mode. In this mode, when the number of secure MAC addresses reaches the limit allowed on the port, packets with unknown source addresses are dropped until you remove a sufficient number of secure MAC addresses or increase the number of maximum allowable addresses. An SNMP trap is sent, a syslog message is logged, and the violation counter increments.
shutdown	Set the security violation shutdown mode. In this mode, the interface is error-disabled when a violation occurs and the port LED turns off. An SNMP trap is sent, a syslog message is logged, and the violation counter increments. When a secure port is in the error-disabled state, you can bring it out of this state by entering the **errdisable recovery cause psecure-violation** global configuration command, or you can manually re-enable it by entering the **shutdown** and **no shut down** interface configuration commands.
shutdown vlan	Set the security violation mode to per-VLAN shutdown. In this mode, only the VLAN on which the violation occurred is error-disabled.

Defaults

The default is to disable port security.

When port security is enabled and no keywords are entered, the default maximum number of secure MAC addresses is 1.

The default violation mode is **shutdown**.

Sticky learning is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

A secure port has the following limitations:

- A secure port can be an access port or a trunk port; it cannot be a dynamic access port.
- A secure port cannot be a protected port.
- A secure port cannot be a destination port for Switched Port Analyzer (SPAN).
- A secure port cannot be a private VLAN port.
- A secure port cannot belong to a Fast EtherChannel or Gigabit EtherChannel port group.
- You cannot configure static secure or sticky secure MAC addresses in the voice VLAN.
- When you enable port security on an interface that is also configured with a voice VLAN, set the maximum allowed secure addresses on the port to two. When the port is connected to a Cisco IP phone, the IP phone requires one MAC address. The Cisco IP phone address is learned on the voice VLAN, but is not learned on the access VLAN. If you connect a single PC to the Cisco IP phone, no additional MAC addresses are required. If you connect more than one PC to the Cisco IP phone, you must configure enough secure addresses to allow one for each PC and one for the Cisco IP phone.
- Voice VLAN is supported only on access ports and not on trunk ports.
- When you enter a maximum secure address value for an interface, if the new value is greater than the previous value, the new value overrides the previously configured value. If the new value is less than the previous value and the number of configured secure addresses on the interface exceeds the new value, the command is rejected.
- The switch does not support port security aging of sticky secure MAC addresses.

A security violation occurs when the maximum number of secure MAC addresses are in the address table and a station whose MAC address is not in the address table attempts to access the interface or when a station whose MAC address is configured as a secure MAC address on another secure port attempts to access the interface.

When a secure port is in the error-disabled state, you can bring it out of this state by entering the **errdisable recovery cause** *psecure-violation* global configuration command. You can manually re-enable the port by entering the **shutdown** and **no shut down** interface configuration commands or by using the **clear errdisable interface** privileged EXEC command.

Setting a maximum number of addresses to one and configuring the MAC address of an attached device ensures that the device has the full bandwidth of the port.

When you enter a maximum secure address value for an interface, this occurs:

- If the new value is greater than the previous value, the new value overrides the previously configured value.
- If the new value is less than the previous value and the number of configured secure addresses on the interface exceeds the new value, the command is rejected.

Sticky secure MAC addresses have these characteristics:

- When you enable sticky learning on an interface by using the **switchport port-security mac-address sticky** interface configuration command, the interface converts all the dynamic secure MAC addresses, including those that were dynamically learned before sticky learning was enabled, to sticky secure MAC addresses and adds all sticky secure MAC addresses to the running configuration.
- If you disable sticky learning by using the **no switchport port-security mac-address sticky** interface configuration command or the running configuration is removed, the sticky secure MAC addresses remain part of the running configuration but are removed from the address table. The addresses that were removed can be dynamically reconfigured and added to the address table as dynamic addresses.
- When you configure sticky secure MAC addresses by using the **switchport port-security mac-address sticky** *mac-address* interface configuration command, these addresses are added to the address table and the running configuration. If port security is disabled, the sticky secure MAC addresses remain in the running configuration.
- If you save the sticky secure MAC addresses in the configuration file, when the switch restarts or the interface shuts down, the interface does not need to relearn these addresses. If you do not save the sticky secure addresses, they are lost. If sticky learning is disabled, the sticky secure MAC addresses are converted to dynamic secure addresses and are removed from the running configuration.
- If you disable sticky learning and enter the **switchport port-security mac-address sticky** *mac-address* interface configuration command, an error message appears, and the sticky secure MAC address is not added to the running configuration.

Examples

This example shows how to enable port security on a port and to set the maximum number of secure addresses to 5. The violation mode is the default, and no secure MAC addresses are configured.

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# switchport mode access
Switch(config-if)# switchport port-security
Switch(config-if)# switchport port-security maximum 5
```

This example shows how to configure a secure MAC address and a VLAN ID on a port:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport port-security
Switch(config-if)# switchport port-security mac-address 1000.2000.3000 vlan 3
```

This example shows how to enable sticky learning and to enter two sticky secure MAC addresses on a port:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# switchport port-security mac-address sticky
Switch(config-if)# switchport port-security mac-address sticky 0000.0000.4141
Switch(config-if)# switchport port-security mac-address sticky 0000.0000.000f
```

This example show how to configure a port to shut down only the VLAN if a violation occurs:

```
Switch(config)# interface gigabitethernet0/2
Switch(config)# switchport port-security violation shutdown vlan
```

You can verify your settings by using the **show port-security** privileged EXEC command.

Related Commands

Command	Description
clear port-security	Deletes from the MAC address table a specific type of secure address or all the secure addresses on the switch or an interface.
show port-security address	Displays all the secure addresses configured on the switch.
show port-security interface *interface-id*	Displays port security configuration for the switch or for the specified interface.

switchport port-security aging

Use the **switchport port-security aging** interface configuration command to set the aging time and type for secure address entries or to change the aging behavior for secure addresses on a particular port. Use the **no** form of this command to disable port security aging or to set the parameters to their default states.

switchport port-security aging {**static** | **time** *time* | **type** {**absolute** | **inactivity**}}

no switchport port-security aging {**static** | **time** | **type**}

Syntax Description

static	Enable aging for statically configured secure addresses on this port.
time *time*	Specify the aging time for this port. The range is 0 to 1440 minutes. If the time is 0, aging is disabled for this port.
type	Set the aging type.
absolute	Set absolute aging type. All the secure addresses on this port age out exactly after the time *(*minutes) specified and are removed from the secure address list.
inactivity	Set the inactivity aging type. The secure addresses on this port age out only if there is no data traffic from the secure source address for the specified time period.

Defaults

The port security aging feature is disabled. The default time is 0 minutes.

The default aging type is absolute.

The default static aging behavior is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

To enable secure address aging for a particular port, set the aging time to a value other than 0 for that port.

To allow limited time access to particular secure addresses, set the aging type as **absolute**. When the aging time lapses, the secure addresses are deleted.

To allow continuous access to a limited number of secure addresses, set the aging type as **inactivity**. This removes the secure address when it become inactive, and other addresses can become secure.

To allow unlimited access to a secure address, configure it as a secure address, and disable aging for the statically configured secure address by using the **no switchport port-security aging static** interface configuration command.

Examples

This example sets the aging time as 2 hours for absolute aging for all the secure addresses on the port:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# switchport port-security aging time 120
```

This example sets the aging time as 2 minutes for inactivity aging type with aging enabled for configured secure addresses on the port:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# switchport port-security aging time 2
Switch(config-if)# switchport port-security aging type inactivity
Switch(config-if)# switchport port-security aging static
```

This example shows how to disable aging for configured secure addresses:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# no switchport port-security aging static
```

Related Commands

Command	Description
show port-security	Displays the port security settings defined for the port.
switchport port-security	Enables port security on a port, restricts the use of the port to a user-defined group of stations, and configures secure MAC addresses.

switchport protected

Use the **switchport protected** interface configuration command to isolate unicast, multicast, and broadcast traffic at Layer 2 from other protected ports on the same switch. Use the **no** form of this command to disable protection on the port.

switchport protected

no switchport protected

Syntax Description

This command has no arguments or keywords.

Defaults

No protected port is defined. All ports are nonprotected.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The switchport protection feature is local to the switch; communication between protected ports on the same switch is possible only through a Layer 3 device. To prevent communication between protected ports on different switches, you must configure the protected ports for unique VLANs on each switch and configure a trunk link between the switches. A protected port is different from a secure port.

A protected port does not forward any traffic (unicast, multicast, or broadcast) to any other port that is also a protected port. Data traffic cannot be forwarded between protected ports at Layer 2; only control traffic, such as PIM packets, is forwarded because these packets are processed by the CPU and forwarded in software. All data traffic passing between protected ports must be forwarded through a Layer 3 device.

Port monitoring does not work if both the monitor and monitored ports are protected ports.

Examples

This example shows how to enable a protected port on an interface:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# switchport protected
```

You can verify your settings by entering the **show interfaces** *interface-id* **switchport** privileged EXEC command.

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching port, including port blocking and port protection settings.
switchport block	Prevents unknown multicast or unicast traffic on the interface.

switchport trunk

Use the **switchport trunk** interface configuration command to set the trunk characteristics when the interface is in trunking mode. Use the **no** form of this command to reset a trunking characteristic to the default.

switchport trunk {**allowed vlan** *vlan-list*| **native vlan** *vlan-id* | **pruning vlan** *vlan-list*}

no switchport trunk {**allowed vlan | native vlan | {pruning vlan**}

Syntax Description

allowed vlan *vlan-list*	Set the list of allowed VLANs that can receive and send traffic on this interface in tagged format when in trunking mode. See the following *vlan-list* format. The **none** keyword is not valid. The default is **all**.
native vlan *vlan-id*	Set the native VLAN for sending and receiving untagged traffic when the interface is in IEEE 802.1Q trunking mode. The range is 1 to 4094.
pruning vlan *vlan-list*	Set the list of VLANs that are eligible for VTP pruning when in trunking mode. The **all** keyword is not valid.

The *vlan-list* format is **all | none | [add | remove | except**] *vlan-atom* [**,***vlan-atom...*] where:

- **all** specifies all VLANs from 1 to 4094. This keyword is not allowed on commands that do not permit all VLANs in the list to be set at the same time.
- **none** means an empty list. This keyword is not allowed on commands that require certain VLANs to be set or at least one VLAN to be set.
- **add** adds the defined list of VLANs to those currently set instead of replacing the list. Valid IDs are from 1 to 1005; extended-range VLANs (VLAN IDs greater than 1005) are valid in some cases.

  Note You can add extended-range VLANs to the allowed VLAN list, but not to the pruning-eligible VLAN list.

  Separate nonconsecutive VLAN IDs with a comma; use a hyphen to designate a range of IDs.
- **remove** removes the defined list of VLANs from those currently set instead of replacing the list. Valid IDs are from 1 to 1005; extended-range VLAN IDs are valid in some cases.

  Note You can remove extended-range VLANs from the allowed VLAN list, but you cannot remove them from the pruning-eligible list.

  Separate nonconsecutive VLAN IDs with a comma; use a hyphen to designate a range of IDs.
- **except** lists the VLANs that should be calculated by inverting the defined list of VLANs. (VLANs are added except the ones specified.) Valid IDs are from 1 to 1005. Separate nonconsecutive VLAN IDs with a comma; use a hyphen to designate a range of IDs.
- *vlan-atom* is either a single VLAN number from 1 to 4094 or a continuous range of VLANs described by two VLAN numbers, the lesser one first, separated by a hyphen.

Defaults

VLAN 1 is the default native VLAN ID on the port.

The default for all VLAN lists is to include all VLANs.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Native VLANs:

- All untagged traffic received on an IEEE 802.1Q trunk port is forwarded with the native VLAN configured for the port.
- If a packet has a VLAN ID that is the same as the sending-port native VLAN ID, the packet is sent without a tag; otherwise, the switch sends the packet with a tag.
- The **no** form of the **native vlan** command resets the native mode VLAN to the appropriate default VLAN for the device.

Allowed VLAN:

- To reduce the risk of spanning-tree loops or storms, you can disable VLAN 1 on any individual VLAN trunk port by removing VLAN 1 from the allowed list. When you remove VLAN 1 from a trunk port, the interface continues to send and receive management traffic, for example, Cisco Discovery Protocol (CDP), Port Aggregation Protocol (PAgP), Link Aggregation Control Protocol (LACP), Dynamic Trunking Protocol (DTP), and VLAN Trunking Protocol (VTP) in VLAN 1.
- The **no** form of the **allowed vlan** command resets the list to the default list, which allows all VLANs.

Trunk pruning:

- The pruning-eligible list applies only to trunk ports.
- Each trunk port has its own eligibility list.
- If you do not want a VLAN to be pruned, remove it from the pruning-eligible list. VLANs that are pruning-ineligible receive flooded traffic.
- VLAN 1, VLANs 1002 to 1005, and extended-range VLANs (VLANs 1006 to 4094) cannot be pruned.

Examples

This example shows how to configure VLAN 3 as the default for the port to send all untagged traffic:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# switchport trunk native vlan 3
```

This example shows how to add VLANs 1, 2, 5, and 6 to the allowed list:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# switchport trunk allowed vlan add 1,2,5,6
```

This example shows how to remove VLANs 3 and 10 to 15 from the pruning-eligible list:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# switchport trunk pruning vlan remove 3,10-15
```

You can verify your settings by entering the **show interfaces** *interface-id* **switchport** privileged EXEC command.

Related Commands

Command	Description
show interfaces switchport	Displays the administrative and operational status of a switching port, including port blocking and port protection settings.
switchport mode	Configures the VLAN membership mode of a port.

switchport voice vlan

Use the **switchport voice vlan** interface configuration command to configure voice VLAN on the port. Use the **no** form of this command to return to the default setting.

switchport voice vlan {*vlan-id* | **dot1p** | **none** | **untagged**}

no switchport voice vlan

Syntax Description

vlan-id	Specify the VLAN to be used for voice traffic. The range is 1 to 4094. By default, the IP phone forwards the voice traffic with an IEEE 802.1Q priority of 5.
dot1p	Configure the switch to accept IEEE 802.1p priority frames tagged with VLAN 0 (the native VLAN). By default, when dot1p priority tagging is configured, the Cisco IP phone forwards the traffic with an IEEE 802.1p priority of 5.
none	Do not instruct the IP telephone about the voice VLAN. The telephone uses the configuration from the telephone key pad.
untagged	Configure the telephone to send untagged voice traffic. This is the default for the telephone.

Defaults

The switch default is not to automatically configure the telephone (**none**).

The telephone default is not to tag frames.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should configure voice VLAN on Layer 2 access ports.

You must enable Cisco Discovery Protocol (CDP) on the switchport connected to the Cisco IP phone for the switch to send configuration information to the phone. CDP is enabled by default globally and on the interface.

Before you enable voice VLAN, we recommend that you enable quality of service (QoS) on the switch by entering the **mls qos** global configuration command and configure the port trust state to trust by entering the **mls qos trust cos** interface configuration command.

When you enter a VLAN ID, the IP phone forwards voice traffic in IEEE 802.1Q frames, tagged with the specified VLAN ID. The switch puts IEEE 802.1Q voice traffic in the voice VLAN.

When you select **dot1q**, **none**, or **untagged**, the switch puts the indicated voice traffic in the access VLAN.

When you enter the **switchport voice vlan dot1q** command, the switch accepts 802.1p tagged frames with VLAN ID 0, instead of dropping the frames. Most devices do not send 802.1p priority frames with VLAN ID 0.

n all configurations, the voice traffic carries a Layer 2 IP precedence value. The default is 5 for voice traffic.

When you enable port security on an interface that is also configured with a voice VLAN, set the maximum allowed secure addresses on the port to two. When the port is connected to a Cisco IP phone, the IP phone requires one MAC address. The Cisco IP phone address is learned on the voice VLAN, but is not learned on the access VLAN. If you connect a single PC to the Cisco IP phone, no additional MAC addresses are required. If you connect more than one PC to the Cisco IP phone, you must configure enough secure addresses to allow one for each PC and one for the Cisco IP phone.

If any type of port security is enabled on the access VLAN, dynamic port security is automatically enabled on the voice VLAN.

You cannot configure static secure MAC addresses in the voice VLAN.

The Port Fast feature is automatically enabled when voice VLAN is configured. When you disable voice VLAN, the Port Fast feature is not automatically disabled.

Examples

This example shows how to configure VLAN 2 as the voice VLAN for the port:

```
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# switchport voice vlan 2
```

You can verify your settings by entering the **show interfaces** *interface-id* **switchport** privileged EXEC command.

Related Commands

Command	Description
show interfaces *interface-id* **switchport**	Displays the administrative and operational status of a switching port.

system mtu

Use the **system mtu** global configuration command to set the maximum packet size or maximum transmission unit (MTU) size for Gigabit Ethernet ports or for Fast Ethernet (10/100) ports. Use the **no** form of this command to restore the global MTU value to its default value.

system mtu {*bytes* | **jumbo** *bytes*}

no system mtu

Syntax Description

bytes	Set the system MTU for ports that are set to 10 or 100 Mb/s. The range is 1500 to 1998 bytes. This is the maximum MTU received at 10/100-Mb/s Ethernet switch ports.
jumbo *bytes*	Set the system jumbo MTU for Gigabit Ethernet ports operating at 1000 Mb/s or greater. The range is 1500 to 9000 bytes. This is the maximum MTU received at the physical port for Gigabit Ethernet ports.

Defaults

The default MTU size for all ports is 1500 bytes.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you use this command to change the system MTU or jumbo MTU size, you must reset the switch before the new configuration takes effect.

The system MTU setting is saved in the switch environmental variable in NVRAM and becomes effective when the switch reloads. The MTU settings you enter with the **system mtu** and **system mtu jumbo** commands are not saved in the switch IOS configuration file, even if you enter the **copy running-config startup-config** privileged EXEC command. Therefore, if you use TFTP to configure a new switch by using a backup configuration file and want the system MTU to be other than the default, you must explicitly configure the **system mtu** and **system mtu jumbo** settings on the new switch and then reload the switch.

Gigabit Ethernet ports operating at 1000 Mb/s are not affected by the **system mtu** command, and 10/100-Mb/s ports are not affected by the **system mtu jumbo** command.

If you enter a value that is outside the range for the specific type of switch, the value is not accepted.

Note The switch does not support setting the MTU on a per-interface basis.

The size of frames that can be received by the switch CPU is limited to 1998 bytes, regardless of the value entered with the **system mtu** command. Although forwarded or routed frames are usually not received by the CPU, some packets (for example, control traffic, SNMP, Telnet, and routing protocols) are sent to the CPU.

For example, if the **system mtu** value is 1998 bytes and the **system mtu jumbo** value is 5000 bytes, packets up to 5000 bytes can be received on interfaces operating at 1000 Mb/s. However, although a packet larger than 1998 bytes can be received on an interface operating at 1000 Mb/s, if its destination interface is operating at 10 or 100 Mb/s, the packet is dropped.

Examples

This example shows how to set the maximum jumbo packet size for Gigabit Ethernet ports operating at 1000 Mb/s or greater to 1800 bytes:

```
Switch(config)# system mtu jumbo 1800
Switch(config)# exit
Switch# reload
```

You can verify your setting by entering the **show system mtu** privileged EXEC command.

Related Commands

Command	Description
show system mtu	Displays the packet size set for Fast Ethernet and Gigabit Ethernet ports.

test cable-diagnostics tdr

Use the **test cable-diagnostics tdr** privileged EXEC command on the switch stack or on a standalone switch to run the Time Domain Reflector (TDR) feature on an interface.

test cable-diagnostics tdr interface *interface-id*

Syntax Description

interface-id	Specify the interface on which to run TDR.

Defaults

There is no default.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

TDR is supported only on 10/100 and 10/100/1000 copper Ethernet ports. It is not supported on SFP module ports. For more information about TDR, see the software configuration guide for this release.

After you run TDR by using the **test cable-diagnostics tdr interface** *interface-id* command, use the **show cable-diagnostics tdr interface** *interface-id* privileged EXEC command to display the results.

Examples

This example shows how to run TDR on an interface:

```
Switch# test cable-diagnostics tdr interface gigabitethernet0/2
TDR test started on interface Gi0/2
A TDR test can take a few seconds to run on an interface
Use 'show cable-diagnostics tdr' to read the TDR results.
```

If you enter the **test cable-diagnostics tdr interface** *interface-id* command on an interface that has a link status of up and a speed of 10 or 100 Mb/s, these messages appear:

```
Switch# test cable-diagnostics tdr interface gigabitethernet0/3
TDR test on Gi0/9 will affect link state and traffic
TDR test started on interface Gi0/3
A TDR test can take a few seconds to run on an interface
Use 'show cable-diagnostics tdr' to read the TDR results.
```

Related Commands

Command	Description
show cable-diagnostics tdr	Displays the TDR results.

traceroute mac

Use the **traceroute mac** privileged EXEC command to display the Layer 2 path taken by the packets from the specified source MAC address to the specified destination MAC address.

traceroute mac [**interface** *interface-id*] {*source-mac-address*} [**interface** *interface-id*] {*destination-mac-address*} [**vlan** *vlan-id*] [**detail**]

Syntax Description

interface *interface-id*	(Optional) Specify an interface on the source or destination switch.
source-mac-address	Specify the MAC address of the source switch in hexadecimal format.
destination-mac-address	Specify the MAC address of the destination switch in hexadecimal format.
vlan *vlan-id*	(Optional) Specify the VLAN on which to trace the Layer 2 path that the packets take from the source switch to the destination switch. Valid VLAN IDs are 1 to 4094.
detail	(Optional) Specify that detailed information appears.

Defaults

There is no default.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

For Layer 2 traceroute to function properly, Cisco Discovery Protocol (CDP) must be enabled on all the switches in the network. Do not disable CDP.

When the switch detects a device in the Layer 2 path that does not support Layer 2 traceroute, the switch continues to send Layer 2 trace queries and lets them time out.

The maximum number of hops identified in the path is ten.

Layer 2 traceroute supports only unicast traffic. If you specify a multicast source or destination MAC address, the physical path is not identified, and an error message appears.

The **traceroute mac** command output shows the Layer 2 path when the specified source and destination addresses belong to the same VLAN. If you specify source and destination addresses that belong to different VLANs, the Layer 2 path is not identified, and an error message appears.

If the source or destination MAC address belongs to multiple VLANs, you must specify the VLAN to which both the source and destination MAC addresses belong. If the VLAN is not specified, the path is not identified, and an error message appears.

The Layer 2 traceroute feature is not supported when multiple devices are attached to one port through hubs (for example, multiple CDP neighbors are detected on a port). When more than one CDP neighbor is detected on a port, the Layer 2 path is not identified, and an error message appears.

This feature is not supported in Token Ring VLANs.

Examples

This example shows how to display the Layer 2 path by specifying the source and destination MAC addresses:

```
Switch# traceroute mac 0000.0201.0601 0000.0201.0201
Source 0000.0201.0601 found on con6[WS-C2918-12T] (2.2.6.6)
con6 (2.2.6.6) :Gi0/1 => Gi0/3
con5                 (2.2.5.5        )  :    Gi0/3 => Gi0/1
con1                 (2.2.1.1        )  :    Gi0/1 => Gi0/2
con2                 (2.2.2.2        )  :    Gi0/2 => Gi0/1
Destination 0000.0201.0201 found on con2[WS-C3550-24] (2.2.2.2)
Layer 2 trace completed
```

This example shows how to display the Layer 2 path by using the **detail** keyword:

```
Switch# traceroute mac 0000.0201.0601 0000.0201.0201 detail
Source 0000.0201.0601 found on con6[WS-C2918-12T] (2.2.6.6)
con6 / WS-C2918-12T / 2.2.6.6 :
        Gi0/2 [auto, auto] => Gi0/3 [auto, auto]
con5 / WS-C2950G-24-EI / 2.2.5.5 :
        Fa0/3 [auto, auto] => Gi0/1 [auto, auto]
con1 / WS-C3550-12G / 2.2.1.1 :
        Gi0/1 [auto, auto] => Gi0/2 [auto, auto]
con2 / WS-C3550-24 / 2.2.2.2 :
        Gi0/2 [auto, auto] => Fa0/1 [auto, auto]
Destination 0000.0201.0201 found on con2[WS-C3550-24] (2.2.2.2)
Layer 2 trace completed.
```

This example shows how to display the Layer 2 path by specifying the interfaces on the source and destination switches:

```
Switch# traceroute mac interface fastethernet0/1 0000.0201.0601 interface fastethernet0/3
0000.0201.0201
Source 0000.0201.0601 found on con6[WS-C2918-12T] (2.2.6.6)
con6 (2.2.6.6) :Gi0/1 => Gi0/3
con5                 (2.2.5.5        )  :    Gi0/3 => Gi0/1
con1                 (2.2.1.1        )  :    Gi0/1 => G0/2
con2                 (2.2.2.2        )  :    Gi0/2 => 0/1
Destination 0000.0201.0201 found on con2[WS-C3550-24] (2.2.2.2)
Layer 2 trace completed
```

This example shows the Layer 2 path when the switch is not connected to the source switch:

```
Switch# traceroute mac 0000.0201.0501 0000.0201.0201 detail
Source not directly connected, tracing source .....
Source 0000.0201.0501 found on con5[WS-C2918-12T] (2.2.5.5)
con5 / WS-C2918-12T / 2.2.5.5 :
        Gi0/1 [auto, auto] => Gi0/3 [auto, auto]
con1 / WS-C3550-12G / 2.2.1.1 :
        Gi0/1 [auto, auto] => Gi0/2 [auto, auto]
con2 / WS-C3550-24 / 2.2.2.2 :
        Gi0/2 [auto, auto] => Fa0/1 [auto, auto]
Destination 0000.0201.0201 found on con2[WS-C3550-24] (2.2.2.2)
Layer 2 trace completed.
```

This example shows the Layer 2 path when the switch cannot find the destination port for the source MAC address:

```
Switch# traceroute mac 0000.0011.1111 0000.0201.0201
Error:Source Mac address not found.
Layer2 trace aborted.
```

This example shows the Layer 2 path when the source and destination devices are in different VLANs:

```
Switch# traceroute mac 0000.0201.0601 0000.0301.0201
Error:Source and destination macs are on different vlans.
Layer2 trace aborted.
```

This example shows the Layer 2 path when the destination MAC address is a multicast address:

```
Switch# traceroute mac 0000.0201.0601 0100.0201.0201
Invalid destination mac address
```

This example shows the Layer 2 path when source and destination switches belong to multiple VLANs:

```
Switch# traceroute mac 0000.0201.0601 0000.0201.0201
Error:Mac found on multiple vlans.
Layer2 trace aborted.
```

Related Commands

Command	Description
traceroute mac ip	Displays the Layer 2 path taken by the packets from the specified source IP address or hostname to the specified destination IP address or hostname.

traceroute mac ip

Use the **traceroute mac ip** privileged EXEC command to display the Layer 2 path taken by the packets from the specified source IP address or hostname to the specified destination IP address or hostname.

traceroute mac ip {*source-ip-address* | *source-hostname*} {*destination-ip-address* | *destination-hostname*} [**detail**]

Syntax Description

source-ip-address	Specify the IP address of the source switch as a 32-bit quantity in dotted-decimal format.
destination-ip-address	Specify the IP address of the destination switch as a 32-bit quantity in dotted-decimal format.
source-hostname	Specify the IP hostname of the source switch.
destination-hostname	Specify the IP hostname of the destination switch.
detail	(Optional) Specify that detailed information appears.

Defaults

There is no default.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

For Layer 2 traceroute to function properly, Cisco Discovery Protocol (CDP) must be enabled on all the switches in the network. Do not disable CDP.

When the switch detects an device in the Layer 2 path that does not support Layer 2 traceroute, the switch continues to send Layer 2 trace queries and lets them time out.

The maximum number of hops identified in the path is ten.

The **traceroute mac ip** command output shows the Layer 2 path when the specified source and destination IP addresses are in the same subnet. When you specify the IP addresses, the switch uses Address Resolution Protocol (ARP) to associate the IP addresses with the corresponding MAC addresses and the VLAN IDs.

- If an ARP entry exists for the specified IP address, the switch uses the associated MAC address and identifies the physical path.
- If an ARP entry does not exist, the switch sends an ARP query and tries to resolve the IP address. The IP addresses must be in the same subnet. If the IP address is not resolved, the path is not identified, and an error message appears.

The Layer 2 traceroute feature is not supported when multiple devices are attached to one port through hubs (for example, multiple CDP neighbors are detected on a port). When more than one CDP neighbor is detected on a port, the Layer 2 path is not identified, and an error message appears.

This feature is not supported in Token Ring VLANs.

Examples

This example shows how to display the Layer 2 path by specifying the source and destination IP addresses and by using the **detail** keyword:

```
Switch# traceroute mac ip 2.2.66.66 2.2.22.22 detail
Translating IP to mac .....
2.2.66.66 => 0000.0201.0601
2.2.22.22 => 0000.0201.0201

Source 0000.0201.0601 found on con6[WS-C2950G-24-EI] (2.2.6.6)
con6 / WS-C2918-12T / 2.2.6.6 :
        Gi0/1 [auto, auto] => Gi0/3 [auto, auto]
con5 / WS-C2950G-24-EI / 2.2.5.5 :
        Fa0/3 [auto, auto] => Gi0/1 [auto, auto]
con1 / WS-C3550-12G / 2.2.1.1 :
        Gi0/1 [auto, auto] => Gi0/2 [auto, auto]
con2 / WS-C3550-24 / 2.2.2.2 :
        Gi0/2 [auto, auto] => Fa0/1 [auto, auto]
Destination 0000.0201.0201 found on con2[WS-C3550-24] (2.2.2.2)
Layer 2 trace completed.
```

This example shows how to display the Layer 2 path by specifying the source and destination hostnames:

```
Switch# traceroute mac ip con6 con2
Translating IP to mac .....
2.2.66.66 => 0000.0201.0601
2.2.22.22 => 0000.0201.0201

Source 0000.0201.0601 found on con6
con6 (2.2.6.6) :Gi0/1 => Gi0/3
con5                 (2.2.5.5        )  :    Gi0/3 => Gi0/1
con1                 (2.2.1.1        )  :    Gi0/1 => Gi0/2
con2                 (2.2.2.2        )  :    Gi0/2 => Fa0/1
Destination 0000.0201.0201 found on con2
Layer 2 trace completed
```

This example shows the Layer 2 path when ARP cannot associate the source IP address with the corresponding MAC address:

```
Switch# traceroute mac ip 2.2.66.66 2.2.77.77
Arp failed for destination 2.2.77.77.
Layer2 trace aborted.
```

Related Commands

Command	Description
traceroute mac	Displays the Layer 2 path taken by the packets from the specified source MAC address to the specified destination MAC address.

trust

Use the **trust** policy-map class configuration command to define a trust state for traffic classified through the **class** policy-map configuration or the **class-map** global configuration command. Use the **no** form of this command to return to the default setting.

trust [**cos** | **dscp** | **ip-precedence**]

no trust [**cos** | **dscp** | **ip-precedence**]

Syntax Description

cos	(Optional) Classify an ingress packet by using the packet class of service (CoS) value. For an untagged packet, the port default CoS value is used.
dscp	(Optional) Classify an ingress packet by using the packet Differentiated Services Code Point (DSCP) values (most significant 6 bits of 8-bit service-type field). For a non-IP packet, the packet CoS value is used if the packet is tagged. If the packet is untagged, the default port CoS value is used to map CoS to DSCP.
ip-precedence	(Optional) Classify an ingress packet by using the packet IP-precedence value (most significant 3 bits of 8-bit service-type field). For a non-IP packet, the packet CoS value is used if the packet is tagged. If the packet is untagged, the port default CoS value is used to map CoS to DSCP.

Defaults

The action is not trusted. If no keyword is specified when the command is entered, the default is **dscp**.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Use this command to distinguish the quality of service (QoS) trust behavior for certain traffic from other traffic. For example, incoming traffic with certain DSCP values can be trusted. You can configure a class map to match and trust the DSCP values in the incoming traffic.

Trust values set with this command supersede trust values set with the **mls qos trust** interface configuration command.

The **trust** command is mutually exclusive with **set** policy-map class configuration command within the same policy map.

If you specify **trust cos**, QoS uses the received or default port CoS value and the CoS-to-DSCP map to generate a DSCP value for the packet.

If you specify **trust dscp**, QoS uses the DSCP value from the ingress packet. For non-IP packets that are tagged, QoS uses the received CoS value; for non-IP packets that are untagged, QoS uses the default port CoS value. In either case, the DSCP value for the packet is derived from the CoS-to-DSCP map.

If you specify **trust ip-precedence**, QoS uses the IP precedence value from the ingress packet and the IP-precedence-to-DSCP map. For non-IP packets that are tagged, QoS uses the received CoS value; for non-IP packets that are untagged, QoS uses the default port CoS value. In either case, the DSCP for the packet is derived from the CoS-to-DSCP map.

To return to policy-map configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.

Examples

This example shows how to define a port trust state to trust incoming DSCP values for traffic classified with *class1*:

```
Switch(config)# policy-map policy1
Switch(config-pmap)# class class1
Switch(config-pmap-c)# trust dscp
Switch(config-pmap-c)# police 1000000 20000 exceed-action policed-dscp-transmit
Switch(config-pmap-c)# exit
```

You can verify your settings by entering the **show policy-map** privileged EXEC command.

Related Commands

Command	Description
set	Classifies IP traffic by setting a DSCP or IP-precedence value in the packet.
show port-security	Displays QoS policy maps.

udld

Use the **udld** global configuration command to enable aggressive or normal mode in the UniDirectional Link Detection (UDLD) and to set the configurable message timer time. Use the **no** form of the command to disable aggressive or normal mode UDLD on all fiber-optic ports.

udld {**aggressive** | **enable** | **message time** *message-timer-interval*}

no udld {**aggressive** | **enable** | **message**}

Syntax Description

aggressive	Enable UDLD in aggressive mode on all fiber-optic interfaces.
enable	Enable UDLD in normal mode on all fiber-optic interfaces.
message time *message-timer-interval*	Configure the period of time between UDLD probe messages on ports that are in the advertisement phase and are determined to be bidirectional. The range is 7 to 90 seconds.

Defaults

UDLD is disabled on all interfaces.

The message timer is set at 60 seconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

UDLD supports two modes of operation: normal (the default) and aggressive. In normal mode, UDLD detects unidirectional links due to misconnected interfaces on fiber-optic connections. In aggressive mode, UDLD also detects unidirectional links due to one-way traffic on fiber-optic and twisted-pair links and due to misconnected interfaces on fiber-optic links. For information about normal and aggressive modes, see the "Understanding UDLD" section in the software configuration guide for this release.

If you change the message time between probe packets, you are making a trade-off between the detection speed and the CPU load. By decreasing the time, you can make the detection-response faster but increase the load on the CPU.

This command affects fiber-optic interfaces only. Use the **udld** interface configuration command to enable UDLD on other interface types.

You can use these commands to reset an interface shut down by UDLD:

- The **udld reset** privileged EXEC command to reset all interfaces shut down by UDLD
- The **shutdown** and **no shutdown** interface configuration commands
- The **no udld enable** global configuration command followed by the **udld** {**aggressive** | **enable**} global configuration command to re-enable UDLD globally

- The **no udld port** interface configuration command followed by the **udld port** or **udld port aggressive** interface configuration command to re-enable UDLD on the specified interface
- The **errdisable recovery cause udld** and **errdisable recovery interval** *interval* global configuration commands to automatically recover from the UDLD error-disabled state

Examples

This example shows how to enable UDLD on all fiber-optic interfaces:

```
Switch(config)# udld enable
```

You can verify your setting by entering the **show udld** privileged EXEC **command**.

Related Commands

Command	Description
show udld	Displays UDLD administrative and operational status for all ports or the specified port.
udld port	Enables UDLD on an individual interface or prevents a fiber-optic interface from being enabled by the **udld** global configuration command.
udld reset	Resets all interfaces shut down by UDLD and permits traffic to again pass through.

udld port

Use the **udld port** interface configuration command to enable the UniDirectional Link Detection (UDLD) on an individual interface or prevent a fiber-optic interface from being enabled by the **udld** global configuration command. Use the **no** form of this command to return to the **udld** global configuration command setting or to disable UDLD if entered for a nonfiber-optic port.

udld port [**aggressive**]

no udld port [**aggressive**]

Syntax Description

aggressive	Enable UDLD in aggressive mode on the specified interface.

Defaults

On fiber-optic interfaces, UDLD is not enabled, not in aggressive mode, and not disabled. For this reason, fiber-optic interfaces enable UDLD according to the state of the **udld enable** or **udld aggressive** global configuration command.

On nonfiber-optic interfaces, UDLD is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

A UDLD-capable port cannot detect a unidirectional link if it is connected to a UDLD-incapable port of another switch.

UDLD supports two modes of operation: normal (the default) and aggressive. In normal mode, UDLD detects unidirectional links due to misconnected interfaces on fiber-optic connections. In aggressive mode, UDLD also detects unidirectional links due to one-way traffic on fiber-optic and twisted-pair links and due to misconnected interfaces on fiber-optic links. For information about normal and aggressive modes, see the “Configuring UDLD” chapter in the software configuration guide for this release.

To enable UDLD in normal mode, use the **udld port** interface configuration command. To enable UDLD in aggressive mode, use the **udld port aggressive** interface configuration command.

Use the **no udld port** command on fiber-optic ports to return control of UDLD to the **udld enable** global configuration command or to disable UDLD on nonfiber-optic ports.

Use the **udld port aggressive** command on fiber-optic ports to override the setting of the **udld enable** or **udld aggressive** global configuration command. Use the **no** form on fiber-optic ports to remove this setting and to return control of UDLD enabling to the **udld** global configuration command or to disable UDLD on nonfiber-optic ports.

You can use these commands to reset an interface shut down by UDLD:

- The **udld reset** privileged EXEC command to reset all interfaces shut down by UDLD
- The **shutdown** and **no shutdown** interface configuration commands
- The **no udld enable** global configuration command followed by the **udld** {**aggressive** | **enable**} global configuration command to re-enable UDLD globally
- The **no udld port** interface configuration command followed by the **udld port or udld port aggressive** interface configuration command to re-enable UDLD on the specified interface
- The **errdisable recovery cause udld** and **errdisable recovery interval** *interval* global configuration commands to automatically recover from the UDLD error-disabled state

Examples

This example shows how to enable UDLD on an port:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# udld port
```

This example shows how to disable UDLD on a fiber-optic interface despite the setting of the **udld** global configuration command:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# no udld port
```

You can verify your settings by entering the **show running-config** or the **show udld** *interface* privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the running configuration on the switch.
show udld	Displays UDLD administrative and operational status for all ports or the specified port.
udld	Enables aggressive or normal mode in UDLD or sets the configurable message timer time.
udld reset	Resets all interfaces shut down by UDLD and permits traffic to again pass through.

udld reset

Use the **udld reset** privileged EXEC command to reset all interfaces disabled by the UniDirectional Link Detection (UDLD) and permit traffic to begin passing through them again (though other features, such as spanning tree, Port Aggregation Protocol (PAgP), and Dynamic Trunking Protocol (DTP) still have their normal effects, if enabled).

udld reset

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If the interface configuration is still enabled for UDLD, these ports begin to run UDLD again and are disabled for the same reason if the problem has not been corrected.

Examples

This example shows how to reset all interfaces disabled by UDLD:

```
Switch# udld reset
1 ports shutdown by UDLD were reset.
```

You can verify your setting by entering the **show udld** privileged EXEC command.

Related Commands

Command	Description
show running-config	Displays the running configuration on the switch.
show udld	Displays UDLD administrative and operational status for all ports or the specified port.
udld	Enables aggressive or normal mode in UDLD or sets the configurable message timer time.
udld port	Enables UDLD on an individual interface or prevents a fiber-optic interface from being enabled by the **udld** global configuration command.

vlan

Use the **vlan** global configuration command to add a VLAN and to enter the config-vlan mode. Use the **no** form of this command to delete the VLAN. Configuration information for normal-range VLANs (VLAN IDs 1 to 1005) is always saved in the VLAN database. When VLAN Trunking Protocol (VTP) mode is transparent, you can create extended-range VLANs (VLAN IDs greater than 1005), and the VTP mode, domain name, and the VLAN configuration are saved in the switch running configuration file. You can save configurations in the switch startup configuration file by entering the **copy running-config startup-config** privileged EXEC command.

vlan *vlan-id*

no vlan vlan-*id*

Syntax Description

vlan-id	ID of the VLAN to be added and configured. For *vlan-id*, the range is 1 to 4094. You can enter a single VLAN ID, a series of VLAN IDs separated by commas, or a range of VLAN IDs separated by hyphens.

Defaults

This command has no default settings.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You must use the **vlan** *vlan-id* global configuration command to add extended-range VLANs (VLAN IDs 1006 to 4094). Before configuring VLANs in the extended range, you must use the **vtp transparent** global configuration or VLAN configuration command to put the switch in VTP transparent mode. Extended-range VLANs are not learned by VTP and are not added to the VLAN database, but when VTP mode is transparent, VTP mode and domain name and all VLAN configurations are saved in the running configuration, and you can save them in the switch startup configuration file.

When you save the VLAN and VTP configurations in the startup configuration file and reboot the switch, the configuration is selected in these ways:

- If both the VLAN database and the configuration file show the VTP mode as transparent and the VTP domain names match, the VLAN database is ignored. The VTP and VLAN configurations in the startup configuration file are used. The VLAN database revision number remains unchanged in the VLAN database.
- If the VTP mode is server, or if the startup VTP mode or domain names do not match the VLAN database, the VTP mode and the VLAN configuration for the first 1005 VLANs use the VLAN database information.

If you try to create an extended-range VLAN when the switch is not in VTP transparent mode, the VLAN is rejected, and you receive an error message.

If you enter an invalid VLAN ID, you receive an error message and do not enter config-vlan mode.

Entering the **vlan** command with a VLAN ID enables config-vlan mode. When you enter the VLAN ID of an existing VLAN, you do not create a new VLAN, but you can modify VLAN parameters for that VLAN. The specified VLANs are added or modified when you exit the config-vlan mode. Only the **shutdown** command (for VLANs 1 to 1005) takes effect immediately.

These configuration commands are available in config-vlan mode. The **no** form of each command returns the characteristic to its default state.

Note Although all commands are visible, the only VLAN configuration commands supported on extended-range VLANs is **mtu** *mtu-size*. For extended-range VLANs, all other characteristics must remain at the default state.

- **are** *are-number*: defines the maximum number of all-routes explorer (ARE) hops for this VLAN. This keyword applies only to TrCRF VLANs.The range is 0 to 13. The default is 7. If no value is entered, 0 is assumed to be the maximum.
- **backupcrf**: specifies the backup CRF mode. This keyword applies only to TrCRF VLANs.
  - **enable** backup CRF mode for this VLAN.
  - **disable** backup CRF mode for this VLAN (the default).
- **bridge** {*bridge-number*| **type**}: specifies the logical distributed source-routing bridge, the bridge that interconnects all logical rings having this VLAN as a parent VLAN in FDDI-NET, Token Ring-NET, and TrBRF VLANs. The range is 0 to 15. The default bridge number is 0 (no source-routing bridge) for FDDI-NET, TrBRF, and Token Ring-NET VLANs. The **type** keyword applies only to TrCRF VLANs and is one of these:
  - **srb** (source-route bridging)
  - **srt** (source-route transparent) bridging VLAN
- **exit**: applies changes, increments the VLAN database revision number (VLANs 1 to 1005 only), and exits config-vlan mode.
- **media**: defines the VLAN media type. See Table 2-23 for valid commands and syntax for different media types.

  Note The switch supports only Ethernet ports. You configure only FDDI and Token Ring media-specific characteristics for VLAN Trunking Protocol (VTP) global advertisements to other switches. These VLANs are locally suspended.

  - **ethernet** is Ethernet media type (the default).
  - **fddi** is FDDI media type.
  - **fd-net** is FDDI network entity title (NET) media type.
  - **tokenring** is Token Ring media type if the VTP v2 mode is disabled, or TrCRF if the VTP Version 2 (v) mode is enabled.
  - **tr-net** is Token Ring network entity title (NET) media type if the VTP v2 mode is disabled or TrBRF media type if the VTP v2 mode is enabled.

- **mtu** *mtu-size*: specifies the maximum transmission unit (MTU) (packet size in bytes). The range is 1500 to 18190. The default is 1500 bytes.
- **name** *vlan-name*: names the VLAN with an ASCII string from 1 to 32 characters that must be unique within the administrative domain. The default is *VLANxxxx* where *xxxx* represents four numeric digits (including leading zeros) equal to the VLAN ID number.
- **no**: negates a command or returns it to the default setting.
- **parent** *parent-vlan-id*: specifies the parent VLAN of an existing FDDI, Token Ring, or TrCRF VLAN. This parameter identifies the TrBRF to which a TrCRF belongs and is required when defining a TrCRF. The range is 0 to 1005. The default parent VLAN ID is 0 (no parent VLAN) for FDDI and Token Ring VLANs. For both Token Ring and TrCRF VLANs, the parent VLAN ID must already exist in the database and be associated with a Token Ring-NET or TrBRF VLAN.
- **ring** *ring-number*: defines the logical ring for an FDDI, Token Ring, or TrCRF VLAN. The range is 1 to 4095. The default for Token Ring VLANs is 0. For FDDI VLANs, there is no default.
- **said** *said-value*: specifies the security association identifier (SAID) as documented in IEEE 802.10. The range is 1 to 4294967294, and the number must be unique within the administrative domain. The default value is 100000 plus the VLAN ID number.
- **shutdown**: shuts down VLAN switching on the VLAN. This command takes effect immediately. Other commands take effect when you exit config-vlan mode.
- **state**: specifies the VLAN state:
  - **active** means the VLAN is operational (the default).
  - **suspend** means the VLAN is suspended. Suspended VLANs do not pass packets.
- **ste** *ste-number*: defines the maximum number of spanning-tree explorer (STE) hops. This keyword applies only to TrCRF VLANs. The range is 0 to 13. The default is 7.
- **stp type**: defines the spanning-tree type for FDDI-NET, Token Ring-NET, or TrBRF VLANs. For FDDI-NET VLANs, the default STP type is **ieee**. For Token Ring-NET VLANs, the default STP type is **ibm**. For FDDI and Token Ring VLANs, the default is no type specified.
  - **ieee** for IEEE Ethernet STP running source-route transparent (SRT) bridging.
  - **ibm** for IBM STP running source-route bridging (SRB).
  - **auto** for STP running a combination of source-route transparent bridging (IEEE) and source-route bridging (IBM).
- **tb-vlan1** *tb-vlan1-id* and **tb-vlan2** *tb-vlan2-id*: specifies the first and second VLAN to which this VLAN is translationally bridged. Translational VLANs translate FDDI or Token Ring to Ethernet, for example. The range is 0 to 1005. If no value is specified, 0 (no transitional bridging) is assumed.

Table 2-23 Valid Commands and Syntax for Different Media Types

Media Type	Valid Syntax
Ethernet	**name** *vlan-name*, **media ethernet, state** {**suspend** | **active**}, **said** *said-value*, **mtu** *mtu-size*, **remote-span**, **tb-vlan1** *tb-vlan1-id*, **tb-vlan2** *tb-vlan2-id*
FDDI	**name** *vlan-name*, **media fddi, state** {**suspend** | **active**}, **said** *said-value*, **mtu** *mtu-size*, **ring** *ring-number*, **parent** *parent-vlan-id*, **tb-vlan1** *tb-vlan1-id*, **tb-vlan2** *tb-vlan2-id*

Table 2-23 Valid Commands and Syntax for Different Media Types (continued)

Media Type	Valid Syntax
FDDI-NET	**name** *vlan-name*, **media fd-net, state** {**suspend** | **active**}, **said** *said-value*, **mtu** *mtu-size*, **bridge** *bridge-number*, **stp type** {**ieee** | **ibm** | **auto**}, **tb-vlan1** *tb-vlan1-id*, **tb-vlan2** *tb-vlan2-id* If VTP v2 mode is disabled, do not set the **stp type** to **auto**.
Token Ring	VTP v1 mode is enabled. **name** *vlan-name*, **media tokenring, state** {**suspend** | **active**}, **said** *said-value*, **mtu** *mtu-size*, **ring** *ring-number*, **parent** *parent-vlan-id*, **tb-vlan1** *tb-vlan1-id*, **tb-vlan2** *tb-vlan2-id*
Token Ring concentrator relay function (TrCRF)	VTP v2 mode is enabled. **name** *vlan-name*, **media tokenring, state** {**suspend** | **active**}, **said** *said-value*, **mtu** *mtu-size*, **ring** *ring-number*, **parent** *parent-vlan-id*, **bridge type** {**srb** | **srt**}, **are** *are-number*, **ste** *ste-number*, **backupcrf** {**enable** | **disable**}, **tb-vlan1** *tb-vlan1-id*, **tb-vlan2** *tb-vlan2-id*
Token Ring-NET	VTP v1 mode is enabled. **name** *vlan-name*, **media tr-net, state** {**suspend** | **active**}, **said** *said-value*, **mtu** *mtu-size*, **bridge** *bridge-number*, **stp type** {**ieee** | **ibm**}, **tb-vlan1** *tb-vlan1-id*, **tb-vlan2** *tb-vlan2-id*
Token Ring bridge relay function (TrBRF)	VTP v2 mode is enabled. **name** *vlan-name*, **media tr-net, state** {**suspend** | **active**}, **said** *said-value*, **mtu** *mtu-size*, **bridge** *bridge-number*, **stp type** {**ieee** | **ibm** | **auto**}, **tb-vlan1** *tb-vlan1-id*, **tb-vlan2** *tb-vlan2-id*

Table 2-24 describes the rules for configuring VLANs.

Table 2-24 VLAN Configuration Rules

Configuration	Rule
VTP v2 mode is enabled, and you are configuring a TrCRF VLAN media type.	Specify a parent VLAN ID of a TrBRF that already exists in the database. Specify a ring number. Do not leave this field blank. Specify unique ring numbers when TrCRF VLANs have the same parent VLAN ID. Only one backup concentrator relay function (CRF) can be enabled.
VTP v2 mode is enabled, and you are configuring VLANs other than TrCRF media type.	Do not specify a backup CRF.
VTP v2 mode is enabled, and you are configuring a TrBRF VLAN media type.	Specify a bridge number. Do not leave this field blank.

Table 2-24 VLAN Configuration Rules (continued)

Configuration	Rule
VTP v1 mode is enabled.	No VLAN can have an STP type set to auto. This rule applies to Ethernet, FDDI, FDDI-NET, Token Ring, and Token Ring-NET VLANs.
Add a VLAN that requires translational bridging (values are not set to zero).	The translational bridging VLAN IDs that are used must already exist in the database. The translational bridging VLAN IDs that a configuration points to must also contain a pointer to the original VLAN in one of the translational bridging parameters (for example, Ethernet points to FDDI, and FDDI points to Ethernet). The translational bridging VLAN IDs that a configuration points to must be different media types than the original VLAN (for example, Ethernet can point to Token Ring). If both translational bridging VLAN IDs are configured, these VLANs must be different media types (for example, Ethernet can point to FDDI and Token Ring).

Examples

This example shows how to add an Ethernet VLAN with default media characteristics. The default includes a *vlan-name* of *VLANxxx*, where *xxxx* represents four numeric digits (including leading zeros) equal to the VLAN ID number. The default **media** option is **ethernet**; the **state** option is **active**. The default *said-value* variable is 100000 plus the VLAN ID; the *mtu-size* variable is 1500; the **stp-type** option is **ieee**. When you enter the **exit** config-vlan configuration command, the VLAN is added if it did not already exist; otherwise, this command does nothing.

This example shows how to create a new VLAN with all default characteristics and enter config-vlan mode:

```
Switch(config)# vlan 200
Switch(config-vlan)# exit
Switch(config)#
```

This example shows how to create a new extended-range VLAN with all the default characteristics, to enter config-vlan mode, and to save the new VLAN in the switch startup configuration file:

```
Switch(config)# vtp mode transparent
Switch(config)# vlan 2000
Switch(config-vlan)# end
Switch# copy running-config startup config
```

You can verify your setting by entering the **show vlan** privileged EXEC command.

Related Commands

Command	Description
show vlan	Displays the parameters for all configured VLANs or one VLAN (if the VLAN ID or name is specified) in the administrative domain.

vmps reconfirm (privileged EXEC)

Use the **vmps reconfirm** privileged EXEC command to immediately send VLAN Query Protocol (VQP) queries to reconfirm all dynamic VLAN assignments with the VLAN Membership Policy Server (VMPS).

vmps reconfirm

Syntax Description

This command has no arguments or keywords.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to immediately send VQP queries to the VMPS:

```
Switch# vmps reconfirm
```

You can verify your setting by entering the **show vmps** privileged EXEC command and examining the VMPS Action row of the Reconfirmation Status section. The **show vmps** command shows the result of the last time the assignments were reconfirmed either because the reconfirmation timer expired or because the **vmps reconfirm** command was entered.

Related Commands

Command	Description
show vmps	Displays VQP and VMPS information.
vmps reconfirm (global configuration)	Changes the reconfirmation interval for the VQP client.

vmps reconfirm (global configuration)

Use the **vmps reconfirm** global configuration command to change the reconfirmation interval for the VLAN Query Protocol (VQP) client. Use the **no** form of this command to return to the default setting.

vmps reconfirm *interval*

no vmps reconfirm

Syntax Description

interval	Reconfirmation interval for VQP client queries to the VLAN Membership Policy Server (VMPS) to reconfirm dynamic VLAN assignments. The range is 1 to 120 minutes.

Defaults

The default reconfirmation interval is 60 minutes.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to set the VQP client to reconfirm dynamic VLAN entries every 20 minutes:

```
Switch(config)# vmps reconfirm 20
```

You can verify your setting by entering the **show vmps** privileged EXEC command and examining information in the Reconfirm Interval row.

Related Commands

Command	Description
show vmps	Displays VQP and VMPS information.
vmps reconfirm (privileged EXEC)	Sends VQP queries to reconfirm all dynamic VLAN assignments with the VMPS.

vmps retry

Use the **vmps retry** global configuration command to configure the per-server retry count for the VLAN Query Protocol (VQP) client. Use the **no** form of this command to return to the default setting.

vmps retry *count*

no vmps retry

Syntax Description

count	Number of attempts to contact the VLAN Membership Policy Server (VMPS) by the client before querying the next server in the list. The range is 1 to 10.

Defaults

The default retry count is 3.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to set the retry count to 7:

```
Switch(config)# vmps retry 7
```

You can verify your setting by entering the **show vmps** privileged EXEC command and examining information in the Server Retry Count row.

Related Commands

Command	Description
show vmps	Displays VQP and VMPS information.

vmps server

Use the **vmps server** global configuration command to configure the primary VLAN Membership Policy Server (VMPS) and up to three secondary servers. Use the **no** form of this command to remove a VMPS server.

vmps server *ipaddress* [**primary**]

no vmps server [*ipaddress*]

Syntax Description

ipaddress	IP address or hostname of the primary or secondary VMPS servers. If you specify a hostname, the Domain Name System (DNS) server must be configured.
primary	(Optional) Decides whether primary or secondary VMPS servers are being configured.

Defaults

No primary or secondary VMPS servers are defined.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The first server entered is automatically selected as the primary server whether or not **primary** is entered. The first server address can be overridden by using **primary** in a subsequent command.

If a member switch in a cluster configuration does not have an IP address, the cluster does not use the VMPS server configured for that member switch. Instead, the cluster uses the VMPS server on the command switch, and the command switch proxies the VMPS requests. The VMPS server treats the cluster as a single switch and uses the IP address of the command switch to respond to requests.

When using the **no** form without specifying the *ipaddress*, all configured servers are deleted. If you delete all servers when dynamic-access ports are present, the switch cannot forward packets from new sources on these ports because it cannot query the VMPS.

Examples

This example shows how to configure the server with IP address 191.10.49.20 as the primary VMPS server. The servers with IP addresses 191.10.49.21 and 191.10.49.22 are configured as secondary servers:

```
Switch(config)# vmps server 191.10.49.20 primary
Switch(config)# vmps server 191.10.49.21
Switch(config)# vmps server 191.10.49.22
```

This example shows how to delete the server with IP address 191.10.49.21:

```
Switch(config)# no vmps server 191.10.49.21
```

You can verify your setting by entering the **show vmps** privileged EXEC command and examining information in the VMPS Domain Server row.

Related Commands

Command	Description
show vmps	Displays VQP and VMPS information.

vtp (global configuration)

Use the **vtp** global configuration command to set or modify the VLAN Trunking Protocol (VTP) configuration characteristics. Use the **no** form of this command to remove the settings or to return to the default settings.

vtp {**domain** *domain-name* | **file** *filename* | **interface** *name* [**only**] | **mode** {**client** | **server** | **transparent**} | **password** *password* | **pruning** | **version** *number*}

no vtp {**file** | **interface** | **mode** | **password** | **pruning** | **version**}

Syntax Description

domain *domain-name*	Specify the VTP domain name, an ASCII string from 1 to 32 characters that identifies the VTP administrative domain for the switch. The domain name is case sensitive.
file *filename*	Specify the Cisco IOS file system file where the VTP VLAN configuration is stored.
interface *name*	Specify the name of the interface providing the VTP ID updated for this device.
only	(Optional) Use only the IP address of this interface as the VTP IP updater.
mode	Specify the VTP device mode as client, server, or transparent.
client	Place the switch in VTP client mode. A switch in VTP client mode is enabled for VTP, and can send advertisements, but does not have enough nonvolatile storage to store VLAN configurations. You cannot configure VLANs on the switch. When a VTP client starts up, it does not send VTP advertisements until it receives advertisements to initialize its VLAN database.
server	Place the switch in VTP server mode. A switch in VTP server mode is enabled for VTP and sends advertisements. You can configure VLANs on the switch. The switch can recover all the VLAN information in the current VTP database from nonvolatile storage after reboot.
transparent	Place the switch in VTP transparent mode. A switch in VTP transparent mode is disabled for VTP, does not send advertisements or learn from advertisements sent by other devices, and cannot affect VLAN configurations on other devices in the network. The switch receives VTP advertisements and forwards them on all trunk ports except the one on which the advertisement was received. When VTP mode is transparent, the mode and domain name are saved in the switch running configuration file, and you can save them in the switch startup configuration file by entering the **copy running-config startup config** privileged EXEC command.
password *password*	Set the administrative domain password for the generation of the 16-byte secret value used in MD5 digest calculation to be sent in VTP advertisements and to validate received VTP advertisements. The password can be an ASCII string from 1 to 32 characters. The password is case sensitive.
pruning	Enable VTP pruning on the switch.
version *number*	Set VTP version to Version 1 or Version 2.

Defaults

The default filename is *flash:vlan.dat*.

The default mode is server mode.

No domain name or password is defined.

No password is configured.

Pruning is disabled.

The default version is Version 1.

Command Modes

Global configuration

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you save VTP mode, domain name, and VLAN configurations in the switch startup configuration file and reboot the switch, the VTP and VLAN configurations are selected by these conditions:

- If both the VLAN database and the configuration file show the VTP mode as transparent and the VTP domain names match, the VLAN database is ignored. The VTP and VLAN configurations in the startup configuration file are used. The VLAN database revision number remains unchanged in the VLAN database.
- If the startup VTP mode is server mode, or the startup VTP mode or domain names do not match the VLAN database, VTP mode and VLAN configuration for the first 1005 VLANs are selected by VLAN database information, and VLANs greater than 1005 are configured from the switch configuration file.

The **vtp file** *filename* cannot be used to load a new database; it renames only the file in which the existing database is stored.

Follow these guidelines when configuring a VTP domain name:

- The switch is in the no-management-domain state until you configure a domain name. While in the no-management-domain state, the switch does not send any VTP advertisements even if changes occur to the local VLAN configuration. The switch leaves the no-management-domain state after it receives the first VTP summary packet on any port that is trunking or after you configure a domain name by using the **vtp domain** command. If the switch receives its domain from a summary packet, it resets its configuration revision number to 0. After the switch leaves the no-management-domain state, it can no be configured to re-enter it until you clear the NVRAM and reload the software.
- Domain names are case-sensitive.
- After you configure a domain name, it cannot be removed. You can only reassign it to a different domain.

Follow these guidelines when setting VTP mode:

- The **no vtp mode** command returns the switch to VTP server mode.
- The **vtp mode server** command is the same as **no vtp mode** except that it does not return an error if the switch is not in client or transparent mode.
- If the receiving switch is in client mode, the client switch changes its configuration to duplicate the configuration of the server. If you have switches in client mode, be sure to make all VTP or VLAN configuration changes on a switch in server mode. If the receiving switch is in server mode or transparent mode, the switch configuration is not changed.
- Switches in transparent mode do not participate in VTP. If you make VTP or VLAN configuration changes on a switch in transparent mode, the changes are not propagated to other switches in the network.
- If you change the VTP or VLAN configuration on a switch that is in server mode, that change is propagated to all the switches in the same VTP domain.
- The **vtp mode transparent** command disables VTP from the domain but does not remove the domain from the switch.
- The VTP mode must be transparent for you to add extended-range VLANs or for VTP and VLAN information to be saved in the running configuration file.
- If extended-range VLANs are configured on the switch and you attempt to set the VTP mode to server or client, you receive an error message, and the configuration is not allowed.
- VTP can be set to either server or client mode only when dynamic VLAN creation is disabled.

Follow these guidelines when setting a VTP password:

- Passwords are case sensitive. Passwords should match on all switches in the same domain.
- When you use the **no vtp password** form of the command, the switch returns to the no-password state.

Follow these guidelines when setting VTP pruning:

- VTP pruning removes information about each pruning-eligible VLAN from VTP updates if there are no stations belonging to that VLAN.
- If you enable pruning on the VTP server, it is enabled for the entire management domain for VLAN IDs 1 to 1005.
- Only VLANs in the pruning-eligible list can be pruned.
- Pruning is supported with VTP Version 1 and Version 2.

Follow these guidelines when setting the VTP version:

- Toggling the Version 2 (v2) mode state modifies parameters of certain default VLANs.
- Each VTP switch automatically detects the capabilities of all the other VTP devices. To use Version 2, all VTP switches in the network must support Version 2; otherwise, you must configure them to operate in VTP Version 1 mode.
- If all switches in a domain are VTP Version 2-capable, you need only to configure Version 2 on one switch; the version number is then propagated to the other Version-2 capable switches in the VTP domain.
- If you are using VTP in a Token Ring environment, VTP Version 2 must be enabled.
- If you are configuring a Token Ring bridge relay function (TrBRF) or Token Ring concentrator relay function (TrCRF) VLAN media type, you must use Version 2.
- If you are configuring a Token Ring or Token Ring-NET VLAN media type, you must use Version 1.

You cannot save password, pruning, and version configurations in the switch configuration file.

Examples

This example shows how to rename the filename for VTP configuration storage to *vtpfilename*:

```
Switch(config)# vtp file vtpfilename
```

This example shows how to clear the device storage filename:

```
Switch(config)# no vtp file vtpconfig
Clearing device storage filename.
```

This example shows how to specify the name of the interface providing the VTP updater ID for this device:

```
Switch(config)# vtp interface gigabitethernet
```

This example shows how to set the administrative domain for the switch:

```
Switch(config)# vtp domain OurDomainName
```

This example shows how to place the switch in VTP transparent mode:

```
Switch(config)# vtp mode transparent
```

This example shows how to configure the VTP domain password:

```
Switch(config)# vtp password ThisIsOurDomain'sPassword
```

This example shows how to enable pruning in the VLAN database:

```
Switch(config)# vtp pruning
Pruning switched ON
```

This example shows how to enable Version 2 mode in the VLAN database:

```
Switch(config)# vtp version 2
```

You can verify your settings by entering the **show vtp status** privileged EXEC command.

Related Commands

Command	Description
show vtp status	Displays the VTP statistics for the switch and general information about the VTP management domain status.

APPENDIX A

Catalyst 2918 Switch Bootloader Commands

During normal bootloader operation, you are not presented with the bootloader command-line prompt. You gain access to the bootloader command line if the switch is set to manually boot up, if an error occurs during power-on self test (POST) DRAM testing, or if an error occurs while loading the operating system (a corrupted Cisco IOS image). You can also access the bootloader if you have lost or forgotten the switch password.

Note The default switch configuration allows an end user with physical access to the switch to recover from a lost password by interrupting the bootup process while the switch is powering up and then entering a new password. The password recovery disable feature allows the system administrator to protect access to the switch password by disabling part of this functionality and allowing the user to interrupt the bootup process only by agreeing to set the system back to the default configuration. With password recovery disabled, the user can still interrupt the bootup process and change the password, but the configuration file (config.text) and the VLAN database file (vlan.dat) are deleted. For more information, see the software configuration guide for this release.

You can access the bootloader through a switch console connection at 9600 bps.

Unplug the switch power cord, and press the switch **Mode** button while reconnecting the power cord. You can release the **Mode** button a second or two after the LED above port 1X goes off. You should then see the bootloader *Switch:* prompt.The bootloader performs low-level CPU initialization, performs POST, and loads a default operating system image into memory.

boot

Use the **boot** bootloader command to load and boot up an executable image and to enter the command-line interface.

boot [**-post** | **-n** | **-p** | *flag*] *filesystem:/file-url ...*

Syntax Description

-post	(Optional) Run the loaded image with an extended or comprehensive power-on self-test (POST). Using this keyword causes POST to take longer to complete.
-n	(Optional) Pause for the Cisco IOS debugger immediately after launching.
-p	(Optional) Pause for the JTAG debugger right after loading the image.
*filesystem***:**	Alias for a flash file system. Use **flash:** for the system board flash device.
/file-url	(Optional) Path (directory) and name of a bootable image. Separate image names with a semicolon.

Defaults

The switch attempts to automatically boot up the system by using information in the BOOT environment variable. If this variable is not set, the switch attempts to load and execute the first executable image it can by performing a recursive, depth-first search throughout the flash file system. In a depth-first search of a directory, each encountered subdirectory is completely searched before continuing the search in the original directory.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

When you enter the **boot** command without any arguments, the switch attempts to automatically boot up the system by using the information in the BOOT environment variable, if any. If you supply an image name for the *file-url* variable, the **boot** command attempts to boot up the specified image.

When you set bootloader **boot** command options, they are executed immediately and apply only to the current bootloader session. These settings are not saved for the next bootup operation.

Filenames and directory names are case sensitive.

Examples

This example shows how to boot up the switch using the *new-image.bin* image:

```
switch: boot flash:/new-images/new-image.bin
```

After entering this command, you are prompted to start the setup program.

Related Commands

Command	Description
set	Sets the BOOT environment variable to boot a specific image when the **BOOT** keyword is appended to the command.

cat

Use the **cat** bootloader command to display the contents of one or more files.

cat *filesystem*:*/file-url* ...

Syntax Description

filesystem:	Alias for a flash file system. Use **flash:** for the system board flash device.
/file-url	Path (directory) and name of the files to display. Separate each filename with a space.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

If you specify a list of files, the contents of each file appears sequentially.

Examples

This example shows how to display the contents of two files:

```
switch: cat flash:/new-images/info flash:env_vars
version_suffix: lanlite-122-44.SE
version_directory: c2918-lanlite-mz.122-44.SE
image_name: c2918-lanlite-mz.122-44.SE.bin
ios_image_file_size: 4413952
total_image_file_size: 4424192
image_feature: LAYER_2|MIN_DRAM_MEG=64
image_family:2918
info_end:
BAUD=57600
MANUAL_BOOT=no
```

Related Commands

Command	Description
more	Displays the contents of one or more files.
type	Displays the contents of one or more files.

copy

Use the **copy** bootloader command to copy a file from a source to a destination.

copy [**-b** *block-size*] *filesystem***:/***source-file-url filesystem***:/***destination-file-url*

Syntax Description

-b *block-size*	(Optional) This option is used only for internal development and testing.
*filesystem***:**	Alias for a flash file system. Use **flash:** for the system board flash device.
/*source-file-url*	Path (directory) and filename (source) to be copied.
/*destination-file-url*	Path (directory) and filename of the destination.

Defaults

The default block size is 4 KB.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

Directory names are limited to 45 characters between the slashes (/); the name cannot contain control characters, spaces, deletes, slashes, quotes, semicolons, or colons.

Filenames are limited to 45 characters; the name cannot contain control characters, spaces, deletes, slashes, quotes, semicolons, or colons.

If you are copying a file to a new directory, the directory must already exist.

Examples

This example show how to copy a file at the root:

```
switch: copy flash:test1.text flash:test4.text
.
File "flash:test1.text" successfully copied to "flash:test4.text"
```

You can verify that the file was copied by entering the **dir** *filesystem***:** bootloader command.

Related Commands

Command	Description
delete	Deletes one or more files from the specified file system.

delete

Use the **delete** bootloader command to delete one or more files from the specified file system.

delete *filesystem***:***/file-url ...*

Syntax Description

*filesystem***:**	Alias for a flash file system. Use **flash:** for the system board flash device.
/file-url	Path (directory) and filename to delete. Separate each filename with a space.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

The switch prompts you for confirmation before deleting each file.

Examples

This example shows how to delete two files:

```
switch: delete flash:test2.text flash:test5.text
Are you sure you want to delete "flash:test2.text" (y/n)?y
File "flash:test2.text" deleted
Are you sure you want to delete "flash:test5.text" (y/n)?y
File "flash:test2.text" deleted
```

You can verify that the files were deleted by entering the **dir flash:** bootloader command.

Related Commands

Command	Description
copy	Copies a file from a source to a destination.

dir

Use the **dir** bootloader command to display a list of files and directories on the specified file system.

dir *filesystem*:*/file-url* ...

Syntax Description

filesystem:	Alias for a flash file system. Use **flash:** for the system board flash device.
/file-url	(Optional) Path (directory) and directory name whose contents you want to display. Separate each directory name with a space.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Directory names are case sensitive.

Examples

This example shows how to display the files in flash memory:

```
switch: dir flash:
Directory of flash:/

    3  -rwx        1839   Mar 01 2007 00:48:15  config.text
   11  -rwx        1140   Mar 01 2007 04:18:48  vlan.dat
   21  -rwx          26   Mar 01 2007 00:01:39  env_vars
    9  drwx         768   Mar 01 2007 23:11:42  html
   16  -rwx        1037   Mar 01 2007 00:01:11  config.text
   14  -rwx        1099   Mar 01 2007 01:14:05  homepage.htm
   22  -rwx          96   Mar 01 2007 00:01:39  system_env_vars
   17  drwx        192    Mar 06 2007 23:22:03  c2918-lanlite-mz.122-44.SE

15998976 bytes total (6397440 bytes free)
```

Table A-1 describes the fields in the display.

Table A-1 dir Field Descriptions

Field	Description
2	Index number of the file.
-rwx	File permission, which can be any or all of the following: • d—directory • r—readable • w—writable • x—executable

Table A-1 dir Field Descriptions (continued)

Field	Description
1644045	Size of the file.
<date>	Last modification date.
env_vars	Filename.

Related Commands

Command	Description
mkdir	Creates one or more directories.
rmdir	Removes one or more directories.

flash_init

Use the **flash_init** bootloader command to initialize the flash file system.

flash_init

Syntax Description

This command has no arguments or keywords.

Defaults

The flash file system is automatically initialized during normal system operation.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

During the normal bootup process, the flash file system is automatically initialized.

Use this command to manually initialize the flash file system. For example, you use this command during the recovery procedure for a lost or forgotten password.

format

Use the **format** bootloader command to format the specified file system and destroy all data in that file system.

format *filesystem***:**

Syntax Description

*filesystem***:**	Alias for a flash file system. Use **flash:** for the system board flash device.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Caution Use this command with care; it destroys all data on the file system and renders your system unusable.

fsck

Use the **fsck** bootloader command to check the file system for consistency.

fsck [**-test** | **-f**] *filesystem***:**

Syntax Description

-test	(Optional) Initialize the file system code and perform extra POST on flash memory. An extensive, nondestructive memory test is performed on every byte that makes up the file system.
-f	(Optional) Initialize the file system code and perform a fast file consistency check. Cyclic redundancy checks (CRCs) in the flashfs sectors are not checked.
*filesystem***:**	Alias for a flash file system. Use **flash:** for the system board flash device.

Defaults

No file system check is performed.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

To stop an in-progress file system consistency check, disconnect the switch power and then reconnect the power.

Examples

This example shows how to perform an extensive file system check on flash memory:

```
switch: fsck -test flash:
```

help

Use the **help** bootloader command to display the available commands.

help

Syntax Description

This command has no arguments or keywords.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You can also use the question mark (?) to display a list of available bootloader commands.

load_helper

Use the **load_helper** bootloader command to load and initialize one or more helper images, which extend or patch the functionality of the bootloader.

load_helper *filesystem***:/***file-url* ...

Syntax Description

*filesystem***:**	Alias for a flash file system. Use **flash:** for the system board flash device.
/*file-url*	Path (directory) and a list of loadable helper files to dynamically load during loader initialization. Separate each image name with a semicolon.

Defaults

No helper files are loaded.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **load_helper** command searches for loadable files only if the HELPER environment variable is set.

Filenames and directory names are case sensitive.

memory

Use the **memory** bootloader command to display memory heap utilization information.

memory

Syntax Description

This command has no arguments or keywords.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to display memory heap utilization information:

```
switch: memory
Text:   0x00700000 - 0x0071cf24 (0x0001cf24 bytes)
Rotext: 0x00000000 - 0x00000000 (0x00000000 bytes)
Data:   0x0071cf24 - 0x00723a0c (0x00006ae8 bytes)
Bss:    0x0072529c - 0x00746f94 (0x00021cf8 bytes)
Heap:   0x00756f98 - 0x00800000 (0x000a9068 bytes)

Bottom heap utilization is 22 percent.
Top heap utilization is 0 percent.
Total heap utilization is 22 percent.
Total bytes: 0xa9068 (692328)
Bytes used: 0x26888 (157832)
Bytes available: 0x827e0 (534496)

Alternate heap utilization is 0 percent.
Total alternate heap bytes: 0x6fd000 (7327744)
Alternate heap bytes used: 0x0 (0)
Alternate heap bytes available: 0x6fd000 (7327744)
```

Table A-2 describes the fields in the display.

Table A-2 memory Field Descriptions

Field	Description
Text	Beginning and ending address of the text storage area.
Rotext	Beginning and ending address of the read-only text storage area. This part of the data segment is grouped with the Text entry.
Data	Beginning and ending address of the data segment storage area.
Bss	Beginning and ending address of the block started by symbol (Bss) storage area. It is initialized to zero.
Heap	Beginning and ending address of the area in memory that memory is dynamically allocated to and freed from.

mkdir

Use the **mkdir** bootloader command to create one or more new directories on the specified file system.

mkdir *filesystem***:***/directory-url ...*

Syntax Description

*filesystem***:**	Alias for a flash file system. Use **flash:** for the system board flash device.
/directory-url	Name of the directories to create. Separate each directory name with a space.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Directory names are case sensitive.

Directory names are limited to 45 characters between the slashes (/); the name cannot contain control characters, spaces, deletes, slashes, quotes, semicolons, or colons.

Examples

This example shows how to make a directory called Saved_Configs:

```
switch: mkdir flash:Saved_Configs
Directory "flash:Saved_Configs" created
```

This example shows how to make two directories:

```
switch: mkdir flash:Saved_Configs1 flash:Test
Directory "flash:Saved_Configs1" created
Directory "flash:Test" created
```

You can verify that the directory was created by entering the **dir** *filesystem***:** bootloader command.

Related Commands

Command	Description
dir	Displays a list of files and directories on the specified file system.
rmdir	Removes one or more directories from the specified file system.

more

Use the **more** bootloader command to display the contents of one or more files.

more *filesystem*:*/file-url ...*

Syntax Description

filesystem:	Alias for a flash file system. Use **flash:** for the system board flash device.
/file-url	Path (directory) and name of the files to display. Separate each filename with a space.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

If you specify a list of files, the contents of each file appears sequentially.

Examples

This example shows how to display the contents of two files:

```
switch: more flash:/new-images/info flash:env_vars
version_suffix: lanlite-122-44.SE
version_directory: c2918-lanlite-mz.122-44.SE
image_name: c2918-lanlite-mz.122-44.SE.bin
ios_image_file_size: 4413952
total_image_file_size: 4424192
image_feature: LAYER_2|MIN_DRAM_MEG=642918
info_end:
BAUD=57600
MANUAL_BOOT=no
```

Related Commands

Command	Description
cat	Displays the contents of one or more files.
type	Displays the contents of one or more files.

rename

Use the **rename** bootloader command to rename a file.

rename *filesystem*:/*source-file-url filesystem*:/*destination-file-url*

Syntax Description

filesystem:	Alias for a flash file system. Use **flash:** for the system board flash device.
/*source-file-url*	Original path (directory) and filename.
/*destination-file-url*	New path (directory) and filename.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

Directory names are limited to 45 characters between the slashes (/); the name cannot contain control characters, spaces, deletes, slashes, quotes, semicolons, or colons.

Filenames are limited to 45 characters; the name cannot contain control characters, spaces, deletes, slashes, quotes, semicolons, or colons.

Examples

This example shows a file named *config.text* being renamed to *config1.text*:

```
switch: rename flash:config.text flash:config1.text
```

You can verify that the file was renamed by entering the **dir** *filesystem*: bootloader command.

Related Commands

Command	Description
copy	Copies a file from a source to a destination.

reset

Use the **reset** bootloader command to perform a hard reset on the system. A hard reset is similar to power-cycling the switch, clearing the processor, registers, and memory.

reset

Syntax Description

This command has no arguments or keywords.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to reset the system:

```
switch: reset
Are you sure you want to reset the system (y/n)?y
System resetting...
```

Related Commands

Command	Description
boot	Loads and boots up an executable image and enters the command-line interface.

rmdir

Use the **rmdir** bootloader command to remove one or more empty directories from the specified file system.

rmdir *filesystem***:***/directory-url ...*

Syntax Description

*filesystem***:**	Alias for a flash file system. Use **flash:** for the system board flash device.
/directory-url	Path (directory) and name of the empty directories to remove. Separate each directory name with a space.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Directory names are case sensitive and limited to 45 characters between the slashes (/); the name cannot contain control characters, spaces, deletes, slashes, quotes, semicolons, or colons.

Before removing a directory, you must first delete all the files in the directory.

The switch prompts you for confirmation before deleting each directory.

Examples

This example shows how to remove a directory:

```
switch: rmdir flash:Test
```

You can verify that the directory was deleted by entering the **dir** *filesystem***:** bootloader command.

Related Commands

Command	Description
dir	Displays a list of files and directories on the specified file system.
mkdir	Creates one or more new directories on the specified file system.

set

Use the **set** bootloader command to set or display environment variables, which can be used to control the bootloader or any other software running on the switch.

set *variable value*

Syntax Description

variable value	Use one of these keywords for *variable and value*: **MANUAL_BOOT**—Decides whether the switch automatically or manually boots up. Valid values are 1, yes, 0, and no. If it is set to no or 0, the bootloader attempts to automatically boot up the system. If it is set to anything else, you must manually boot up the switch from the bootloader mode. **BOOT** *filesystem***:/***file-url*—A semicolon-separated list of executable files to try to load and execute when automatically booting up. If the BOOT environment variable is not set, the system attempts to load and execute the first executable image it can find by using a recursive, depth-first search through the flash: file system. If the BOOT variable is set but the specified images cannot be loaded, the system attempts to boot up the first bootable file that it can find in the flash file system. **ENABLE_BREAK**—Decides whether the automatic bootup process can be interrupted by using the Break key on the console. Valid values are 1, yes, on, 0, no, and off. If it is set to 1, yes, or on, you can interrupt the automatic bootup process by pressing the Break key on the console after the flash file system has initialized. **HELPER** *filesystem***:/***file-url*—A semicolon-separated list of loadable files to dynamically load during the bootloader initialization. Helper files extend or patch the functionality of the bootloader. **PS1** *prompt*—A string that is used as the command-line prompt in bootloader mode. **CONFIG_FILE flash:/***file-url*—The filename that Cisco IOS uses to read and write a nonvolatile copy of the system configuration. **BAUD** *rate*—The rate in bits per second (bps) used for the console. The Cisco IOS software inherits the baud rate setting from the bootloader and continues to use this value unless the configuration file specifies another setting. The range is from 0 to 4294967295 bps. Valid values are 50, 75, 110, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 56000, 57600, 115200, and 128000. The most commonly used values are 300, 1200, 2400, 9600, 19200, 57600, and 115200.
	BOOTHLPR *filesystem***:/***file-url*—The name of the Cisco IOS helper image that is first loaded into memory so that it can then load a second Cisco IOS image into memory and launch it. This variable is used only for internal development and testing. **HELPER_CONFIG_FILE** *filesystem***:/***file-url*—The name of the configuration file to be used by the Cisco IOS helper image. If this is not set, the file specified by the CONFIG_FILE environment variable is used by all versions of Cisco IOS that are loaded, including the helper image. This variable is used only for internal development and testing.

Defaults

The environment variables have these default values:

MANUAL_BOOT: No (0)

BOOT: Null string

ENABLE_BREAK: No (Off or 0) (the automatic bootup process cannot be interrupted by pressing the Break key on the console).

HELPER: No default value (helper files are not automatically loaded).

PS1: switch:

CONFIG_FILE: config.text

BAUD: 9600 bps

BOOTHLPR: No default value (no helper images are specified).

HELPER_CONFIG_FILE: No default value (no helper configuration file is specified).

SWITCH_NUMBER: 1

SWITCH_PRIORITY: 1

Note Environment variables that have values are stored in the flash file system in various files. The format of these files is that each line contains an environment variable name and an equal sign followed by the value of the variable. A variable has no value if it is not listed in this file; it has a value if it is listed in the file even if the value is a null string. A variable that is set to a null string (for example, " ") is a variable with a value. Many environment variables are predefined and have default values.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Environment variables are case sensitive and must be entered as documented.

Environment variables that have values are stored in flash memory outside of the flash file system.

Under normal circumstances, it is not necessary to alter the setting of the environment variables.

The MANUAL_BOOT environment variable can also be set by using the **boot manual** global configuration command.

The BOOT environment variable can also be set by using the **boot system** *filesystem***:/***file-url* global configuration command.

The ENABLE_BREAK environment variable can also be set by using the **boot enable-break** global configuration command.

The HELPER environment variable can also be set by using the **boot helper** *filesystem***:/***file-url* global configuration command.

The CONFIG_FILE environment variable can also be set by using the **boot config-file flash:/***file-url* global configuration command.

The BOOTHLPR environment variable can also be set by using the **boot boothlpr** *filesystem***:/***file-url global configuration command.*

The HELPER_CONFIG_FILE environment variable can also be set by using the **boot helper-config-file** *filesystem***:/***file-url* global configuration command.

The HELPER_CONFIG_FILE environment variable can also be set by using the **boot helper-config-file** *filesystem***:/***file-url* global configuration command.

The bootloader prompt string (PS1) can be up to 120 printable characters except the equal sign (=).

Examples

This example shows how to change the bootloader prompt:

```
switch: set PS1 loader:
loader:
```

You can verify your setting by using the **set** bootloader command.

Related Commands

Command	Description
unset	Resets one or more environment variables to its previous setting.

type

Use the **type** bootloader command to display the contents of one or more files.

type *filesystem***:***/file-url* ...

Syntax Description

*filesystem***:**	Alias for a flash file system. Use **flash:** for the system board flash device.
/file-url	Path (directory) and name of the files to display. Separate each filename with a space.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

If you specify a list of files, the contents of each file appears sequentially.

Examples

This example shows how to display the contents of two files:

```
switch: type flash:/new-images/info flash:env_vars
version_suffix: lanlite-122-44.SE
version_directory: c2918-lanlite-mz.122-44.SEcbs30x0
image_name: c2918-lanlite-mz.122-44.SE.bin
ios_image_file_size: 4413952
total_image_file_size: 4424192
image_feature: LAYER_2|MIN_DRAM_MEG=642918
info_end:
BAUD=57600
MANUAL_BOOT=no
```

Related Commands

Command	Description
cat	Displays the contents of one or more files.
more	Displays the contents of one or more files.

unset

Use the **unset** bootloader command to reset one or more environment variables.

unset *variable ...*

Syntax Description

variable	Use one of these keywords for *variable*: **MANUAL_BOOT**—Decides whether the switch automatically or manually boots up. **BOOT**—Resets the list of executable files to try to load and execute when automatically booting up. If the BOOT environment variable is not set, the system attempts to load and execute the first executable image it can find by using a recursive, depth-first search through the flash file system. If the BOOT variable is set but the specified images cannot be loaded, the system attempts to boot up the first bootable file that it can find in the flash file system. **ENABLE_BREAK**—Decides whether the automatic bootup process can be interrupted by using the Break key on the console after the flash file system has been initialized. **HELPER**—A semicolon-separated list of loadable files to dynamically load during the bootloader initialization. Helper files extend or patch the functionality of the bootloader. **PS1**—A string that is used as the command-line prompt in bootloader mode. **CONFIG_FILE**—Resets the filename that Cisco IOS uses to read and write a nonvolatile copy of the system configuration. **BAUD**—Resets the rate in bits per second (bps) used for the console. The Cisco IOS software inherits the baud rate setting from the bootloader and continues to use this value unless the configuration file specifies another setting. **BOOTHLPR**—Resets the name of the Cisco IOS helper image that is first loaded into memory so that it can then load a second Cisco IOS image into memory and launch it. This variable is used only for internal development and testing. **HELPER_CONFIG_FILE**—Resets the name of the configuration file to be used by the Cisco IOS helper image. If this is not set, the file specified by the CONFIG_FILE environment variable is used by all versions of Cisco IOS that are loaded, including the helper image. This variable is used only for internal development and testing.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

Under normal circumstances, it is not necessary to alter the setting of the environment variables.

The MANUAL_BOOT environment variable can also be reset by using the **no boot manual** global configuration command.

The BOOT environment variable can also be reset by using the **no boot system** global configuration command.

The ENABLE_BREAK environment variable can also be reset by using the **no boot enable-break** global configuration command.

The HELPER environment variable can also be reset by using the **no boot helper** global configuration command.

The CONFIG_FILE environment variable can also be reset by using the **no boot config-file** global configuration command.

The BOOTHLPR environment variable can also be reset by using the **no boot boothlpr** global configuration command.

The HELPER_CONFIG_FILE environment variable can also be reset by using the **no boot helper-config-file** global configuration command.

Examples

This example shows how to reset the prompt string to its previous setting:

```
switch: unset PS1
switch:
```

Related Commands

Command	Description
set	Sets or displays environment variables.

version

Use the **version** boot loader command to display the bootloader version.

version

Syntax Description

This command has no arguments or keywords.

Command Modes

Bootloader

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Examples

This example shows how to display the bootloader version:

```
switch: version
C2918 Boot Loader (C2918-HBOOT-M) Version 12.2(55r)SE, RELEASE SOFTWARE (fc1)
Compiled Fri 24-Sep-10 14:43 by nburra
switch:
```

APPENDIX **B**

Catalyst 2918 Switch Debug Commands

This appendix describes the **debug** privileged EXEC commands that have been created or changed for use with the Catalyst 2918 switch. These commands are helpful in diagnosing and resolving internetworking problems and should be enabled only under the guidance of Cisco technical support staff.

Caution Because debugging output is assigned high priority in the CPU process, it can render the system unusable. For this reason, use the **debug** commands only to troubleshoot specific problems or during troubleshooting sessions with Cisco technical support staff. It is best to use the **debug** commands during periods of lower network traffic and fewer users. Debugging during these periods decreases the likelihood that increased **debug** command processing overhead will affect system use.

debug cluster

Use the **debug cluster** privileged EXEC command to enable debugging of cluster-specific events. Use the **no** form of this command to disable debugging.

debug cluster {**discovery** | **events** | **extended** | **hsrp** | **http** | **ip** [**packet**] | **members** | **nat** | **neighbors** | **platform** | **snmp** | **vqpxy**}

no debug cluster {**discovery** | **events** | **extended** | **hsrp** | **http** | **ip** [**packet**] | **members** | **nat** | **neighbors** | **platform** | **snmp** | **vqpxy**}

Syntax Description

discovery	Display cluster discovery debug messages.
events	Display cluster event debug messages.
extended	Display extended discovery debug messages.
hsrp	Display the Hot Standby Router Protocol (HSRP) debug messages.
http	Display Hypertext Transfer Protocol (HTTP) debug messages.
ip [**packet**]	Display IP or transport packet debug messages.
members	Display cluster member debug messages.
nat	Display Network Address Translation (NAT) debug messages.
neighbors	Display cluster neighbor debug messages.
platform	Display platform-specific cluster debug messages.
snmp	Display Simple Network Management Protocol (SNMP) debug messages.
vqpxy	Display VLAN Query Protocol (VQP) proxy debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

This command is available only on the cluster command switch.

The **undebug cluster** command is the same as the **no debug cluster** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show cluster	Displays the cluster status and a summary of the cluster to which the switch belongs.

Command	Description
show cluster candidates	Displays a list of candidate switches when entered on the command switch.
show cluster members	Displays information about cluster members when executed on the command switch.

debug dot1x

Use the **debug dot1x** privileged EXEC command to enable debugging of the IEEE 802.1x authentication feature. Use the **no** form of this command to disable debugging.

debug dot1x {**all** | **errors** | **events** | **feature** | **packets** | **registry** | **state-machine**}

no debug dot1x {**all** | **errors** | **events** | **feature** | **packets** | **registry** | **state-machine**}

Syntax Description

all	Display all IEEE 802.1x authentication debug messages.
errors	Display IEEE 802.1x error debug messages.
events	Display IEEE 802.1x event debug messages.
feature	Display IEEE 802.1x feature debug messages.
packets	Display IEEE 802.1x packet debug messages.
registry	Display IEEE 802.1x registry invocation debug messages.
state-machine	Display state-machine related-events debug messages.

Note Though visible in the command-line help strings, the **redundancy** keyword is not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug dot1x** command is the same as the **no debug dot1x** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show dot1x	Displays IEEE 802.1xstatistics, administrative status, and operational status for the switch or for the specified port.

debug dtp

Use the **debug dtp** privileged EXEC command to enable debugging of the Dynamic Trunking Protocol (DTP) activity. Use the **no** form of this command to disable debugging.

debug dtp {**aggregation** | **all** | **decision** | **events** | **oserrs** | **packets** | **queue** | **states** | **timers**}

no debug dtp {**aggregation** | **all** | **decision** | **events** | **oserrs** | **packets** | **queue** | **states** | **timers**}

Syntax Description

aggregation	Display DTP user-message aggregation debug messages.
all	Display all DTP debug messages.
decision	Display the DTP decision-table debug messages.
events	Display the DTP event debug messages.
oserrs	Display DTP operating system-related error debug messages.
packets	Display DTP packet-processing debug messages.
queue	Display DTP packet-queueing debug messages.
states	Display DTP state-transition debug messages.
timers	Display DTP timer-event debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug dtp** command is the same as the **no debug dtp** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show dtp	Displays DTP information for the switch or for a specified interface.

debug eap

Use the **debug eap** privileged EXEC command to enable debugging of the Extensible Authentication Protocol (EAP) activity. Use the **no** form of this command to disable debugging.

debug dot1x {**all** | **authenticator** | **errors** | **events** | **md5** | **packets** | **peer** | **sm**}

no debug dot1x {**all** | **authenticator** | **errors** | **events** | **md5** | **packets** | **peer** | **sm**}

Syntax Description

all	Display all EAP debug messages.
authenticator	Display authenticator debug messages.
errors	Display EAP error debug messages.
events	Display EAP event debug messages.
md5	Display EAP-MD5 debug messages.
packets	Display EAP packet debug messages.
peer	Display EAP peer debug messages.
sm	Display EAP state-machine related-events debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug dot1x** command is the same as the **no debug dot1x** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show eap	Displays EAP registration and session information for the switch or for the specified port.

debug etherchannel

Use the **debug etherchannel** privileged EXEC command to enable debugging of the EtherChannel/PAgP shim. This shim is the software module that is the interface between the Port Aggregation Protocol (PAgP) software module and the port manager software module. Use the **no** form of this command to disable debugging.

debug etherchannel [**all** | **detail** | **error** | **event** | **idb**]

no debug etherchannel [**all** | **detail** | **error** | **event** | **idb**]

Syntax Description

all	(Optional) Display all EtherChannel debug messages.
detail	(Optional) Display detailed EtherChannel debug messages.
error	(Optional) Display EtherChannel error debug messages.
event	(Optional) Debug major EtherChannel event messages.
idb	(Optional) Display PAgP interface descriptor block debug messages.

Note Though visible in the command-line help strings, the **linecard** keyword is not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you do not specify a keyword, all debug messages appear.

The **undebug etherchannel** command is the same as the **no debug etherchannel** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show etherchannel	Displays EtherChannel information for the channel.

debug interface

Use the **debug interface** privileged EXEC command to enable debugging of interface-related activities. Use the **no** form of this command to disable debugging.

debug interface {*interface-id* | **null** *interface-number* | **port-channel** *port-channel-number* | **vlan** *vlan-id*}

no debug interface {*interface-id* | **null** *interface-number* | **port-channel** *port-channel-number* | **vlan** *vlan-id*}

Syntax Description

interface-id	Display debug messages for the specified physical port, identified by type switch number/module number/ port, for example **gigabitethernet 0/2**.
null *interface-number*	Display debug messages for null interfaces. The *interface-number* is always **0**.
port-channel *port-channel-number*	Display debug messages for the specified EtherChannel port-channel interface. The *port-channel-number* range is 1 to 6.
vlan *vlan-id*	Display debug messages for the specified VLAN. The *vlan-id* range is 1 to 4094.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you do not specify a keyword, all debug messages appear.

The **undebug interface** command is the same as the **no debug interface** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show etherchannel	Displays EtherChannel information for the channel.

debug ip dhcp snooping

Use the **debug ip dhcp snooping** privileged EXEC command to enable debugging of DHCP snooping. Use the **no** form of this command to disable debugging.

debug ip dhcp snooping {*mac-address* | **agent** | **event** | **packet**}

no debug ip dhcp snooping {*mac-address* | **agent** | **event** | **packet**}

Syntax Description

mac-address	Display debug messages for a DHCP packet with the specified MAC address.
agent	Display debug messages for DHCP snooping agents.
event	Display debug messages for DHCP snooping events.
packet	Display debug messages for DHCP snooping.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

The **undebug ip dhcp snooping** command is the same as the **no debug ip dhcp snooping** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug ip igmp filter

Use the **debug ip igmp filter** privileged EXEC command to enable debugging of Internet Group Management Protocol (IGMP) filter events. Use the **no** form of this command to disable debugging.

debug ip igmp filter

no debug ip igmp filter

Syntax Description

This command has no arguments or keywords.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug ip igmp filter** command is the same as the **no debug ip igmp filter** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug ip igmp max-groups

Use the **debug ip igmp max-groups** privileged EXEC command to enable debugging of Internet Group Management Protocol (IGMP) maximum groups events. Use the **no** form of this command to disable debugging.

debug ip igmp max-groups

no debug ip igmp max-groups

Syntax Description

This command has no arguments or keywords.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug ip igmp max-groups** command is the same as the **no debug ip igmp max-groups** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug ip igmp snooping

Use the **debug igmp snooping** privileged EXEC command to enable debugging of Internet Group Management Protocol (IGMP) snooping activity. Use the **no** form of this command to disable debugging.

debug ip igmp snooping [**group** | **management** | **querier** | **router** | **timer**]

no debug ip igmp snooping [**group** | **management** | **querier** | **router** | **timer**]

Syntax Description

group	(Optional) Display IGMP snooping group activity debug messages.
management	(Optional) Display IGMP snooping management activity debug messages.
querier	(Optional) Display IGMP snooping querier debug messages.
router	(Optional) Display IGMP snooping router activity debug messages.
timer	(Optional) Display IGMP snooping timer event debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug ip igmp snooping** command is the same as the **no debug ip igmp snooping** command.

Related Commands

Command	Description
debug platform ip igmp snooping	Displays information about platform-dependent IGMP snooping activity.
show debugging	Displays information about the types of debugging that are enabled.

debug lacp

Use the **debug lacp** privileged EXEC command to enable debugging of Link Aggregation Control Protocol (LACP) activity. Use the **no** form of this command to disable debugging.

debug lacp [**all** | **event** | **fsm** | **misc** | **packet**]

no debug lacp [**all** | **event** | **fsm** | **misc** | **packet**]

Syntax Description

all	(Optional) Display all LACP debug messages.
event	(Optional) Display LACP event debug messages.
fsm	(Optional) Display LACP finite state-machine debug messages.
misc	(Optional) Display miscellaneous LACP debug messages.
packet	(Optional) Display LACP packet debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug lacp** command is the same as the **no debug lacp** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show lacp	Displays LACP channel-group information.

debug mac-notification

Use the **debug mac-notification** privileged EXEC command to enable debugging of MAC notification events. Use the **no** form of this command to disable debugging.

debug mac-notification

no debug mac-notification

Syntax Description

This command has no arguments or keywords.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug mac-notification** command is the same as the **no debug mac-notification** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show mac address-table notification	Displays the MAC address notification information for all interfaces or the specified interface.

debug matm

Use the **debug matm** privileged EXEC command to enable debugging of platform-independent MAC address management. Use the **no** form of this command to disable debugging.

debug matm

no debug matm

Syntax Description

This command has no arguments or keywords.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug matm** command is the same as the **no debug matm** command.

Related Commands

Command	Description
debug platform matm	Displays information about platform-dependent MAC address management.
show debugging	Displays information about the types of debugging that are enabled.

debug monitor

Use the **debug monitor** privileged EXEC command to enable debugging of the Switched Port Analyzer (SPAN) feature. Use the **no** form of this command to disable debugging.

debug monitor {**all** | **errors** | **idb-update** | **info** | **list** | **notifications** | **platform** | **requests** | **snmp**}

no debug monitor {**all** | **errors** | **idb-update** | **info** | **list** | **notifications** | **platform** | **requests** | **snmp**}

Syntax Description

all	Display all SPAN debug messages.
errors	Display detailed SPAN error debug messages.
idb-update	Display SPAN interface description block (IDB) update-trace debug messages.
info	Display SPAN informational-tracing debug messages.
list	Display SPAN port and VLAN-list tracing debug messages.
notifications	Display SPAN notification debug messages.
platform	Display SPAN platform-tracing debug messages.
requests	Display SPAN request debug messages.
snmp	Display SPAN and Simple Network Management Protocol (SNMP) tracing debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug monitor** command is the same as the **no debug monitor** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show monitor	Displays information about all SPAN and remote SPAN (RSPAN) sessions on the switch.

debug nvram

Use the **debug nvram** privileged EXEC command to enable debugging of NVRAM activity. Use the **no** form of this command to disable debugging.

debug nvram

no debug nvram

Syntax Description

This command has no arguments or keywords.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug nvram** command is the same as the **no debug nvram** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug pagp

Use the **debug pagp** privileged EXEC command to enable debugging of Port Aggregation Protocol (PAgP) activity. Use the **no** form of this command to disable debugging.

debug pagp [**all** | **event** | **fsm** | **misc** | **packet**]

no debug pagp [**all** | **event** | **fsm** | **misc** | **packet**]

Syntax Description

all	(Optional) Display all PAgP debug messages.
event	(Optional) Display PAgP event debug messages.
fsm	(Optional) Display PAgP finite state-machine debug messages.
misc	(Optional) Display miscellaneous PAgP debug messages.
packet	(Optional) Display PAgP packet debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug pagp** command is the same as the **no debug pagp** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show pagp	Displays PAgP channel-group information.

debug platform cpu-queues

Use the **debug platform cpu-queues** privileged EXEC command to enable debugging of platform central processing unit (CPU) receive queues. Use the **no** form of this command to disable debugging.

debug platform cpu-queues {**broadcast-q** | **cbt-to-spt-q** | **cpuhub-q** | **host-q** | **icmp-q** | **igmp-snooping-q** | **layer2-protocol-q** | **logging-q** | **remote-console-q** | **software-fwd-q** | **stp-q**}

no debug platform cpu-queues {**broadcast-q** | **cbt-to-spt-q** | **cpuhub-q** | **host-q** | **icmp-q** | **igmp-snooping-q** | **layer2-protocol-q** | **logging-q** | **remote-console-q** | **software-fwd-q** | **stp-q**}

Syntax Description

broadcast-q	Display debug messages about packets received by the broadcast queue.
cbt-to-spt-q	Display debug messages about packets received by the core-based tree to shortest-path tree (cbt-to-spt) queue.
cpuhub-q	Display debug messages about packets received by the CPU heartbeat queue.
host-q	Display debug messages about packets received by the host queue.
icmp-q	Display debug messages about packets received by the Internet Control Message Protocol (ICMP) queue.
igmp-snooping-q	Display debug messages about packets received by the Internet Group Management Protocol (IGMP)-snooping queue.
layer2-protocol-q	Display debug messages about packets received by the Layer 2 protocol queue.
logging-q	Display debug messages about packets received by the logging queue.
remote-console-q	Display debug messages about packets received by the remote console queue.
software-fwd-q	Debug packets received by the software forwarding queue.
stp-q	Debug packets received by the Spanning Tree Protocol (STP) queue.

Note Though visible in the command-line help strings, the **routing-protocol-Q** and **rpffail-q** keywords are not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform cpu-queues** command is the same as the **no debug platform cpu-queues** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform dot1x

Use the **debug platform dot1x** privileged EXEC command to enable debugging of IEEE 802.1x events. Use the **no** form of this command to disable debugging.

debug platform dot1x {**initialization** | **interface-configuration** | **rpc**}

no debug platform dot1x {**initialization** | **interface-configuration** | **rpc**}

Syntax Description

initialization	Display IEEE 802.1x-authentication initialization sequence debug messages.
interface-configuration	Display IEEE 802.1x interface configuration-related debug messages.
rpc	Display IEEE 802.1x remote procedure call (RPC) request debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform dot1x** command is the same as the **no debug platform dot1x** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform etherchannel

Use the **debug platform etherchannel** privileged EXEC command to enable debugging of platform-dependent EtherChannel events. Use the **no** form of this command to disable debugging.

debug platform etherchannel {**init** | **link-up** | **rpc** | **warnings**}

no debug platform etherchannel {**init** | **link-up** | **rpc** | **warnings**}

Syntax Description

init	Display EtherChannel module initialization debug messages.
link-up	Display EtherChannel link-up and link-down related debug messages.
rpc	Display EtherChannel remote procedure call (RPC) debug messages.
warnings	Display EtherChannel warning debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform etherchannel** command is the same as the **no debug platform etherchannel** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform forw-tcam

Use the **debug platform forw-tcam** privileged EXEC command to enable debugging of the forwarding ternary content addressable memory (TCAM) manager. Use the **no** form of this command to disable debugging.

debug platform forw-tcam [**adjustment** | **allocate** | **audit** | **error** | **move** | **read** | **write**]

no debug platform forw-tcam [**adjustment** | **allocate** | **audit** | **error** | **move** | **read** | **write**]

Syntax Description

adjustment	(Optional) Display TCAM manager adjustment debug messages.
allocate	(Optional) Display TCAM manager allocation debug messages.
audit	(Optional) Display TCAM manager audit messages.
error	(Optional) Display TCAM manager error messages.
move	(Optional) Display TCAM manager move messages.
read	(Optional) Display TCAM manager read messages.
write	(Optional) Display TCAM manager write messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

If you do not specify a keyword, all forwarding TCAM manager debug messages appear.

The **undebug platform forw-tcam** command is the same as the **no debug platform forw-tcam** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform ip dhcp

Use the **debug platform ip dhcp** privileged EXEC command to debug DHCP events. Use the **no** form of this command to disable debugging.

debug platform ip dhcp [**all** | **error** | **event** | **packet** | **rpc**]

no debug platform ip dhcp [**all** | **error** | **event** | **packet** | **rpc**]

Syntax Description

all	(Optional) Display all DHCP debug messages.
error	(Optional) Display DHCP error debug messages.
event	(Optional) Display DHCP event debug messages.
packet	(Optional) Display DHCP packet-related debug messages.
rpc	(Optional) Display DHCP remote procedure call (RPC) request debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(55)SE	This command was introduced.

Usage Guidelines

The **undebug platform ip dhcp** command is the same as the **no debug platform ip dhcp** command.

Related Commands

Command	Description
show ip dhcp snooping	Displays the DHCP snooping configuration.
show ip dhcp snooping binding	Displays the DHCP snooping binding information.
show debugging	Displays information about the types of debugging that are enabled.

debug platform ip igmp snooping

Use the **debug platform ip igmp snooping** privileged EXEC command to enable debugging of platform-dependent Internet Group Management Protocol (IGMP) snooping. Use the **no** form of this command to disable debugging.

debug platform ip igmp snooping {**all** | **di** | **error** | **event** | **group** | **mgmt** | **pak** | **retry** | **rpc** | **warn**}

debug platform ip igmp snooping pak {*ip-address* | **error** | **ipopt** | **leave**| **query** | **report** | **rx** | **svi** | **tx**}

debug platform ip igmp snooping rpc [**cfg** | **misc** | **vlan**]

no debug platform ip igmp snooping {**all** | **di** | **error** | **event** | **group** | **mgmt** | **pak** | **retry** | **rpc** | **warn**}

Syntax Description

all	Display all IGMP snooping debug messages.
di	Display IGMP snooping destination index (di) coordination remote procedure call (RPC) debug messages.
error	Display IGMP snooping error messages.
event	Display IGMP snooping event debug messages.
group	Display IGMP snooping group debug messages.
mgmt	Display IGMP snooping management debug messages.
pak {*ip-address* | **error** | **ipopt** | **leave** | **query** | **report** | **rx** | **svi** | **tx**}	Display IGMP snooping packet event debug messages. The keywords have these meanings: • *ip-address*—IP address of the IGMP group. • **error**—Display IGMP snooping packet error debug messages. • **ipopt**—Display IGMP snooping IP bridging options debug messages. • **leave**—Display IGMP snooping leave debug messages. • **query**—Display IGMP snooping query debug messages. • **report**—Display IGMP snooping report debug messages. • **rx**—Display IGMP snooping received packet debug messages. • **svi**—Display IGMP snooping switched virtual interface (SVI) packet debug messages. • **tx**—Display IGMP snooping sent packet debug messages.
retry	Display IGMP snooping retry debug messages.
rpc [**cfg** | **misc** | **vlan**]	Display IGMP snooping remote procedure call (RPC) event debug messages. The keywords have these meanings: • **cfg**—(Optional) Display IGMP snooping RPC debug messages. • **misc**—(Optional) IGMP snooping miscellaneous RPC debug messages. • **vlan**—(Optional) IGMP snooping VLAN assert RPC debug messages.
warn	Display IGMP snooping warning messages.

Note Though visible in the command-line help strings, the **rpc l3mm** keyword is not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform ip igmp snooping** command is the same as the **no debug platform ip igmp snooping** command.

Related Commands

Command	Description
debug ip igmp snooping	Displays information about platform-independent IGMP snooping activity.
show debugging	Displays information about the types of debugging that are enabled.

debug platform led

Use the **debug platform led** privileged EXEC command to enable debugging of LED actions. Use the **no** form of this command to disable debugging.

debug platform led {**generic** | **signal**}

no debug platform led {**generic** | **signal**}

Syntax Description

generic	Display LED generic action debug messages.
signal	Display LED signal bit map debug messages.

Note Though visible in the command-line help strings, the **stack** keyword is not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform led** command is the same as the **no debug platform led** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform matm

Use the **debug platform matm** privileged EXEC command to enable debugging of platform-dependent MAC address management. Use the **no** form of this command to disable debugging.

debug platform matm {**aging** | **all** | **ec-aging** | **errors** | **learning** | **rpc** | **secure-address** | **warnings**}

no debug platform matm {**aging** | **all** | **ec-aging** | **errors** | **learning** | **rpc** | **secure-address** | **warnings**}

Syntax Description

aging	Display MAC address aging debug messages.
all	Display all platform MAC address management event debug messages.
ec-aging	Display EtherChannel address aging-related debug messages.
errors	Display MAC address management error messages.
learning	Display MAC address management address-learning debug messages.
rpc	Display MAC address management remote procedure call (RPC) related debug messages.
secure-address	Display MAC address management secure address learning debug messages.
warning	Display MAC address management warning messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform matm** command is the same as the **no debug platform matm** command.

Related Commands

Command	Description
debug matm	Displays information about platform-independent MAC address management.
show debugging	Displays information about the types of debugging that are enabled.

debug platform messaging application

Use the **debug platform messaging application** privileged EXEC command to enable debugging of application messaging activity. Use the **no** form of this command to disable debugging.

debug platform messaging application {**all** | **badpak** | **cleanup** | **events** | **memerr** | **messages** | **usererr**}

no debug platform messaging application {**all** | **badpak** | **cleanup** | **events** | **memerr** | **messages** | **usererr**}

Syntax Description

all	Display all application-messaging debug messages.
badpak	Display bad-packet debug messages.
cleanup	Display clean-up debug messages.
events	Display event debug messages.
memerr	Display memory-error debug messages.
messages	Display application-messaging debug messages.
usererr	Display user-error debug messages.

Note Though visible in the command-line help strings, the **stackchg** keyword is not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform messaging application** command is the same as the **no debug platform messaging application** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform phy

Use the **debug platform phy** privileged EXEC command to enable debugging of PHY driver information. Use the **no** form of this command to disable debugging.

debug platform phy {**automdix** | **cablediag** | **dual-purpose** | **flcd** {**configure** | **ipc** | **iter** | **trace**} | **flowcontrol** | **forced** | **init-seq** | **link-status** | **read** | **sfp** | **show-controller** | **speed** | **write** | **xenpak**}

no debug platform phy {**automdix** | **cablediag** | **dual-purpose** | **flcd** {**configure** | **ipc** | **iter** | **trace**} | **flowcontrol** | **forced** | **init-seq** | **link-status** | **read** | **sfp** | **show-controller** | **speed** | **write** | **xenpak**}

Syntax Description

automdix	Display PHY automatic medium-dependent interface crossover (auto-MDIX) debug messages.
cablediag	Display PHY cable-diagnostic debug messages.
dual-purpose	Display PHY dual-purpose event debug messages.
flcd {**configure** | **ipc** | **iter** | **trace**}	Display PHY FLCD debug messages. The keywords have these meanings: • **configure**—Display PHY configure debug messages. • **ipc**—Display Interprocess Communication Protocol (IPC) debug messages. • **iter**—Display iter debug messages. • **trace**—Display trace debug messages.
flowcontrol	Display PHY flowcontrol debug messages.
forced	Display PHY forced-mode debug messages.
init-seq	Display PHY initialization-sequence debug messages.
link-status	Display PHY link-status debug messages.
read	Display PHY-read debug messages.
sfp	Display PHY small form-factor pluggable (SFP) modules debug messages.
show-controller	Display PHY show-controller debug messages.
speed	Display PHY speed-change debug messages.
write	Display PHY-write debug messages.
xenpak	Display PHY XENPAK debug messages

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform phy** command is the same as the **no debug platform phy** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform pm

Use the **debug platform pm** privileged EXEC command to enable debugging of the platform-dependent port manager software module. Use the **no** form of this command to disable debugging.

debug platform pm {**all** | **counters** | **errdisable** | **etherchnl** | **exceptions** | **hpm-events** | **idb-events** | **if-numbers** | **ios-events** | **link-status** | **platform** | **pm-events** | **pm-span** | **pm-vectors** [**detail**] | **rpc** [**general** | **oper-info** | **state** | **vectors** | **vp-events**] | **soutput-vectors** | **sync** | **vlans**}

no debug platform pm {**all** | **counters** | **errdisable** | **etherchnl** | **exceptions** | **hpm-events** | **idb-events** | **if-numbers** | **ios-events** | **link-status** | **platform** | **pm-events** | **pm-span** | **pm-vectors** [**detail**] | **rpc** [**general** | **oper-info** | **state** | **vectors** | **vp-events**] | **soutput-vectors** | **sync** | **vlans**}

Syntax Description

all	Display all port-manager debug messages.
counters	Display counters for remote procedure call (RPC) debug messages.
errdisable	Display error-disabled related-events debug messages.
etherchnl	Display EtherChannel related-events debug messages.
exceptions	Display system exception debug messages.
hpm-events	Display platform port-manager event debug messages.
idb-events	Display interface descriptor block (IDB) related-events debug messages.
if-numbers	Display interface-number translation-event debug messages.
ios-events	Display Cisco IOS event debug messages.
link-status	Display interface link-detection event debug messages.
platform	Display port-manager function-event debug messages.
pm-events	Display port manager event debug messages.
pm-span	Display port manager Switched Port Analyzer (SPAN) event debug messages.
pm-vectors [**detail**]	Display port-manager vector-related-event debug messages. The keyword has this meaning: • **detail**—Display vector-function details.
rpc [**general** | **oper-info** | **state** | **vectors** | **vp-events**]	Display RPC related-event debug messages. The keywords have these meanings: • **general**—(Optional) Display RPC general events. • **oper-info**—(Optional) Display operational- and informational-related RPC messages. • **state**—(Optional) Display administrative- and operational-related RPC messages. • **vectors**—(Optional) Display vector-related RPC messages. • **vp-events**—(Optional) Display virtual ports related-events RP messages.
soutput-vectors	Display IDB output vector event debug messages.
sync	Display operational synchronization and VLAN line-state event debug messages.
vlans	Display VLAN creation and deletion event debug messages.

Note Though visible in the command-line help strings, the **stack-manager** keyword is not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform pm** command is the same as the **no debug platform pm** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform port-asic

Use the **debug platform port-asic** privileged EXEC command to enable debugging of the port application-specific integrated circuit (ASIC) driver. Use the **no** form of this command to disable debugging.

debug platform port-asic {**interrupt** | **periodic** | **read** | **write**}

no debug platform port-asic {**interrupt** | **periodic** | **read** | **write**}

Syntax Description

interrupt	Display port-ASIC interrupt-related function debug messages.
periodic	Display port-ASIC periodic-function-call debug messages.
read	Display port-ASIC read debug messages.
write	Display port-ASIC write debug messages.

Note Though visible in the command-line help strings, the **stack** keyword is not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform port-asic** command is the same as the **no debug platform port-asic** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform port-security

Use the **debug platform port-security** privileged EXEC command to enable debugging of platform-dependent port-security information. Use the **no** form of this command to disable debugging.

debug platform port-security {**add** | **aging** | **all** | **delete** | **errors** | **rpc** | **warnings**}

no debug platform port-security {**add** | **aging** | **all** | **delete** | **errors** | **rpc** | **warnings**}

Syntax Description

add	Display secure address addition debug messages.
aging	Display secure address aging debug messages.
all	Display all port-security debug messages.
delete	Display secure address deletion debug messages.
errors	Display port-security error debug messages.
rpc	Display remote procedure call (RPC) debug messages.
warnings	Display warning debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform port-security** command is the same as the **no debug platform port-security** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform qos-acl-tcam

Use the **debug platform qos-acl-tcam** privileged EXEC command to enable debugging of the quality of service (QoS) and access control list (ACL) ternary content addressable memory (TCAM) manager software. Use the **no** form of this command to disable debugging.

debug platform qos-acl-tcam {**all** | **ctcam** | **errors** | **labels** | **mask** | **rpc** | **tcam**}

no debug platform qos-acl-tcam {**all** | **ctcam** | **errors** | **labels** | **mask** | **rpc** | **tcam**}

Syntax Description

all	Display all QoS and ACL TCAM (QATM) manager debug messages.
ctcam	Display Cisco TCAM (CTCAM) related-events debug messages.
errors	Display QATM error-related-events debug messages.
labels	Display QATM label-related-events debug messages.
mask	Display QATM mask-related-events debug messages.
rpc	Display QATM remote procedure call (RPC) related-events debug messages.
tcam	Display QATM TCAM-related events debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform qos-acl-tcam** command is the same as the **no debug platform qos-acl-tcam** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform resource-manager

Use the **debug platform resource-manager** privileged EXEC command to enable debugging of the resource manager software. Use the **no** form of this command to disable debugging.

debug platform resource-manager {**all** | **dm** | **erd** | **errors** | **madmed** | **sd** | **stats** | **vld**}

no debug platform resource-manager {**all** | **dm** | **erd** | **errors** | **madmed** | **sd** | **stats** | **vld**}

Syntax Description

all	Display all resource manager debug messages.
dm	Display destination-map debug messages.
erd	Display equal-cost-route descriptor-table debug messages.
errors	Display error debug messages.
madmed	Display the MAC address descriptor table and multi-expansion descriptor table debug messages.
sd	Display the station descriptor table debug messages.
stats	Display statistics debug messages.
vld	Display the VLAN-list descriptor debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform resource-manager** command is the same as the **no debug platform resource-manager** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform snmp

Use the **debug platform snmp** privileged EXEC command to enable debugging of the platform-dependent Simple Network Management Protocol (SNMP) software. Use the **no** form of this command to disable debugging.

debug platform snmp

no debug platform snmp

Syntax Description

This command has no arguments or keywords.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform snmp** command is the same as the **no debug platform snmp** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform span

Use the **debug platform span** privileged EXEC command to enable debugging of the platform-dependent Switched Port Analyzer (SPAN) software. Use the **no** form of this command to disable debugging.

debug platform span

no debug platform span

Syntax Description

This command has no arguments or keywords.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform span** command is the same as the **no debug platform span** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform supervisor-asic

Use the **debug platform supervisor-asic** privileged EXEC command to enable debugging of the supervisor application-specific integrated circuit (ASIC). Use the **no** form of this command to disable debugging.

debug platform supervisor-asic {**all** | **errors** | **receive** | **send**}

no debug platform supervisor-asic {**all** | **errors** | **receive** | **send**}

Syntax Description

all	Display all supervisor-ASIC event debug messages.
errors	Display the supervisor-ASIC error debug messages.
receive	Display the supervisor-ASIC receive debug messages.
send	Display the supervisor-ASIC send debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform supervisor-asic** command is the same as the **no debug platform supervisor-asic** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform sw-bridge

Use the **debug platform sw-bridge** privileged EXEC command to enable debugging of the software bridging function. Use the **no** form of this command to disable debugging.

debug platform sw-bridge {**broadcast** | **control** | **multicast** | **packet** | **unicast**}

no debug platform sw-bridge {**broadcast** | **control** | **multicast** | **packet** | **unicast**}

Syntax Description

broadcast	Display broadcast-data debug messages.
control	Display protocol-packet debug messages.
multicast	Display multicast-data debug messages.
packet	Display sent and received data debug messages.
unicast	Display unicast-data debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform sw-bridge** command is the same as the **no debug platform sw-bridge** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform tcam

Use the **debug platform tcam** privileged EXEC command to enable debugging of ternary content addressable memory (TCAM) access and lookups. Use the **no** form of this command to disable debugging.

debug platform tcam {**log** | **read** | **search** | **write**}

debug platform tcam log l2 {**acl** {**input** | **output**} | **local** | **qos**}

debug platform tcam log l3 {**acl** {**input** | **output**} | **qos**}

debug platform tcam read {**reg** | **ssram** | **tcam**}

debug platform tcam search

debug platform tcam write {**forw-ram** | **reg** | **tcam**}

no debug platform tcam {**log** | **read** | **search** | **write**}

no debug platform tcam log l2 {**acl** {**input** | **output**} | **local** | **qos**}

no debug platform tcam log l3 {**acl** {**input** | **output**} | **qos**}

no debug platform tcam read {**reg** | **ssram** | **tcam**}

no debug platform tcam search

no debug platform tcam write {**forw-ram** | **reg** | **tcam**}

Syntax Description

log l2 {**acl** {**input** | **output**} | **local** | **qos**}	Display Layer 2 field-based CAM look-up type debug messages. The keywords have these meanings: • **acl** {**input** | **output**}—Display input or output ACL look-up debug messages. • **local**—Display local forwarding look-up debug messages. • **qos**—Display classification and quality of service (QoS) look-up debug messages.
l3 {**acl** {**input** | **output**} | **qos**}	Display Layer 3 field-based CAM look-up type debug messages. The keywords have these meanings: • **acl** {**input** | **output**}—Display input or output ACL look-up debug messages. • **qos**—Display classification and quality of service (QoS) look-up debug messages.
read {**reg** | **ssram** | **tcam**}	Display TCAM-read debug messages. The keywords have these meanings: • **reg**—Display TCAM-register read debug messages. • **ssram**—Display synchronous static RAM (SSRAM)-read debug messages. • **tcam**—Display TCAM-read debug messages.

search	Display supervisor-initiated TCAM-search results debug messages.
write {**forw-ram** | **reg** | **tcam**}	Display TCAM-write debug messages. The keywords have these meanings: **forw-ram**—Display forwarding-RAM write debug messages. **reg**—Display TCAM-register write debug messages. **tcam**—Display TCAM-write debug messages.

Note Though visible in the command-line help strings, the **l3 ipv6** {**acl** {**input** \| **output**} \| **local** \| **qos** \| **secondary**}, the **l3 local**, and the **l3 secondary** keywords are not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform tcam** command is the same as the **no debug platform tcam** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform udld

Use the **debug platform udld** privileged EXEC command to enable debugging of the platform-dependent UniDirectional Link Detection (UDLD) software. Use the **no** form of this command to disable debugging.

debug platform udld [**all** | **error** | **rpc** {**events** | **messages**}]

no debug platform udld [**all** | **error** | **rpc** {**events** | **messages**}]

Syntax Description

all	(Optional) Display all UDLD debug messages.
error	(Optional) Display error condition debug messages.
rpc {**events** | **messages**}	(Optional) Display UDLD remote procedure call (RPC) debug messages. The keywords have these meanings: • **events**—Display UDLD RPC events. • **messages**—Display UDLD RPC messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform udld** command is the same as the **no debug platform udld** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug platform vlan

Use the **debug platform vlan** privileged EXEC command to enable debugging of the VLAN manager software. Use the **no** form of this command to disable debugging.

debug platform vlan {**errors** | **mvid** | **rpc**}

no debug platform vlan {**errors** | **mvid** | **rpc**}

Syntax Description

errors	Display VLAN error debug messages.
mvid	Display mapped VLAN ID allocations and free debug messages.
rpc	Display remote procedure call (RPC) debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug platform vlan** command is the same as the **no debug platform vlan** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug pm

Use the **debug pm** privileged EXEC command to enable debugging of port manager (PM) activity. The port manager is a state machine that controls all the logical and physical interfaces. All features, such as VLANs, UniDirectional Link Detection (UDLD), and so forth, work with the port manager to provide switch functions. Use the **no** form of this command to disable debugging.

debug pm {**all** | **assert** | **card** | **etherchnl** | **hatable** | **messages** | **port** | **redundancy** | **registry** | **sm** | **span** | **split** | **vlan** | **vp**}

no debug pm {**all** | **assert** | **card** | **etherchnl** | **hatable** | **messages** | **port** | **redundancy** | **registry** | **sm** | **span** | **split** | **vlan** | **vp**}

Syntax Description

all	Display all PM debug messages.
assert	Display assert debug messages.
card	Display line-card related-events debug messages.
etherchnl	Display EtherChannel related-events debug messages.
hatable	Display Host Access Table events debug messages.
messages	Display PM debug messages.
port	Display port related-events debug messages.
redundancy	Display redundancy debug messages.
registry	Display PM registry invocation debug messages.
sm	Display state-machine related-events debug messages.
span	Display spanning-tree related-events debug messages.
split	Display split-processor debug messages.
vlan	Display VLAN related-events debug messages.
vp	Display virtual port related-events debug messages.

Note Though visible in the command-line help strings, the **scp** and **pvlan** keywords are not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug pm** command is the same as the **no debug pm** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug port-security

Use the **debug port-security** privileged EXEC command to enable debugging of the allocation and states of the port security subsystem. Use the **no** form of this command to disable debugging.

debug port-security

no debug port-security

Syntax Description

This command has no arguments or keywords.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug port-security** command is the same as the **no debug port-security** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show port-security	Displays port-security settings for an interface or for the switch.

debug qos-manager

Use the **debug qos-manager** privileged EXEC command to enable debugging of the quality of service (QoS) manager software. Use the **no** form of this command to disable debugging.

debug qos-manager {**all** | **event** | **verbose**}

no debug qos-manager {**all** | **event** | **verbose**}

Syntax Description

all	Display all QoS-manager debug messages.
event	Display QoS-manager related-event debug messages.
verbose	Display QoS-manager detailed debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug qos-manager** command is the same as the **no debug qos-manager** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

debug spanning-tree

Use the **debug spanning-tree** privileged EXEC command to enable debugging of spanning-tree activities. Use the **no** form of this command to disable debugging.

debug spanning-tree {**all** | **backbonefast** | **bpdu** | **bpdu-opt** | **config** | **etherchannel** | **events** | **exceptions** | **general** | **mstp** | **pvst+** | **root** | **snmp** | **switch** | **synchronization** | **uplinkfast**}

no debug spanning-tree {**all** | **backbonefast** | **bpdu** | **bpdu-opt** | **config** | **etherchannel** | **events** | **exceptions** | **general** | **mstp** | **pvst+** | **root** | **snmp** | **switch** | **synchronization** | **uplinkfast**}

Syntax Description

all	Display all spanning-tree debug messages.
backbonefast	Display BackboneFast-event debug messages.
bpdu	Display spanning-tree bridge protocol data unit (BPDU) debug messages.
bpdu-opt	Display optimized BPDU handling debug messages.
config	Display spanning-tree configuration change debug messages.
etherchannel	Display EtherChannel-support debug messages.
events	Display spanning-tree topology event debug messages.
exceptions	Display spanning-tree exception debug messages.
general	Display general spanning-tree activity debug messages.
mstp	Debug Multiple Spanning Tree Protocol events.
pvst+	Display per-VLAN spanning-tree plus (PVST+) event debug messages.
root	Display spanning-tree root-event debug messages.
snmp	Display spanning-tree Simple Network Management Protocol (SNMP) handling debug messages.
synchronization	Display the spanning-tree synchronization event debug messages.
switch	Display switch shim command debug messages. This shim is the software module that is the interface between the generic Spanning Tree Protocol (STP) code and the platform-specific code of various switch platforms.
uplinkfast	Display UplinkFast-event debug messages.

Note Though visible in the command-line help strings, the **csuf/csrt** keyword is not supported.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug spanning-tree command is the** same as the **no debug spanning-tree** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show spanning-tree	Displays spanning-tree state information.

debug spanning-tree backbonefast

Use the **debug spanning-tree backbonefast** privileged EXEC command to enable debugging of spanning-tree BackboneFast events. Use the **no** form of this command to disable debugging.

debug spanning-tree backbonefast [**detail** | **exceptions**]

no debug spanning-tree backbonefast [**detail** | **exceptions**]

Syntax Description

detail	(Optional) Display detailed BackboneFast debug messages.
exceptions	(Optional) Display spanning-tree BackboneFast-exception debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug spanning-tree backbonefast** command is the same as the **no debug spanning-tree backbonefast** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show spanning-tree	Displays spanning-tree state information.

debug spanning-tree bpdu

Use the **debug spanning-tree bpdu** privileged EXEC command to enable debugging of sent and received spanning-tree bridge protocol data units (BPDUs). Use the **no** form of this command to disable debugging.

debug spanning-tree bpdu [**receive** | **transmit**]

no debug spanning-tree bpdu [**receive** | **transmit**]

Syntax Description

receive	(Optional) Display the nonoptimized path for received BPDU debug messages.
transmit	(Optional) Display the nonoptimized path for sent BPDU debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug spanning-tree bpdu** command is the same as the **no debug spanning-tree bpdu** command**.**

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show spanning-tree	Displays spanning-tree state information.

debug spanning-tree bpdu-opt

Use the **debug spanning-tree bpdu-opt** privileged EXEC command to enable debugging of optimized spanning-tree bridge protocol data units (BPDUs) handling. Use the **no** form of this command to disable debugging.

debug spanning-tree bpdu-opt [**detail** | **packet**]

no debug spanning-tree bpdu-opt [**detail** | **packet**]

Syntax Description

detail	(Optional) Display detailed optimized BPDU-handling debug messages.
packet	(Optional) Display packet-level optimized BPDU-handling debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug spanning-tree bpdu-opt** command is the same as the **no debug spanning-tree bpdu-opt** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show spanning-tree	Displays spanning-tree state information.

debug spanning-tree mstp

Use the **debug spanning-tree mstp** privileged EXEC command to enable debugging of the Multiple Spanning Tree Protocol (MSTP) software. Use the **no** form of this command to disable debugging.

debug spanning-tree mstp {**all** | **boundary** | **bpdu-rx** | **bpdu-tx** | **errors** | **flush** | **init** | **migration** | **pm** | **proposals** | **region** | **roles** | **sanity_check** | **sync** | **tc** | **timers**}

no debug spanning-tree mstp {**all** | **boundary** | **bpdu-rx** | **bpdu-tx** | **errors** | **flush** | **init** | **migration** | **pm** | **proposals** | **region** | **roles** | **sanity_check** | **sync** | **tc** | **timers**}

Syntax Description

all	Enable all the debugging messages.
boundary	Debug flag changes at these boundaries: • An multiple spanning-tree (MST) region and a single spanning-tree region running Rapid Spanning Tree Protocol (RSTP) • An MST region and a single spanning-tree region running 802.1D • An MST region and another MST region with a different configuration
bpdu-rx	Debug the received MST bridge protocol data units (BPDUs).
bpdu-tx	Debug the sent MST BPDUs.
errors	Debug MSTP errors.
flush	Debug the port flushing mechanism.
init	Debug the initialization of the MSTP data structures.
migration	Debug the protocol migration state machine.
pm	Debug MSTP port manager events.
proposals	Debug handshake messages between the designated switch and the root switch.
region	Debug the region synchronization between the switch processor (SP) and the route processor (RP).
roles	Debug MSTP roles.
sanity_check	Debug the received BPDU sanity check messages.
sync	Debug the port synchronization events.
tc	Debug topology change notification events.
timers	Debug the MSTP timers for start, stop, and expire events.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug spanning-tree mstp** command is the same as the **no debug spanning-tree mstp** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show spanning-tree	Displays spanning-tree state information.

debug spanning-tree switch

Use the **debug spanning-tree switch** privileged EXEC command to enable debugging of the software interface between the Spanning Tree Protocol (STP) software module and the port manager software module. Use the **no** form of this command to disable debugging.

debug spanning-tree switch {**all** | **errors** | **flush** | **general** | **helper** | **pm** | **rx** {**decode** | **errors** | **interrupt** | **process**} | **state** | **tx** [**decode**] | **uplinkfast**}

no debug spanning-tree switch {**all** | **errors** | **flush** | **general** | **helper** | **pm** | **rx** {**decode** | **errors** | **interrupt** | **process**} | **state** | **tx** [**decode**] | **uplinkfast**}

Syntax Description

all	Display all spanning-tree switch debug messages.
errors	Display debug messages for the interface between the spanning-tree software module and the port manager software module.
flush	Display debug messages for the shim flush operation.
general	Display general event debug messages.
helper	Display spanning-tree helper-task debug messages. Helper tasks handle bulk spanning-tree updates.
pm	Display port-manager event debug messages.
rx	Display received bridge protocol data unit (BPDU) handling debug messages. The keywords have these meanings: • **decode**—Display decoded received packets. • **errors**—Display receive error debug messages. • **interrupt**—Display interrupt service request (ISR) debug messages. • **process**—Display process receive BPDU debug messages.
state	Display spanning-tree port state change debug messages;
tx [**decode**]	Display sent BPDU handling debug messages. The keyword has this meaning: • **decode**—(Optional) Display decoded sent packets.
uplinkfast	Display uplinkfast packet transmission debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug spanning-tree switch** command is the same as the **no debug spanning-tree switch** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show spanning-tree	Displays spanning-tree state information.

debug spanning-tree uplinkfast

Use the **debug spanning-tree uplinkfast** privileged EXEC command to enable debugging of spanning-tree UplinkFast events. Use the **no** form of this command to disable debugging.

debug spanning-tree uplinkfast [**exceptions**]

no debug spanning-tree uplinkfast [**exceptions**]

Syntax Description

exceptions	(Optional) Display spanning-tree UplinkFast-exception debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug spanning-tree uplinkfast** command is the same as the **no debug spanning-tree uplinkfast** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show spanning-tree	Displays spanning-tree state information.

debug sw-vlan

Use the **debug sw-vlan** privileged EXEC command to enable debugging of VLAN manager activities. Use the **no** form of this command to disable debugging.

debug sw-vlan {**badpmcookies** | **cfg-vlan** {**bootup** | **cli**} | **events** | **ifs** | **management** | **mapping** | **notification** | **packets** | **redundancy** | **registries** | **vtp**}

no debug sw-vlan {**badpmcookies** | **cfg-vlan** {**bootup** | **cli**} | **events** | **ifs** | **management** | **mapping** | **notification** | **packets** | **redundancy** | **registries** | **vtp**}

Syntax Description

badpmcookies	Display debug messages for VLAN manager incidents of bad port manager cookies.
cfg-vlan {**bootup** | **cli**}	Display config-vlan debug messages. The keywords have these meanings: • **bootup**—Display messages when the switch is booting up. • **cli**—Display messages when the command-line interface (CLI) is in config-vlan mode.
events	Display debug messages for VLAN manager events.
ifs	See the **debug sw-vlan ifs** command.
management	Display debug messages for VLAN manager management of internal VLANs.
mapping	Display debug messages for VLAN mapping.
notification	See the **debug sw-vlan notification** command.
packets	Display debug messages for packet handling and encapsulation processes.
redundancy	Display debug messages for VTP VLAN redundancy.
registries	Display debug messages for VLAN manager registries.
vtp	See the **debug sw-vlan vtp** command.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug sw-vlan** command is the same as the **no debug sw-vlan** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show vlan	Displays the parameters for all configured VLANs or one VLAN (if the VLAN name or ID is specified) in the administrative domain.
show vtp	Displays general information about VTP management domain, status, and counters.

debug sw-vlan ifs

Use the **debug sw-vlan ifs** privileged EXEC command to enable debugging of the VLAN manager IOS file system (IFS) error tests. Use the **no** form of this command to disable debugging.

debug sw-vlan ifs {**open** {**read** | **write**} | **read** {**1** | **2** | **3** | **4**} | **write**}

no debug sw-vlan ifs {**open** {**read** | **write**} | **read** {**1** | **2** | **3** | **4**} | **write**}

Syntax Description

open {**read** | **write**}	Display VLAN manager IFS file-open operation debug messages. The keywords have these meanings: • **read**—Display VLAN manager IFS file-read operation debug messages. • **write**—Display VLAN manager IFS file-write operation debug messages.
read {**1** | **2** | **3** | **4**}	Display file-read operation debug messages for the specified error test (1, 2, 3, or 4).
write	Display file-write operation debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug sw-vlan ifs** command is the same as the **no debug sw-vlan ifs** command.

When selecting the file read operation, Operation **1** reads the file header, which contains the header verification word and the file version number. Operation **2** reads the main body of the file, which contains most of the domain and VLAN information. Operation **3** reads type length version (TLV) descriptor structures. Operation **4** reads TLV data.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show vlan	Displays the parameters for all configured VLANs or one VLAN (if the VLAN name or ID is specified) in the administrative domain.

debug sw-vlan notification

Use the **debug sw-vlan notification** privileged EXEC command to enable debugging of the activation and deactivation of Inter-Link Switch (ISL) VLAN IDs. Use the **no** form of this command to disable debugging.

debug sw-vlan notification {**accfwdchange** | **allowedvlancfgchange** | **fwdchange** | **linkchange** | **modechange** | **pruningcfgchange** | **statechange**}

no debug sw-vlan notification {**accfwdchange** | **allowedvlancfgchange** | **fwdchange** | **linkchange** | **modechange** | **pruningcfgchange** | **statechange**}

Syntax Description

accfwdchange	Display debug messages for VLAN manager notification of aggregated access interface spanning-tree forward changes.
allowedvlancfgchange	Display debug messages for VLAN manager notification of changes to the allowed VLAN configuration.
fwdchange	Display debug messages for VLAN manager notification of spanning-tree forwarding changes.
linkchange	Display debug messages for VLAN manager notification of interface link-state changes.
modechange	Display debug messages for VLAN manager notification of interface mode changes.
pruningcfgchange	Display debug messages for VLAN manager notification of changes to the pruning configuration.
statechange	Display debug messages for VLAN manager notification of interface state changes.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug sw-vlan notification** command is the same as the **no debug sw-vlan notification** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show vlan	Displays the parameters for all configured VLANs or one VLAN (if the VLAN name or ID is specified) in the administrative domain.

debug sw-vlan vtp

Use the **debug sw-vlan vtp** privileged EXEC command to enable debugging of the VLAN Trunking Protocol (VTP) code. Use the **no** form of this command to disable debugging.

debug sw-vlan vtp {**events** | **packets** | **pruning** [**packets** | **xmit**] | **redundancy** | **xmit**}

no debug sw-vlan vtp {**events** | **packets** | **pruning** | **redundancy** | **xmit**}

Syntax Description

events	Display debug messages for general-purpose logic flow and detailed VTP messages generated by the VTP_LOG_RUNTIME macro in the VTP code.
packets	Display debug messages for the contents of all incoming VTP packets that have been passed into the VTP code from the IOS VTP platform-dependent layer, except for pruning packets.
pruning [**packets** | **xmit**]	Display debug messages generated by the pruning segment of the VTP code. The keywords have these meanings: • **packets**—(Optional) Display debug messages for the contents of all incoming VTP pruning packets that have been passed into the VTP code from the IOS VTP platform-dependent layer. • **xmit**—(Optional) Display debug messages for the contents of all outgoing VTP packets that the VTP code requests the IOS VTP platform-dependent layer to send.
redundancy	Display debug messages for VTP redundancy.
xmit	Display debug messages for the contents of all outgoing VTP packets that the VTP code requests the IOS VTP platform-dependent layer to send, except for pruning packets.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug sw-vlan vtp** command is the same as the **no debug sw-vlan vtp** command.

If no further parameters are entered after the **pruning keyword**, VTP pruning debugging messages appear. They are generated by the VTP_PRUNING_LOG_NOTICE, VTP_PRUNING_LOG_INFO, VTP_PRUNING_LOG_DEBUG, VTP_PRUNING_LOG_ALERT, and VTP_PRUNING_LOG_WARNING macros in the VTP pruning code.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show vtp	Displays general information about VTP management domain, status, and counters.

debug udld

Use the **debug udld** privileged EXEC command to enable debugging of the UniDirectional Link Detection (UDLD) feature. Use the **no** form of this command to disable UDLD debugging.

debug udld {**events** | **packets** | **registries**}

no debug udld {**events** | **packets** | **registries**}

Syntax Description

events	Display debug messages for UDLD process events as they occur.
packets	Display debug messages for the UDLD process as it receives packets from the packet queue and tries to send them at the request of the UDLD protocol code.
registries	Display debug messages for the UDLD process as it processes registry calls from the UDLD process-dependent module and other feature modules.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug udld** command is the same as the **no debug udld** command.

For **debug udld events**, these debugging messages appear:

- General UDLD program logic flow
- State machine state changes
- Program actions for the set and clear ErrDisable state
- Neighbor cache additions and deletions
- Processing of configuration commands
- Processing of link-up and link-down indications

For **debug udld packets**, these debugging messages appear:

- General packet processing program flow on receipt of an incoming packet
- Indications of the contents of the various pieces of packets received (such as type length versions [TLVs]) as they are examined by the packet reception code
- Packet transmission attempts and the outcome

For **debug udld registries**, these categories of debugging messages appear:

- Sub-block creation
- Fiber-port status changes

- State change indications from the port manager software
- MAC address registry calls

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.
show udld	Displays UDLD administrative and operational status for all ports or the specified port.

debug vqpc

Use the **debug vqpc** privileged EXEC command to enable debugging of the VLAN Query Protocol (VQP) client. Use the **no** form of this command to disable debugging.

debug vqpc [**all** | **cli** | **events** | **learn** | **packet**]

no debug vqpc [**all** | **cli** | **events** | **learn** | **packet**]

Syntax Description

all	(Optional) Display all VQP client debug messages.
cli	(Optional) Display the VQP client command-line interface (CLI) debug messages.
events	(Optional) Display VQP client event debug messages.
learn	(Optional) Display VQP client address learning debug messages.
packet	(Optional) Display VQP client packet information debug messages.

Defaults

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

The **undebug vqpc** command is the same as the **no debug vqpc** command.

Related Commands

Command	Description
show debugging	Displays information about the types of debugging that are enabled.

APPENDIX C

Catalyst 2918 Switch Show Platform Commands

This appendix describes the **show platform** privileged EXEC commands that have been created or changed for use with the Catalyst 2918 switch. These commands display information helpful in diagnosing and resolving internetworking problems and should be used only under the guidance of Cisco technical support staff.

show platform etherchannel

Use the **show platform etherchannel** privileged EXEC command to display platform-dependent EtherChannel information.

show platform etherchannel {**flags** | **time-stamps**}

Syntax Description

flags	Display EtherChannel port flags.
time-stamps	Display EtherChannel time stamps.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with a technical support representative while troubleshooting a problem. Do not use this command unless a technical support representative asks you to do so.

show platform forward

Use the **show platform forward** privileged EXEC command for an interface to specify how the hardware would forward a frame that matches the specified parameters.

show platform forward *interface-id* [**vlan** *vlan-id*] *src-mac dst-mac* [*l3protocol-id*] [**sap** | **snap**] [**cos** *cos*] [**ip** *src-ip dst-ip* [**frag** *field*] [**dscp** *dscp*] {*l4protocol-id* | **icmp** *icmp-type icmp-code* | **igmp** *igmp-version igmp-type* | **sctp** *src-port dst-port* | **tcp** *src-port dst-port flags* | **udp** *src-port dst-port*]}

Syntax Description

interface-id	The input physical interface, the port on which the packet comes in to the switch (including type and port number).
vlan *vlan-id*	(Optional) Input VLAN ID. The range is 1 to 4094. If not specified, and the input interface is not a routed port, the default is 1.
src-mac	48-bit source MAC address.
dst-mac	48-bit destination MAC address.
l3protocol-id	(Optional) The Layer 3 protocol used in the packet. The number is a value 0 to 65535.
sap	(Optional) Service access point (SAP) encapsulation type.
snap	(Optional) Subnetwork Access Protocol (SNAP) encapsulation type.
cos *cos*	(Optional) Class of service (CoS) value of the frame. The range is 0 to 7.
ip *src-ip dst-ip*	(Optional, but required for IP packets) Source and destination IP addresses in dotted decimal notation.
frag *field*	(Optional) The IP fragment field for a fragmented IP packet. The range is 0 to 65535.
dscp *dscp*	(Optional) Differentiated Services Code Point (DSCP) field in the IP header. The range is 0 to 63.
l4protocol-id	The numeric value of the Layer 4 protocol field in the IP header. The range is 0 to 255. For example, 47 is generic routing encapsulation (GRE), and 89 is Open Shortest Path First (OSPF). If the protocol is TCP, User Datagram Protocol (UDP), Internet Control Message Protocol (ICMP), or Internet Group Management Protocol (IGMP), you should use the appropriate keyword instead of a numeric value.
icmp *icmp-type icmp-code*	ICMP parameters. The *icmp-type* and *icmp-code* ranges are 0 to 255.
igmp *igmp-version igmp-type*	IGMP parameters. The *igmp-version* range is 1 to 15; the *igmp-type* range is 0 to 15.
sctp *src-port dst-port*	Stream Control Transmission Protocol (SCTP) parameters. The ranges for the SCTP source and destination ports are 0 to 65535.
tcp *src-port dst-port flags*	TCP parameters: TCP source port, destination port, and the numeric value of the TCP flags byte in the header. The *src-port* and *dst-port* ranges are 0 to 65535. The flag range is 0 to 1024.
udp *src-port dst-port*	UDP parameters. The *src-port* and *dst-port* ranges are 0 to 65535.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with a technical support representative while troubleshooting a problem. Do not use this command unless a technical support representative asks you to do so.

Examples

For examples of the **show platform forward** command output displays and what they mean, see the "Troubleshooting" chapter of the software configuration guide for this release.

show platform ip igmp snooping

Use the **show platform ip igmp snooping** privileged EXEC command to display platform-dependent Internet Group Management Protocol (IGMP) snooping information.

show platform ip igmp snooping {**all** | **control** [**di**] | **counters** | **flood** [**vlan** *vlan-id*] | **group** *ip-address* | **hardware** | **retry** [**count** | **local** [**count**] | **remote** [**count**]]}

Syntax Description

all	Display all IGMP snooping platform IP multicast information.
control [**di**]	Display IGMP snooping control entries. The keyword has this meaning: • **di**—(Optional) Display IGMP snooping control destination index entries.
counters	Display IGMP snooping counters.
flood [**vlan** *vlan-id*]	Display IGMP snooping flood information. The keyword has this meaning: • **vlan** *vlan-id*—(Optional) Display flood information for the specified VLAN. The range is 1 to 4094.
group *ip-address*	Display the IGMP snooping multicast group information, where *ip-address* is the IP address of the group.
hardware	Display IGMP snooping information loaded into hardware.
retry [**count** | **local** [**count**]	Display IGMP snooping retry information. The keywords have these meanings: • **count**—(Optional) Display only the retry count. • **local**—(Optional) Display local retry entries.
remote [**count**]	Display remote entries. The keyword has this meaning: • **count**—(Optional) Display only the remote count.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with a technical support representative while troubleshooting a problem. Do not use this command unless a technical support representative asks you to do so.

show platform layer4op

Use the **show platform layer4op** privileged EXEC command to display platform-dependent Layer 4 operator information.

show platform layer4op {**acl** | **pacl** [*port-asic*] | **qos** [*port-asic*] | **vcu**}

Syntax Description

acl	Display access control list (ACL) Layer 4 operators information.
pacl [*port-asic*]	Display port ACL Layer 4 operators information. The keyword has this meaning: • *port-asic*—(Optional) Port ASIC number.
qos [*port-asic*]	Display quality of service (QoS) Layer 4 operators information. The keyword has this meaning: • *port-asic*—(Optional) QoS port ASIC number.
vcu	Display value compare unit (VCU) register information.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with a technical support representative while troubleshooting a problem. Do not use this command unless a technical support representative asks you to do so.

show platform mac-address-table

Use the **show platform mac-address-table** privileged EXEC command to display platform-dependent MAC address table information.

show platform mac-address-table [**aging-array** | **hash-table** | **mac-address** *mac-address*] [**vlan** *vlan-id*]]

Syntax Description

aging-array	(Optional) Display the MAC address table aging array.
hash-table	(Optional) Display the MAC address table hash table.
mac-address *mac-address*	(Optional) Display the MAC address table MAC address information, where *mac-address* is the 48-bit hardware address.
vlan *vlan-id*	(Optional) Display information for the specified VLAN. The range is 1 to 4094.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with a technical support representative while troubleshooting a problem. Do not use this command unless a technical support representative asks you to do so.

show platform messaging

Use the **show platform messaging** privileged EXEC command to display platform-dependent application and performance message information.

show platform messaging {**application** [**incoming** | **outgoing** | **summary**] | **hiperf** [*class-number*]}

Syntax Description

application [**incoming** | **outgoing** | **summary**]	Display application message information. The keywords have these meanings: • **incoming**—(Optional) Display only information about incoming application messaging requests. • **outgoing**—(Optional) Display only information about incoming application messaging requests. • **summary**—(Optional) Display summary information about all application messaging requests.
hiperf [*class-number*]	Display outgoing high-performance message information. Specify the *class-number* option to display information about high-performance messages for this class number. The range is 0 to 36.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with a technical support representative while troubleshooting a problem. Do not use this command unless a technical support representative asks you to do so.

show platform monitor

Use the **show platform monitor** privileged EXEC command to display platform-dependent Switched Port Analyzer (SPAN) information.

show platform monitor [**session** *session-number*]

Syntax Description

session *session-number*	(Optional) Display SPAN information for the specified SPAN session. The range is 1 to 66.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with a technical support representative while troubleshooting a problem. Do not use this command unless a technical support representative asks you to do so.

show platform pm

Use the **show platform pm** privileged EXEC command to display platform-dependent port-manager information.

show platform pm {**counters** | **group-masks** | **idbs** {**active-idbs** | **deleted-idbs**} | **if-numbers** | **link-status** | **platform-block** | **port-info** *interface-id* | **vlan** {**info** | **line-state**}

Syntax Description

counters	Display module counters information.
group-masks	Display EtherChannel group masks information.
idbs {**active-idbs** | **deleted-idbs**}	Display interface data block (IDB) information. The keywords have these meanings: • **active-idbs**—Display active IDB information. • **deleted-idbs**—Display deleted and leaked IDB information.
if-numbers	Display interface numbers information.
link-status	Display local port link status information.
platform-block	Display platform port block information.
port-info *interface-id*	Display port administrative and operation fields for the specified interface.
vlan {**info** | **line-state**}	Display platform VLAN information. The keywords have these meanings: • **info**—Display information for active VLANs. • **line-state**—Display line-state information.

Note Though visible in the command-line help strings, the **stack-view** keyword is not supported.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with your technical support representative while troubleshooting a problem. Do not use this command unless your technical support representative asks you to do so.

show platform port-asic

Use the **show platform port-asic** privileged EXEC command to display platform-dependent port ASIC register information.

show platform port-asic {**cpu-queue-map-table** [**asic** *number* | **port** *number* [**asic** *number*]] |
dest-map index *number* |
etherchannel-info [**asic** *number* | **port** *number* [**asic** *number*]] |
exception [**asic** *number* | **port** *number* [**asic** *number*]] |
global-status [**asic** *number* | **port** *number* [**asic** *number*]] |
learning [**asic** *number* | **port** *number* [**asic** *number*]] |
mac-info [**asic** *number* | **port** *number* [**asic** *number*]] |
mvid [**asic** *number*] |
packet-info-ram [**asic** *number* | **index** *number* [**asic** *number*]] |
port-info [**asic** *number* | **port** *number* [**asic** *number*]] |
prog-parser [**asic** *number* | **port** *number* [**asic** *number*]] |
receive {**buffer-queue** | **port-fifo** | **supervisor-sram**} [**asic** *number* | **port** *number* [**asic** *number*]] |
span [*vlan-id* [**asic** *number*] | [**asic** *number*]
stats {**drop** | **enqueue** | **miscellaneous** | **supervisor**} [**asic** *number* | **port** *number* [**asic** *number*]] |
transmit {**port-fifo** | **queue** | **supervisor-sram**} [**asic** *number* | **port** *number* [**asic** *number*]]
vct [**asic** *number* | **port** *number* [**asic** *number*]]
version}

Syntax Description

cpu-queue-map-table [**asic** *number*	**port** *number* [**asic** *number*]]	Display the CPU queue-map table entries. The keywords have these meanings: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27.
dest-map index *number*	Display destination-map information for the specified index. The range is 0 to 65535.
etherchannel-info [**asic** *number*	**port** *number* [**asic** *number*]]	Display the contents of the EtherChannel information register. The keywords have these meanings: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.
exception [**asic** *number*	**port** *number* [**asic** *number*]]	Display the exception-index register information. The keywords have these meanings: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.

global-status [**asic** *number* | **port** *number* [**asic** *number*]]	Display global and interrupt status. The keywords have these meanings: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.
learning [**asic** *number* | **port** *number* [**asic** *number*]]	Display entries in the learning cache. The keywords have these meanings: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.
mac-info [**asic** *number* | **port** *number* [**asic** *number*]]	Display the contents of the MAC information register. The keywords have these meanings: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.
mvid [**asic** *number*]	Display the mapped VLAN ID table. The keyword has this meaning: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1.
packet-info-ram [**asic** *number* | **index** *number* [**asic** *number*]]	Display the packet information RAM. The keywords have these meanings: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **index** *number*—(Optional) Display information for the specified packet RAM index number and ASIC number. The range is 0 to 63.
port-info [**asic** *number* | **port** *number* [**asic** *number*]]	Display port information register values. The keywords have these meanings: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.

prog-parser [**asic** *number* | **port** *number* [**asic** *number*]]	Display the programmable parser tables. The keywords have these meanings: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.
receive {**buffer-queue** | **port-fifo** | **supervisor-sram**} [**asic** *number* | **port** *number* [**asic** *number*]]	Display receive information. The keywords have these meanings: • **buffer-queue**—Display the buffer queue information. • **port-fifo**—Display the port-FIFO information. • **supervisor-sram**—Display the supervisor static RAM (SRAM) information. • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.
span [*vlan-id* | **asic** *number*]	Display the Switched Port Analyzer (SPAN)-related information. The keywords have these meanings: • *vlan-id*—(Optional) Display information for the specified VLAN. The range is 0 to 1023. • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1.
stats {**drop** | **enqueue** | **miscellaneous** | **supervisor**} [**asic** *number* | **port** *number* [**asic** *number*]]	Display raw statistics for the port ASIC. The keywords have these meanings: • **drop**—Display drop statistics. • **enqueue**—Display enqueue statistics. • **miscellaneous**—Display miscellaneous statistics. • **supervisor**—Display supervisor statistics. • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.

transmit {**port-fifo** | **queue** | **supervisor-sram**} [**asic** *number* | **port** *number* [**asic** *number*]]	Display transmit information. The keywords have these meanings: • **port-fifo**—Display the contents of the port-FIFO information register. • **queue**—Display the contents of the queue information register. • **supervisor-sram**—Display supervisor SRAM information. • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.
vct [**asic** *number* | **port** *number* [**asic** *number*]]	Display the VLAN compression table entries for the specified ASIC or for the specified port and ASIC. The keywords have these meanings: • **asic** *number*—(Optional) Display information for the specified ASIC. The range is 0 to 1. • **port** *number*—(Optional) Display information for the specified port and ASIC number. The range is 0 to 27, where 0 is the supervisor and 1 to 25 are the ports.
version	Display version and device type information for port ASICs.

Note Though visible in the command-line help strings, the **stack** {**control** | **dest-map** | **learning** | **messages** | **mvid** | **prog-parser** | **span** | **stats** [**asic** *number* | **port** *number* [**asic** *number*]] keywords are not supported.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with your technical support representative while troubleshooting a problem. Do not use this command unless your technical support representative asks you to do so.

show platform port-security

Use the **show platform port-security** privileged EXEC command to display platform-dependent port-security information.

show platform port-security

Syntax Description

There are no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with your technical support representative while troubleshooting a problem. Do not use this command unless your technical support representative asks you to do so.

show platform qos

Use the **show platform qos** privileged EXEC command to display platform-dependent quality of service (QoS) information.

show platform qos {**label asic** *number* | **policer** {**parameters asic** *number* | **port alloc** *number* **asic** *number*}}

Syntax Description

label asic *number*	Display QoS label maps for the specified ASIC. (Optional) For **asic** *number*, the range is 0 to 1.
policer {**parameters asic** *number* | **port alloc** *number* **asic** *number*}	Display policer information. The keywords have these meanings: • **parameters asic** *number*—Display parameter information for the specified ASIC. The range is 0 to 1. • **port alloc** *number* **asic** *number*—Display port allocation information for the specified port and ASIC. The port allocation range is 0 to 25. The ASIC range is 0 to 1.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with your technical support representative while troubleshooting a problem. Do not use this command unless your technical support representative asks you to do so.

show platform resource-manager

Use the **show platform resource-manager** privileged EXEC command to display platform-dependent resource-manager information.

show platform resource-manager {**dm** [**index** *number*] | **erd** [**index** *number*] | **mad** [**index** *number*] | **med** [**index** *number*] | **mod** | **msm** {**hash-table** [**vlan** *vlan-id*] | **mac-address** *mac-address* [**vlan** *vlan-id*]} | **sd** [**index** *number*] | **vld** [**index** *number*]}

Syntax Description

dm [**index** *number*]	Display the destination map. The keyword has this meaning: • **index** *number*—(Optional) Display the specified index. The range is 0 to 65535.
erd [**index** *number*]	Display the equal-cost-route descriptor table for the specified index. The keyword has this meaning: • **index** *number*—(Optional) Display the specified index. The range is 0 to 65535.
mad [**index** *number*]	Display the MAC-address descriptor table for the specified index. The keyword has this meaning: • **index** *number*—(Optional) Display the specified index. The range is 0 to 65535.
med [**index** *number*]	Display the multi-expansion descriptor table for the specified index. The keyword has this meaning: • **index** *number*—(Optional) Display the specified index. The range is 0 to 65535.
mod	Display the resource-manager module information.
msm {**hash-table** [**vlan** *vlan-id*] | **mac-address** *mac-address* [**vlan** *vlan-id*]}	Display the MAC-address descriptor table and the station descriptor table information. The keywords have these meanings: • **hash-table** [**vlan** *vlan-id*]—Display the hash table for all VLANs or the specified VLAN. The range is 1 to 4094. • **mac-address** *mac-address* [**vlan** *vlan-id*]—Display the MAC-address descriptor table for the specified MAC address represented by the 48-bit hardware address for all VLANs or the specified VLAN. The range is 1 to 4094.
sd [**index** *number*]	Display the station descriptor table for the specified index. The keyword has this meaning: • **index** *number*—(Optional) Display the specified index. The range is 0 to 65535.
vld [**index** *number*]	Display the VLAN-list descriptor table for the specified index. The keyword has this meaning: • **index** *number*—(Optional) Display the specified index. The range is 0 to 65535.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with your technical support representative while troubleshooting a problem. Do not use this command unless your technical support representative asks you to do so.

show platform snmp counters

Use the **show platform snmp counters** privileged EXEC command to display platform-dependent Simple Network Management Protocol (SNMP) counter information.

show platform snmp counters

Syntax Description

There are no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with your technical support representative while troubleshooting a problem. Do not use this command unless your technical support representative asks you to do so.

show platform spanning-tree

Use the **show platform spanning-tree** privileged EXEC command to display platform-dependent spanning-tree information.

show platform spanning-tree synchronization [**detail | vlan** *vlan-id*]

Syntax Description

synchronization [**detail	vlan** *vlan-id*]	Display spanning-tree state synchronization information. The keywords have these meanings: • **detail**—(Optional) Display detailed spanning-tree information. • **vlan** *vlan-id*—(Optional) Display VLAN switch spanning-tree information for the specified VLAN. The range is 1 to 4094.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with your technical support representative while troubleshooting a problem. Do not use this command unless your technical support representative asks you to do so.

show platform stp-instance

Use the **show platform stp-instance** privileged EXEC command to display platform-dependent spanning-tree instance information.

show platform stp-instance *vlan-id*

Syntax Description

vlan-id	Display spanning-tree instance information for the specified VLAN. The range is 1 to 4094.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with your technical support representative while troubleshooting a problem. Do not use this command unless your technical support representative asks you to do so.

show platform tcam

Use the **show platform tcam** privileged EXEC command to display platform-dependent ternary content addressable memory (TCAM) driver information.

show platform tcam {**errors** | **handle** *number* | **log-results** | **table** {**acl** | **all** | **local** | **mac-address** | **qos** | **station** | **vlan-list**} | **usage**} [**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

show platform tcam table acl [**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

show platform tcam table all [**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

[**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]] [| {**begin** | **exclude** | **include**} *expression*] [**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

show platform tcam table local [**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

show platform tcam table mac-address [**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

[**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

show platform tcam table qos [**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

[**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

show platform tcam table station [**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

show platform tcam table vlan-list [[**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]

Syntax Description

errors	Displays TCAM memory consistency check errors in the Hulc Quality of Service (QoS)/access control list (ACL) TCAM Manager (HQATM), Hulc Forwarding TCAM Manager (HFTM), and unassigned spaces on the TCAM.
handle *number*	Display the TCAM handle. The range is 0 to 4294967295.
log-results	Display the TCAM log results.
table {**acl** | **all** | **local** | **mac-address** | **qos** | **station** | **vlan-list**}	Display lookup and forwarding table information. The keywords have these meanings: • **acl**—Display the access-control list (ACL) table. • **all**—Display all the TCAM tables. • **local**—Display the local table. • **mac-address**—Display the MAC-address table. • **qos**—Display the QoS table. • **station**—Display the station table. • **vlan-list**—Display the VLAN list table.
usage	Display the CAM and forwarding table usage.
[[**asic** *number* [**detail** [**invalid**]] | [**index** *number* [**detail** [**invalid**]] | **invalid** | **num** *number* [**detail** [**invalid**]] | **invalid**] | [**invalid**] | [**num** *number* [**detail** [**invalid**]] | **invalid**]]	Display information. The keywords have these meanings: • **asic** *number*—Display information for the specified ASIC device ID. The range is 0 to 15. • **detail** [**invalid**]—(Optional) Display valid or invalid details. • **index** *number*—(Optional) Display information for the specified TCAM table index. The range is 0 to 32768. • **num** *number*—(Optional) Display information for the specified TCAM table number. The range is 0 to 32768.

Note Though visible in the command-line help strings, the **ipv6**, **equal-cost-route**, **multicast-expansion**, **secondary,** and **usage** keywords are not supported.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.
12.2(55)SE	The **errors** keyword was added.

Usage Guidelines

You should use this command only when you are working directly with your technical support representative while troubleshooting a problem. Do not use this command unless your technical support representative asks you to do so.

show platform vlan

Use the **show platform vlan** privileged EXEC command to display platform-dependent VLAN information.

show platform vlan {**misc** | **mvid** | **prune** | **refcount** | **rpc** {**receive** | **transmit**}}

Syntax Description

misc	Display miscellaneous VLAN module information.
mvid	Display the mapped VLAN ID (MVID) allocation information.
prune	Display the pruning database.
refcount	Display the VLAN lock module-wise reference counts.
rpc {**receive** | **transmit**}	Display remote procedure call (RPC) messages. The keywords have these meanings: • **receive**—Display received information. • **transmit**—Display sent information.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(44)SE	This command was introduced.

Usage Guidelines

You should use this command only when you are working directly with your technical support representative while troubleshooting a problem. Do not use this command unless your technical support representative asks you to do so.

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