



CHAPTER 2

Catalyst 2350 Switch Cisco IOS Commands

aaa authorization network

Use the **aaa authorization network** global configuration command to configure the switch to use user-RADIUS authorization for all network-related service requests, such as 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.
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Defaults

Authorization is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

Use the **aaa authorization network default group radius** global configuration command to allow the switch to download 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 operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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 [/allow-feature-upgrade | /directory | /force-reload | /imageonly |  
/leave-old-sw | /no-set-boot | /no-version-check | /only-system-type system-type | /overwrite  
| /reload | /safe] source-url1 [source-url2 source-url3 source-url4]
```

```
archive download-sw [/allow-feature-upgrade | /directory | /force-reload | /imageonly |  
/leave-old-sw | /no-set-boot | /overwrite | /reload | /safe] /directory source-url1 [source-url2  
source-url3 source-url4]
```

Syntax Description	
/allow-feature-upgrade	Allow installation of software images with different feature sets (for example, upgrade from the IP base feature set to the IP services features set).
/directory	Specify a directory for all of the images.
/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.

<i>source-url1</i> [<i>sourceurl2</i>	The source URLs for the software images.
<i>sourceurl3 sourceurl4</i>]	Enter one source URL for the software image that the switch supports.
	The <i>image-name.tar</i> is the software image to download and install on the switch.
	These options are supported:
	<ul style="list-style-type: none"> Local flash file system syntax: flash: FTP syntax: ftp:[[/username[:password]@location]/directory]/image-name.tar HTTP server syntax: http:[[/username:password@]{hostname host-ip}[/directory]/image-name.tar Secure HTTP server syntax: https:[[/username:password@]{hostname host-ip}[/directory]/image-name.tar Remote Copy Protocol (RCP) syntax: rcp:[[/username@location]/directory]/image-name.tar Secure Copy Protocol (SCP) syntax for the: scp:[[/username@location]/directory]/image-name.tar The syntax for the TFTP: tftp:[[/location]/directory]/image-name.tar

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(46)EY	This command was introduced.

Usage Guidelines

Use the **/allow-feature-upgrade** option to allow installation of an image with a different feature set, for example, upgrading from the IP base feature set to the IP services feature.

You can use the **archive download-sw /directory** command to specify a directory only once, followed by a tar file or list of tar files to be downloaded, instead of specifying complete paths with each tar file.

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 2-50.

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.

Use the **/directory** option to specify a directory for the images.

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
```

This example specifies the location of two tar images without having to specify the path each time:

```
Switch# archive download-sw tftp://10.1.1.10/  
c2350-lanlite-tar.122-46.EY.tar c2350-lanlitek9-tar.122-46.EY.tar
```

This example specifies the location of three tar images without having to specify the path each time:

```
Switch# archive download-sw /directory tftp://10.1.1.10/  
c2350-lanlite-tar.122-46.EY.tar 2350-lanlitek9-tar.122-46.EY.tar  
c2350-lanlitek9-mz.122-46.EY.bin
```

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 the 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):
rnp:[[//*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 the 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 <i>source-url</i>	<p>Display the contents of an existing tar file to the screen.</p> <p>For <i>source-url</i>, specify the source URL alias for the local or network file system. These options are supported:</p> <ul style="list-style-type: none"> • The syntax for the local flash file system: flash: • The syntax for the FTP: ftp:<code>[[/username[:password]@location]/directory]/tar-filename.tar</code> • The syntax for an HTTP server: http:<code>[[/username:password]@]{hostname host-ip}/[directory]/image-name.tar</code> • The syntax for a secure HTTP server: https:<code>[[/username:password]@]{hostname host-ip}/[directory]/image-name.tar</code> • The syntax for the RCP: rcp:<code>[[/username@location]/directory]/tar-filename.tar</code> • The syntax for the TFTP: tftp:<code>[[/location]/directory]/tar-filename.tar</code> <p>The <i>tar-filename.tar</i> is the tar file to display.</p>
/xtract <i>source-url</i> flash:/file-url [<i>dir/file...</i>]	<p>Extract files from a tar file to the local file system.</p> <p>For <i>source-url</i>, specify the source URL alias for the local file system. These options are supported:</p> <ul style="list-style-type: none"> • The syntax for the local flash file system: flash: • The syntax for the FTP: ftp:<code>[[/username[:password]@location]/directory]/tar-filename.tar</code> • The syntax for an HTTP server: http:<code>[[/username:password]@]{hostname host-ip}/[directory]/image-name.tar</code> • The syntax for a secure HTTP server: https:<code>[[/username:password]@]{hostname host-ip}/[directory]/image-name.tar</code> • The syntax for the RCP: rcp:<code>[[/username@location]/directory]/tar-filename.tar</code> • The syntax for the TFTP: tftp:<code>[[/location]/directory]/tar-filename.tar</code> <p>The <i>tar-filename.tar</i> is the tar file from which to extract.</p> <p>For flash:/file-url [<i>dir/file...</i>], specify the location on the local flash file system into which the tar file is extracted. Use the <i>dir/file...</i> 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.</p>

Defaults

There is no default setting.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(46)EY	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 *c2350-lanlite-tar.122-46.EY.tar* file that is in flash memory. The contents of the tar file appear on the screen:

```
Switch# archive tar /table flash:c2350-lanlite-tar.122-46.EY.tar
info (219 bytes)

c2350-lanlite-tar.122-46.EY.tar/ (directory)
c2350-lanlite-tar.122-46.EY.tar(610856 bytes)
c2350-lanlite-tar.122-46.EY.tar/info (219 bytes)
info.ver (219 bytes)
```

This example shows how to display only the *c2350-lanlite-tar.122-46.EY.tar/html* directory and its contents:

```
Switch# archive tar /table flash:c2350-lanlite-tar.122-46.EY.tar/html
c2350-lanlite-tar.122-46.EY.tar/html/ (directory)
c2350-lanlite-tar.122-46.EY.tar/html/const.htm (556 bytes)
c2350-lanlite-tar.122-46.EY.tar/html/xhome.htm (9373 bytes)
c2350-lanlite-tar.122-46.EY.tar/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 <i>version_string</i>	(Optional) Specify the specific version string of the image to be uploaded.
<i>destination-url</i>	<p>The destination URL alias for a local or network file system. The <i>image-name.tar</i> is the name of software image to be stored on the server.</p> <p>These options are supported:</p> <ul style="list-style-type: none"> Local flash file system syntax: flash: FTP syntax: ftp:[[/username[:password]@location]/directory]/image-name.tar HTTP server syntax: http:[[/username:password@]{hostname host-ip}[/directory]/image-name.tar Secure HTTP server syntax: https:[[/username:password@]{hostname host-ip}[/directory]/image-name.tar Remote Copy Protocol (RCP) syntax: rcp:[[/username@location]/directory]/image-name.tar TFTP syntax: tftp:[[/location]/directory]/image-name.tar

Defaults	Uploads the currently running image from the flash: file system.
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Command Modes	Privileged EXEC
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Command History	Release	Modification
	12.2(46)EY	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.

boot config-file

Use the **boot config-file** global configuration command on a standalone switch 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	<table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.2(46)EY</td><td>This command was introduced.</td></tr></table>		Release	Modification	12.2(46)EY	This command was introduced.
Release	Modification					
12.2(46)EY	This command was introduced.					
Usage Guidelines	<p>Filenames and directory names are case sensitive.</p> <p>This command changes the setting of the CONFIG_FILE environment variable. For more information, see Appendix A, “Catalyst 2350 Switch Boot Loader Commands.”</p>					
Related Commands	<table><tr><th>Command</th><th>Description</th></tr><tr><td>show boot</td><td>Displays the settings of the boot environment variables.</td></tr></table>		Command	Description	show boot	Displays the settings of the boot environment variables.
Command	Description					
show boot	Displays the settings of the boot environment variables.					

boot enable-break

Use the **boot enable-break** global configuration command on a standalone switch 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(46)EY	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 2350 Switch Boot Loader Commands.”](#)

Related Commands

Command	Description
show boot	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

<i>filesystem:</i>	Alias for a flash file system. Use flash: for the system board flash device.
<i>/file-url</i>	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(46)EY	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 2350 Switch Boot Loader Commands.”](#)

Related Commands

Command	Description
show boot	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	<i>filesystem:</i>	Alias for a flash file system. Use flash: for the system board flash device.
	<i>/file-url</i>	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(46)EY	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 2350 Switch Boot Loader Commands.”](#)

Related Commands	Command	Description
	show boot	Displays the settings of the boot environment variables.

boot manual

Use the **boot manual** global configuration command on a standalone switch 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.
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Defaults	Manual booting is disabled.
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Command Modes	Global configuration
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Command History	Release	Modification
	12.2(46)EY	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 <i>switch:</i> prompt. To boot up the system, use the boot boot loader command, and specify the name of the bootable image.
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This command changes the setting of the MANUAL_BOOT environment variable. For more information, see [Appendix A, “Catalyst 2350 Switch Boot Loader Commands.”](#)

Related Commands	Command	Description
	show boot	Displays the settings of the boot environment variables.

boot private-config-file

Use the **boot private-config-file** global configuration command on a standalone switch 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	<i>filename</i>	The name of the private configuration file.
---------------------------	-----------------	---

Defaults	The default configuration file is <i>private-config</i> .
-----------------	---

Command Modes	Global configuration
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Command History	Release	Modification
	12.2(46)EY	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 <i>pconfig</i> :
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```
Switch(config)# boot private-config-file pconfig
```

Related Commands	Command	Description
	show boot	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

no boot system switch *{number | all}*

Syntax Description

<i>filesystem:</i>	Alias for a flash file system. Use flash: for the system board flash device.
<i>/file-url</i>	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(46)EY	This command was introduced.

Usage Guidelines

Filenames and directory names are case sensitive.

If you enter the **boot system** *filesystem:/file-url* command the specified software image is loaded during the next boot cycle.

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 2350 Switch Boot Loader Commands.”](#)

Related Commands

Command	Description
show boot	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**]}}

On mode:

channel-group *channel-group-number* **mode on**

Syntax Description

<i>channel-group-number</i>	Specify the channel group number. The range is 1 to 48.
mode	Specify the EtherChannel mode.
active	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	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(46)EY	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.

You do not have to disable the IP address that is assigned to a physical port that is part of a channel group, but we strongly recommend that you do so.

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.

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 that 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 that 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 operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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(46)EY	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.

class

Use the **class** policy-map configuration command to define a traffic classification match criteria (through the **police**, **set**, and **trust** policy-map class configuration commands) for the specified class-map name. Use the **no** form of this command to delete an existing class map.

class *class-map-name*

no class *class-map-name*

Syntax Description

<i>class-map-name</i>	Name of the class map.
-----------------------	------------------------

Defaults

No policy map class-maps are defined.

Command Modes

Policy-map configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

Before using the **class** command, you must use the **policy-map** global configuration command to identify the policy map and to enter policy-map configuration mode. After specifying a policy map, you can configure a policy for new classes or modify a policy for any existing classes in that policy map. You attach the policy map to a port by using the **service-policy** interface configuration command.

After entering the **class** command, you enter policy-map class configuration mode, and these configuration commands are available:

- **exit**: exits policy-map class configuration mode and returns to policy-map configuration mode.
- **no**: returns a command to its default setting.
- **police**: defines a policer or aggregate policer for the classified traffic. The policer specifies the bandwidth limitations and the action to take when the limits are exceeded. For more information, see the **police** and **police aggregate** policy-map class commands.
- **set**: specifies a value to be assigned to the classified traffic. For more information, see the **set** command.
- **trust**: defines a trust state for traffic classified with the **class** or the **class-map** command. For more information, see the **trust** command.

To return to policy-map configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.

The **class** command performs the same function as the **class-map global configuration command**. Use the **class** command when a new classification, which is not shared with any other ports, is needed. Use the **class-map** command when the map is shared among many ports.

Examples

This example shows how to create a policy map called *policy1*. When attached to the ingress direction, it matches all the incoming traffic defined in *class1*, sets the IP Differentiated Services Code Point (DSCP) to 10, and polices the traffic at an average rate of 1 Mb/s and bursts at 20 KB. Traffic exceeding the profile is marked down to a DSCP value gotten from the policed-DSCP map and then sent.

```
Switch(config)# policy-map policy1
Switch(config-pmap)# class class1
Switch(config-pmap-c)# set dscp 10
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
class-map	Creates a class map to be used for matching packets to the class whose name you specify.
police	Defines a policer for classified traffic.
policy-map	Creates or modifies a policy map that can be attached to multiple ports to specify a service policy.
set	Classifies IP traffic by setting a DSCP or IP-precedence value in the packet.
show policy-map	Displays quality of service (QoS) policy maps.
trust	Defines a trust state for the traffic classified through the class policy-map configuration command or the class-map global configuration command.

class-map

Use the **class-map** global configuration command to create a class map to be used for matching packets to the class whose name you specify and to enter class-map configuration mode. Use the **no** form of this command to delete an existing class map and to return to global configuration mode.

class-map [**match-all** | **match-any**] *class-map-name*

no class-map [**match-all** | **match-any**] *class-map-name*

Syntax Description

match-all	(Optional) Perform a logical-AND of all matching statements under this class map. All criteria in the class map must be matched.
match-any	(Optional) Perform a logical-OR of the matching statements under this class map. One or more criteria must be matched.
<i>class-map-name</i>	Name of the class map.

Defaults

No class maps are defined.

If neither the **match-all** or **match-any** keyword is specified, the default is **match-all**.

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

Use this command to specify the name of the class for which you want to create or modify class-map match criteria and to enter class-map configuration mode.

The **class-map** command and its subcommands are used to define packet classification, marking, and aggregate policing as part of a globally named service policy applied on a per-port basis.

After you are in quality of service (QoS) class-map configuration mode, these configuration commands are available:

- **description**: describes the class map (up to 200 characters). The **show class-map** privileged EXEC command displays the description and the name of the class-map.
- **exit**: exits from QoS class-map configuration mode.
- **match**: configures classification criteria. For more information, see the [match \(class-map configuration\)](#) command.
- **no**: removes a match statement from a class map.
- **rename**: renames the current class map. If you rename a class map with a name that is already used, the message `A class-map with this name already exists` appears.

If you enter the **match-all** or **match-any** keyword, you can only use it to specify an extended named access control list (ACL) with the **match access-group** *acl-index-or-name* class-map configuration command.

To define packet classification on a physical-port basis, only one **match** command per class map is supported. In this situation, the **match-all** and **match-any** keywords are equivalent.

Only one ACL can be configured in a class map. The ACL can have multiple access control entries (ACEs).

Examples

This example shows how to configure the class map called *class1* with one match criterion, which is an access list called *103*:

```
Switch(config)# access-list 103 permit ip any any dscp 10
Switch(config)# class-map class1
Switch(config-cmap)# match access-group 103
Switch(config-cmap)# exit
```

This example shows how to delete the class map *class1*:

```
Switch(config)# no class-map class1
```

You can verify your settings by entering the **show class-map** privileged EXEC command.

Related Commands

Command	Description
class	Defines a traffic classification match criteria (through the police , set , and trust policy-map class configuration commands) for the specified class-map name.
match (class-map configuration)	Defines the match criteria to classify traffic.
policy-map	Creates or modifies a policy map that can be attached to multiple ports to specify a service policy.
show class-map	Displays QoS class maps.

clear eap

Use the **clear eap** 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 <i>name</i>	Clear EAP credential information for the specified profile.
	interface <i>interface-id</i>	Clear EAP information for the specified interface.
	method <i>name</i>	Clear EAP information for the specified method.
	transport <i>name</i>	Clear EAP transport information for the specified lower level.

Defaults No default is defined.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(46)EY	This command was introduced

Usage Guidelines You can clear all counters by using the **clear eap** 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
```

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.
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Command Default	No default is defined
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Command Modes	Privileged EXEC
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Command History	Release	Modification
	12.2(46)EY	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 Gigabit Ethernet port 0/2. 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 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

<i>channel-group-number</i>	(Optional) Channel group number. The range is 1 to 48.
counters	Clear traffic counters.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(46)EY	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 logging onboard

Use the **clear logging onboard** privileged EXEC command to clear all of the on-board failure logging (OBFL) data except for the uptime and CLI-command information stored in the flash memory.

clear logging onboard

Syntax Description	This command has no arguments or keywords.
---------------------------	--

Defaults	No default is defined.
-----------------	------------------------

Command Modes	Privileged EXEC
----------------------	-----------------

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	We recommend that you keep OBFL enabled and do not erase the data stored in the flash memory.
-------------------------	---

Examples	This example shows how to clear all the OBFL information except for the uptime and CLI-command information:
-----------------	---

```
Switch# clear logging onboard
Clear logging onboard buffer [confirm]
```

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

Related Commands	Command	Description
	hw-module module [<i>switch-number</i>] logging onboard	Enables OBFL.
	onboard	Displays OBFL 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 <i>mac-addr</i>	(Optional) Delete the specified dynamic MAC address.
	dynamic interface <i>interface-id</i>	(Optional) Delete all dynamic MAC addresses on the specified physical port or port channel.
	dynamic vlan <i>vlan-id</i>	(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(46)EY	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
	show mac address-table	Displays the MAC address table static and dynamic entries.
	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

<i>channel-group-number</i>	(Optional) Channel group number. The range is 1 to 48.
counters	Clear traffic counters.

Defaults

No default is defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(46)EY	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 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 <i>interface-id</i> (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 48.	
Defaults	No default is defined.	
Command Modes	Privileged EXEC	
Command History	Release	Modification
	12.2(46)EY	This command was introduced.
Usage Guidelines	If the <i>interface-id</i> 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 <i>interface-id</i> (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 48.
---------------------------	---

Defaults	No default is defined.
-----------------	------------------------

Command Modes	Privileged EXEC
----------------------	-----------------

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	<p>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).</p>
-------------------------	--

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	<p>This example shows how to restart the protocol migration process on a port:</p> <pre>Switch# clear spanning-tree detected-protocols interface gigabitethernet0/1</pre>
-----------------	---

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 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(46)EY	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 or Ethernet management 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	<i>mac-address</i>	MAC address of the cluster command switch.
	member <i>number</i>	(Optional) Number of a configured cluster member switch. The range is 0 to 15.
	name <i>name</i>	(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(46)EY	This command was introduced.

Usage Guidelines	<p>This command is available only on the cluster command switch.</p> <p>A cluster member can have only one cluster command switch.</p> <p>The cluster member switch retains the identity of the cluster command switch during a system reload by using the <i>mac-address</i> parameter.</p> <p>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 or Ethernet management 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 <i>n</i> global configuration command on the cluster command switch.</p> <p>When a standby cluster command switch becomes active (becomes the cluster command switch), it removes the cluster commander address line from its configuration.</p>
------------------	---

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
show 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

<i>number</i>	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(46)EY	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	<i>name</i>	Name of the cluster up to 31 characters. Valid characters include only alphanumerics, dashes, and underscores.
	<i>command-switch-member-number</i>	(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(46)EY	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 on the cluster command switch 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	<i>holdtime-in-secs</i>	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(46)EY	This command was introduced.

Usage Guidelines	<p>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.</p> <p>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.</p>
------------------	--

Examples	<p>This example shows how to change the interval timer and the duration on the cluster command switch.</p> <pre>Switch(config)# cluster timer 3 Switch(config)# cluster holdtime 30</pre> <p>You can verify your settings by entering the show cluster privileged EXEC command.</p>
----------	--

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*

no cluster member *n*

Syntax Description	<i>n</i>	The number that identifies a cluster member. The range is 0 to 15.
	mac-address <i>H.H.H</i>	MAC address of the cluster member switch in hexadecimal format.

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

Command Modes	Global configuration
---------------	----------------------

Command History	Release	Modification
	12.2(46)EY	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 <i>key</i> 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 on the a cluster command switch 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	<i>interface-id</i>	Interface to serve as the outside interface. Valid interfaces include physical interfaces, port-channels, or VLANs. The port-channel range is 1 to 48. The VLAN range is 1 to 4094.
---------------------------	---------------------	---

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

Command Modes	Global configuration
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Command History	Release	Modification
	12.2(46)EY	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 operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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
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Command History	Release	Modification
	12.2(46)EY	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 timer

Use the **cluster timer** global configuration command on the a cluster command switch 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	<i>interval-in-secs</i>	Interval in seconds between heartbeat messages. The range is 1 to 300 seconds.
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Defaults	The interval is 8 seconds.
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Command Modes	Global configuration
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Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	<p>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.</p> <p>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.</p>
------------------	---

Examples	<p>This example shows how to change the heartbeat interval timer and the duration on the cluster command switch:</p> <pre>Switch(config)# cluster timer 3 Switch(config)# cluster holdtime 30</pre>
----------	---

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.

copy logging onboard

Use the **copy logging onboard** privileged EXEC command to copy on-board failure logging (OBFL) data to the local network or a specific file system.

copy logging onboard *destination*

Syntax Description	<p><i>destination</i></p> <p>Specify the location on the local network or file system to which the system messages are copied.</p> <p>For <i>destination</i>, specify the destination on the local or network file system and the filename. These options are supported:</p> <ul style="list-style-type: none"> • The syntax for the local flash file system: flash[<i>number</i>]:/filename • The syntax for the FTP: ftp://username:password@host/filename • The syntax for an HTTP server: http://[[username:password]@]{hostname host-ip}[/directory]/filename • The syntax for the NVRAM: nvrasm:/filename • The syntax for the null file system: null:/filename • The syntax for the Remote Copy Protocol (RCP): rcp://username@host/filename • The syntax for the switch file system: system:/filename • The syntax for the temporary file system: tmpsys:/filename • The syntax for the TFTP: tftp:[[/location]/directory]/filename
---------------------------	---

Defaults	This command has no default setting.
-----------------	--------------------------------------

Command Modes	Privileged EXEC
----------------------	-----------------

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines

For information about OBFL, see the [hw-module](#) command.

Examples

This example shows how to copy the OBFL data messages to the *obfl_file* file on the flash file system:

```
Switch# copy logging onboard flash:obfl_file
OBFL copy successful
Switch#
```

Related Commands

Command	Description
hw-module module [<i>switch-number</i>] logging onboard	Enables OBFL.
onboard	Displays OBFL information.

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

<i>macro-name</i>	Name of the interface-range macro; up to 32 characters.
<i>interface-range</i>	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(46)EY	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; **gigabitethernet0/1-2** is not a valid range

Valid values for *type* and *interface*:

- **vlan** *vlan-id - vlan-ID*, where the VLAN ID is 1 to 4094
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 48
- **gigabitethernet** *module/{first port} - {last port}*
- **tengigabitethernet** *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:

gigabitethernet0/3, gigabitethernet0/1 - 2

gigabitethernet0/3 -4, tengigabitethernet0/1 - 2

Examples

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

```
Switch(config)# define interface-range macro1 gigabitethernet0/1 - 2,
gigabitethernet0/5 - 7, tengigabitethernet0/1 - 2
```

Related Commands

Command	Description
interface range	Executes a command on multiple ports at the same time.
show running-config	Displays the operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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(46)EY	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 <i>Cisco IOS Configuration Fundamentals Command Reference, Release 12.2</i> .

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.

diagnostic monitor

Use the **diagnostic monitor** global configuration command to configure health-monitoring diagnostic testing. Use the **no** form of this command to disable testing and to return to the default settings.

diagnostic monitor interval test {*name* | *test-id* | *test-id-range* | **all**} *hh:mm:ss milliseconds day*

diagnostic monitor test {*name* | *test-id* | *test-id-range* | **all**}

diagnostic monitor syslog

diagnostic monitor threshold test {*name* | *test-id* | *test-id-range* | **all**} **failure count** *count*

no diagnostic monitor interval test {*name* | *test-id* | *test-id-range* | **all**}

no diagnostic monitor test {*name* | *test-id* | *test-id-range* | **all**}

no diagnostic monitor syslog

no diagnostic monitor threshold test {*name* | *test-id* | *test-id-range* | **all**} **failure count** *count*

Syntax Description

interval	Configure the interval between tests.
test	Specify the tests to be run.
<i>name</i>	Specify the name of the test. For more information, see the “Usage Guidelines” section.
<i>test-id</i>	Specify the ID number of the test. The range is from 1 to 7. For more information, see the “Usage Guidelines” section.
<i>test-id-range</i>	Specify more than one test with the range of test ID numbers. For more information, see the “Usage Guidelines” section.
all	Specify all of the diagnostic tests.
<i>hh:mm:ss</i>	Configure the monitoring interval in hours, minutes, and seconds. For formatting information, see the “Usage Guidelines” section.
<i>milliseconds</i>	Configure the monitoring interval in milliseconds (ms). The range is from 0 to 999 ms.
<i>day</i>	Configure the monitoring interval in the number of days. The range is from 0 to 20 days. For formatting information, see the “Usage Guidelines” section.
syslog	Enable the generation of a syslog message when a health-monitoring test fails.
threshold	Configure the failure threshold.
failure count <i>count</i>	Set the failure threshold count. The range for <i>count</i> is from 0 to 99.

Defaults

Monitoring is disabled, and a failure threshold value is not set.

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

Follow these guidelines when configuring health-monitoring diagnostic testing:

- *name*—Enter the **show diagnostic content** privileged EXEC command to display the test names in the test ID list.
- *test-id*—Enter the **show diagnostic content** command to display the test numbers in the test ID list.
- *test-id-range*—Enter the **show diagnostic content** command to display the test numbers in the test ID list. Enter the range as integers separated by a comma and a hyphen (for example, 1,3-6 specifies test IDs 1, 3, 4, 5, and 6).
- *hh*—Enter the hours from 0 to 24.
- *mm*—Enter the minutes from 0 to 60.
- *ss*—Enter the seconds from 0 to 60.
- *milliseconds*—Enter the test time in milliseconds from 0 to 999.
- *day*—Enter the number of days between test from 0 to 20.
- Enter the **diagnostic monitor test 1** command to enable diagnostic monitoring.

You must configure the failure threshold and the interval between tests before enabling diagnostic monitoring.

When entering the **diagnostic monitor switch number test {name | test-id | test-id-range | all}** command, you must isolate network traffic by disabling all connected ports, and do not send test packets during the test.

Examples

This example shows how to configure a health-monitoring test:

```
Switch(config)# diagnostic monitor threshold switch 2 test 1 failure count 20
Switch(config)# diagnostic monitor interval switch 2 test 1 12:30:00 750 5
```

Related Commands

Command	Description
show diagnostic	Displays online diagnostic test results.

diagnostic schedule

Use the **diagnostic schedule** global configuration command to configure the diagnostic test schedule. Use the **no** form of this command to remove the schedule.

diagnostic schedule test {*name* | *test-id* | *test-id-range* | **all** | **basic** | **non-disruptive**} {**daily** *hh:mm* | **on** *mm dd yyyy hh:mm* | **weekly** *day-of-week hh:mm*}

no diagnostic schedule test {*name* | *test-id* | *test-id-range* | **all** | **basic** | **non-disruptive**} {**daily** *hh:mm* | **on** *mm dd yyyy hh:mm* | **weekly** *day-of-week hh:mm*}

Syntax Description		
test		Specify the tests to be scheduled.
<i>name</i>		Specify the name of the test. For more information, see the “Usage Guidelines” section.
<i>test-id</i>		Specify the ID number of the test. The range is from 1 to 7. For more information, see the “Usage Guidelines” section.
<i>test-id-range</i>		Specify more than one test with the range of test ID numbers. For more information, see the “Usage Guidelines” section.
all		Specify all of the diagnostic tests.
basic		Specify the basic on-demand diagnostic tests.
non-disruptive		Specify the nondisruptive health-monitoring tests.
daily <i>hh:mm</i>		Specify the daily scheduling of the diagnostic tests. For formatting information, see the “Usage Guidelines” section.
on <i>mm dd yyyy hh:mm</i>		Specify the scheduling of the diagnostic tests on a specific day and time. For formatting information, see the “Usage Guidelines” section.
weekly <i>day-of-week hh:mm</i>		Specify the weekly scheduling of the diagnostic tests. For formatting information, see the “Usage Guidelines” section.

Defaults

This command has no default settings.

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

Use these guidelines when scheduling testing:

- *name*—Enter the **show diagnostic content** privileged EXEC command to display the test names in the test ID list.
- *test-id*—Enter the **show diagnostic content** command to display the test numbers in the test ID list.

- *test-id-range*—Enter the **show diagnostic content** command to display the test numbers in the test ID list. Enter the range as integers separated by a comma and a hyphen (for example, 1,3-6 specifies test IDs 1, 3, 4, 5, and 6).
- *hh:mm*—Enter the time as a 2-digit number (for a 24-hour clock) for hours:minutes; the colon (:) is required, such as 12:30.
- For *mm dd yyyy*:
 - *mm*—Spell out the month, such as January, February, and so on, with upper case or lower case characters.
 - *dd*—Enter the day as a 2-digit number, such as 03 or 16.
 - *yyyy*—Enter the year as a 4-digit number, such as 2006.
- *day-of-week*—Spell out the day of the week, such as Monday, Tuesday, and so on, with upper case or lower case characters.

Examples

This example shows how to schedule diagnostic testing for a specific day and time:

```
Switch(config)# diagnostic schedule test 1,2,4-6 on november 3 2006 23:10
```

This example shows how to schedule diagnostic testing to occur weekly at a specific time on a switch:

```
Switch(config)# diagnostic schedule test TestPortAsicMem weekly friday 09:23
```

Related Commands

Command	Description
show diagnostic	Displays online diagnostic test results.

diagnostic start

Use the **diagnostic start** privileged EXEC command to run an online diagnostic test.

diagnostic start test {*name* | *test-id* | *test-id-range* | **all** | **basic** | **non-disruptive**}

Syntax Description	test	Specify the tests to run.
	<i>name</i>	Specify the name of a test. For more information, see the “Usage Guidelines” section.
	<i>test-id</i>	Specify the ID number of a test. The range is from 1 to 7. For more information, see the “Usage Guidelines” section.
	<i>test-id-range</i>	Specify more than one test with the range of test ID numbers. For more information, see the “Usage Guidelines” section.
	all	Specify all the diagnostic tests.
	basic	Specify the basic on-demand diagnostic tests.
	non-disruptive	Specify the nondisruptive health-monitoring tests.

Defaults This command has no default setting.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines The switch supports these tests:

ID	Test Name	[On-Demand Test Attributes]
1	TestPortAsicStackPortLoopback	[B*N****]
2	TestPortAsicLoopback	[B*D*R**]
3	TestPortAsicCam	[B*D*R**]
4	TestPortAsicRingLoopback	[B*D*R**]
5	TestMicRingLoopback	[B*D*R**]
6	TestPortAsicMem	[B*D*R**]
7	TestInlinePwrCtrlr	[B*D*R**]

When specifying a test name, use the **show diagnostic content** privileged EXEC command to display the test ID list. To specify test 3 by using the test name, enter the **diagnostic start switch number test TestPortAsicCam** privileged EXEC command.

If specifying more than one test to run, use the *test-id-range* parameter, and enter integers separated by a comma and a hyphen. For example, to specify tests 2, 3, and 4, enter the **diagnostic start switch number test 2-4** command. To specify tests 1, 3, 4, 5, and 6, enter the **diagnostic start switch number test 1,3-6** command.

After starting the tests by using the **diagnostic start** command, you cannot stop the testing process.

Examples

This example shows how to start diagnostic test 1 on the switch:

```
Switch# diagnostic start test 1
Switch#
06:27:50: %DIAG-6-TEST_RUNNING: Switch: Running TestPortAsicStackPortLoopback{ID=1} ...
(switch-1)
06:27:51: %DIAG-6-TEST_OK: Switch: TestPortAsicStackPortLoopback{ID=1} has completed
successfully
```

Related Commands

Command	Description
show diagnostic	Displays online diagnostic test results.

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 Gigabit Ethernet ports.

You cannot configure the duplex mode on 10-Gigabit Ethernet ports; it is always **full**.

The default is **full** for the 100BASE-LX small form-factor pluggable (SFP) modules.

The default is **half** for the 100BASE-FX 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(46)EY	This command was introduced.

Usage Guidelines

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

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

errdisable detect cause {all | bpduguard | dtp-flap | gbic-invalid | l2ptguard | link-flap | loopback | pagp-flap | sfp-config-mismatch | small-frame}

no errdisable detect cause {all | bpduguard | dtp-flap | gbic-invalid | l2ptguard | link-flap | loopback | pagp-flap | sfp-config-mismatch | small-frame}

For the BPDU guard feature, you can use this command to globally configure the switch to shut down just the offending VLAN on the port when a violation occurs, instead of shutting down 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.
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 This error refers to an invalid small form-factor pluggable (SFP) module.
l2ptguard	Enable error detection for a Layer 2 protocol-tunnel error-disabled cause.
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.
sfp-config-mismatch	Enable error detection on an SFP configuration mismatch.
small-frame	See the errdisable detect cause small-frame command.

Command Default Detection is enabled for all causes. All causes, except for per-VLAN error disabling, are configured to shut down the entire port.

Command Modes Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

A cause (**link-flap**, **dhcp-rate-limit**, and so forth) is the reason for the error-disabled state. When a cause is detected on an interface, the interface 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 feature, 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 interface 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 recover an interface from the error-disabled state.

Examples

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

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

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

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

You can verify your setting 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 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(46)EY	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

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

```
errdisable recovery {cause {all | bpduguard | channel-misconfig | dtp-flap | gbic-invalid |
l2ptguard | link-flap | loopback | pagp-flap | sfp-mismatch | small-frame | udld}} | {interval
interval}
```

```
no errdisable recovery {cause {all | bpduguard | channel-misconfig | dtp-flap | gbic-invalid |
l2ptguard | link-flap | loopback | pagp-flap | sfp-mismatch | small-frame | udld}} | {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.
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 This error refers to an invalid small form-factor pluggable (SFP) error-disabled state.
l2ptguard	Enable the timer to recover from a Layer 2 protocol tunnel error-disabled state.
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.
sfp-config-mismatch	Enable error detection on an SFP configuration mismatch.
small-frame	See the errdisable recovery cause small-frame command.
udld	Enable the timer to recover from the UniDirectional Link Detection (UDLD) 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
	12.246)EY	This command was introduced.

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

errdisable recovery cause small-frame

Use the **errdisable recovery cause small-frame** global configuration command 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(46)EY	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.

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(46)EY	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, and a stack trace. 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. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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 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(46)EY	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 2-1 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 gigabitethernet0/1
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.

hw-module

Use the **hw-module** global configuration command to enable on-board failure logging (OBFL). Use the **no** form of this command to disable this feature.

hw-module module [*switch-number*] **logging onboard** [**message level** *level*]

no hw-module module [*switch-number*] **logging onboard** [**message level**]

Syntax Description

<i>switch-number</i>	The switch number is always 1.
message level <i>level</i>	(Optional) Specify the severity of the hardware-related messages that are stored in the flash memory. The range is from 1 to 7.

Defaults

OBFL is enabled, and all messages appear.

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

We recommend that you keep OBFL enabled and do not erase the data stored in the flash memory.

To ensure that the time stamps in the OBFL data logs are accurate, you should manually set the system clock, or configure it by using Network Time Protocol (NTP).

If you do not enter the **message level** *level* parameter, all the hardware-related messages generated by the switch are stored in the flash memory.

Examples

This example shows how to enable OBFL on a switch and to specify that only severity 1 hardware-related messages are stored in the flash memory of the switch:

```
Switch(config)# hw-module module 1 logging onboard message level 1
```

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

Related Commands

Command	Description
clear logging onboard	Removes the OBFL data in the flash memory.
onboard	Displays OBFL information.

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 48.

Defaults

No port-channel logical interfaces are defined.

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	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.


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.

 interface port-channel

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 operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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

<i>port-range</i>	Port range. For a list of valid values for <i>port-range</i> , 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(46)EY	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* - *vlan-ID*, where VLAN ID is from 1 to 4094
- **gigabitethernet** *module*/ {*first port*} - {*last port*}, where module is always 0
- **tengigabitethernet** *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 48



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 gigabitethernet0/1 - 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 operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

interface vlan

Use the **interface vlan** global configuration command to create or access a dynamic switch virtual interface (SVI) and to enter interface configuration mode. Use the **no** form of this command to delete an SVI.

```
interface vlan vlan-id  
  
no interface vlan vlan-id
```


Syntax Description	<i>vlan-id</i> 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(46)EY	This command was introduced.

Usage Guidelines SVIs 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 ISL or IEEE 802.1Q encapsulated trunk or the VLAN ID configured for an access port.

 **Note** When you create an SVI, it does not become active until it is associated with a physical port.

If you delete an SVI 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 SVI by entering the **interface vlan *vlan-id*** command for the deleted interface. The interface comes back up, but the previous configuration is gone.

The interrelationship between the number of SVIs configured on a switch and the number of other features being configured might have an impact on CPU utilization due to hardware limitations. You can use the **sdm prefer** global configuration command to reallocate system hardware resources based on templates and feature tables. For more information, see the [sdm prefer](#) command.

Examples

This example shows how to create a new SVI 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 <i>vlan-id</i>	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 control access to a Layer 2 interface. 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**}

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

Syntax Description

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

Defaults

No access list is applied to the interface.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

You can apply named or numbered standard or extended IP access lists to an interface. To define an access 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 use numbered standard access lists ranging from 1 to 99 and 1300 to 1999 or extended access lists ranging from 100 to 199 and 2000 to 2699.

These are limitations for applying an access list to Layer 2 interfaces (port ACLs):

- You can only apply ACLs in the inbound direction; the **out** keyword is not supported for Layer 2 interfaces.
- You can only apply one IP ACL per interface.
- Layer 2 interfaces Port ACLs do not support logging; if the **log** keyword is specified in the IP ACL, it is ignored.
- An IP ACL applied to a Layer 2 interface only filters IP packets.

For standard inbound access lists, after the switch receives a packet, it checks the source address of the packet against the access list. IP extended access lists can optionally check other fields in the packet, such as the destination IP address, protocol type, or port numbers. If the access list permits the packet, the switch continues to process the packet. If the access list denies the packet, the switch discards the packet. If the specified access list does not exist, all packets are passed.

Examples

This example shows how to apply IP access list 101 to inbound packets on a port:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# ip access-group 101 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. For syntax information, select Cisco IOS IP Command Reference, Volume 1 of 3:Addressing and Services, Release 12.2 > IP Services Commands
ip access-list	Configures a named ACL. For syntax information, select Cisco IOS IP Command Reference, Volume 1 of 3:Addressing and Services, Release 12.2 > IP Services Commands .
show access-lists	Displays ACLs configured on the switch.
show ip access-lists	Displays IP ACLs configured on the switch. For syntax information, select Cisco IOS IP Command Reference, Volume 1 of 3:Addressing and Services, Release 12.2 > IP Services Commands .
show ip interface	Displays information about interface status and configuration. For syntax information, select Cisco IOS IP Command Reference, Volume 1 of 3:Addressing and Services, Release 12.2 > IP Services Commands .

ip address

Use the **ip address** interface configuration command to set an IP address for the switch or an IP address for each switch virtual interface (SVI) on the 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	<i>ip-address</i>	IP address.
	<i>subnet-mask</i>	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
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Command History	Release	Modification
	12.2(46)EY	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 operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

ip admission

Use the **ip admission** interface configuration command to enable web authentication. You can also use this command in fallback-profile mode. Use the **no** form of this command to disable web authentication.

ip admission *rule*

no ip admission

Syntax Description	rule	Apply an IP admission rule to the interface.
---------------------------	------	--

Command Modes	Global configuration
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Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	The ip admission command applies a web authentication rule to a switch port.
-------------------------	---

Examples	<p>This example shows how to apply a web authentication rule to a switchport:</p> <pre>Switch# configure terminal Switch(config)# interface gigabitethernet0/1 Switch(config-if)# ip admission rule1</pre>
-----------------	---

Related Commands	Command	Description
	flowcontrol	Enable web authentication on a port
	ip admission name proxy http	Enable web authentication globally on a switch
	show ip admission	Displays information about NAC cached entries or the NAC configuration. For more information, see the <i>Network Admission Control Software Configuration Guide</i> on Cisco.com.

ip admission name proxy http

Use the **ip admission name proxy http** global configuration command to enable web authentication. Use the **no** form of this command to disable web authentication.

ip admission name proxy http

no ip admission name proxy http

Syntax Description	This command has no arguments or keywords.
---------------------------	--

Defaults	Web authentication is disabled.
-----------------	---------------------------------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	<p>The ip admission name proxy http command globally enables web authentication on a switch.</p> <p>After you enable web authentication on a switch, use the ip access-group in and ip admission web-rule interface configuration commands to enable web authentication on a specific interface.</p>
-------------------------	---

Examples	This example shows how to configure only web authentication on a switchport:
-----------------	--

```
Switch# configure terminal
Switch(config) ip admission name http-rule proxy http
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# ip access-group 101 in
Switch(config-if)# ip admission rule
Switch(config-if)# end
```

Related Commands	Command	Description
	flowcontrol	Create a web authentication fallback profile.
	ip admission	Enable web authentication on a port
	show ip admission	Displays information about NAC cached entries or the NAC configuration. For more information, see the <i>Network Admission Control Software Configuration Guide</i> on Cisco.com.

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	<i>profile number</i> The IGMP profile number to be applied. The range is 1 to 4294967295.
---------------------------	--

Defaults	No IGMP filters are applied.
-----------------	------------------------------

Command Modes	Interface configuration
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Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	You can apply IGMP filters only to Layer 2 physical interfaces; you cannot apply IGMP filters to routed ports , switch virtual interfaces (SVIs) or 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 ip igmp profile	Displays the characteristics of the specified IGMP profile.
	show running-config interface <i>interface-id</i>	Displays the running configuration on the switch interface, including the IGMP profile (if any) that is applied to an interface. For syntax information, select Cisco IOS Configuration Fundamentals Command Reference, Release 12.2 > File Management Commands > Configuration File Management Commands .

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

<i>number</i>	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(46)EY	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 ~~routed ports~~, switch virtual interfaces (SVIs) or 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 <i>interface-id</i>	Displays the running configuration on the switch interface, including the maximum number of IGMP groups that an interface can join and the throttling action. For syntax information, select Cisco IOS Configuration Fundamentals Command Reference, Release 12.2 > File Management Commands > Configuration File Management Commands .

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	<i>profile number</i> 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(46)EY	This command was introduced.

Usage Guidelines	When you are in IGMP profile configuration mode, you can create the profile by using these commands:
	<ul style="list-style-type: none">• 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.
	show ip igmp profile	Displays the characteristics of all IGMP profiles or the specified IGMP profile number.

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 <i>vlan-id</i>	(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(46)EY	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	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 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 <i>vlan-id</i>	(Optional) Enable IGMP snooping and the leave timer on the specified VLAN. The range is 1 to 1001 and 1006 to 4094.
<i>time</i>	Interval time out in seconds. The range is 100 to 32768 milliseconds.

Defaults

The default timeout setting is 1000 milliseconds.

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	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 static	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 <i>vlan-id</i>	(Optional) Enable IGMP snooping and the IGMP querier function on the specified VLAN. The range is 1 to 1001 and 1006 to 4094.
address <i>ip-address</i>	(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 <i>response-time</i>	(Optional) Set the maximum time to wait for an IGMP querier report. The range is 1 to 25 seconds.
query-interval <i>interval-count</i>	(Optional) Set the interval between IGMP queriers. The range is 1 to 18000 seconds.
tcn query [count <i>count</i> interval <i>interval</i>]	(Optional) Set parameters related to Topology Change Notifications (TCNs). The keywords have these meanings: <ul style="list-style-type: none"> count <i>count</i>—Set the number of TCN queries to be executed during the TCN interval time. The range is 1 to 10. interval <i>interval</i>—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 <i>version</i>	(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(46)EY	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(46)EY	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 <i>count</i>	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(46)EY	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(46)EY	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	<i>vlan-id</i>	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(46)EY	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 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

<i>vlan-id</i>	Enable IGMP snooping on the specified VLAN. The range is 1 to 1001 and 1006 to 4094.
<i>ip-address</i>	Add a Layer 2 port as a member of a multicast group with the specified group IP address.
interface <i>interface-id</i>	Specify the interface of the member port. The keywords have these meanings: <ul style="list-style-type: none"> gigabitethernet <i>interface number</i>—a Gigabit Ethernet IEEE 802.3z interface. tengigabitethernet <i>interface number</i>—a 10-Gigabit Ethernet IEEE 802.3z interface. port-channel <i>interface number</i>—a channel interface. The range is 0 to 48.

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(46)EY	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(46)EY	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 SSHv2:

```
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. For syntax information, select Cisco IOS Release 12.2 Configuration Guides and Command References > Cisco IOS Security Command Reference, Release 12.2 > Other Security Features > Secure Shell Commands .
	show ssh	Displays the status of the SSH server. For syntax information, select Cisco IOS Release 12.2 Configuration Guides and Command References > Cisco IOS Security Command Reference, Release 12.2 > Other Security Features > Secure Shell Commands .

ipv6 mld snooping

Use the **ipv6 mld snooping** global configuration command without keywords to enable IP version 6 (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.

ipv6 mld snooping [**vlan** *vlan-id*]

no ipv6 mld snooping [**vlan** *vlan-id*]



Note

This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

Syntax Description

vlan <i>vlan-id</i>	(Optional) Enable or disable IPv6 MLD snooping on the specified VLAN. The VLAN ID range is 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 will take place.

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 {default | vlan}** 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 will override global configuration on interfaces on which MLD snooping has been 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.

When the IPv6 multicast router is a Catalyst 6500 switch and you are using extended VLANs (in the range 1006 to 4094), IPv6 MLD snooping must be enabled on the extended VLAN on the Catalyst 6500 switch in order for the Catalyst 2350 switch to receive queries on the VLAN. For normal-range VLANs (1 to 1005), it is not necessary to enable IPv6 MLD snooping on the VLAN on the Catalyst 6500 switch.

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 enable MLD snooping:

```
Switch(config)# ipv6 mld snooping
```

This example shows how to disable MLD snooping on a VLAN:

```
Switch(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	Configures an SDM template to optimize system resources based on how the switch is being used.
show ipv6 mld snooping	Displays MLD snooping configuration.

ipv6 mld snooping last-listener-query-count

Use the **ipv6 mld snooping last-listener-query-count** global configuration command to configure IP version 6 (IPv6) Multicast Listener Discovery Multicast Address Specific Queries (MASQs) or that will be sent before aging out a client. Use the **no** form of this command to reset the query count to the default settings.

```
ipv6 mld snooping [vlan vlan-id] last-listener-query-count integer_value  
  
no ipv6 mld snooping [vlan vlan-id] last-listener-query-count
```



Note

This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

Syntax Description

vlan <i>vlan-id</i>	(Optional) Configure last-listener query count on the specified VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
<i>integer_value</i>	The range is 1 to 7.

Command Default

The default global count is 2.
The default VLAN count is 0 (the global count is used).

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 {default | vlan}** 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 silently 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 it should not be 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 the default of 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
```

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-interval	Sets IPv6 MLD snooping last-listener query interval.
sdm prefer	Configures an SDM template to optimize system resources based on how the switch is being used.
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 IP version 6 (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 Multicast 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.

ipv6 mld snooping [**vlan** *vlan-id*] **last-listener-query-interval** *integer_value*

no ipv6 mld snooping [**vlan** *vlan-id*] **last-listener-query-interval**



Note

This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

Syntax Description

vlan <i>vlan-id</i>	(Optional) Configure last-listener query interval on the specified VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
<i>integer_value</i>	Set the time period (in thousands of a second) that a multicast router to wait after issuing a 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 default global query interval (maximum response time) is 1000 (1 second).
The default VLAN query interval (maximum response time) is 0 (the global count is used).

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 {default | vlan}** 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 a 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, this 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	Configures an SDM template to optimize system resources based on how the switch is being used.
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 IP version 6 (IPv6) Multicast Listener Discovery (MLD) snooping listener message suppression. Use the **no** form of this command to disable MLD snooping listener message suppression.

ipv6 mld snooping listener-message-suppression

no ipv6 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.

Command Default

The default is for MLD snooping listener message suppression to be disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 {default | vlan}** global configuration command and reload the switch.

MLD snooping listener message suppression is equivalent to IGMP snooping report suppression. When enabled, received MLDv1 reports to a group 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
```

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	Enables IPv6 MLD snooping.
	sdm prefer	Configures an SDM template to optimize system resources based on how the switch is being used.
	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 IP version 6 (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.

ipv6 mld snooping [**vlan** *vlan-id*] **robustness-variable** *integer_value*

no ipv6 mld snooping [**vlan** *vlan-id*] **robustness-variable**

**Note**

This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

Syntax Description

vlan <i>vlan-id</i>	(Optional) Configure the robustness variable on the specified VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
<i>integer_value</i>	The range is 1 to 3.

Command Default

The default global robustness variable (number of queries before deleting a listener) is 2.

The default 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(46)EY	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 {default | vlan}** 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 there are no MLDv1 reports received for the configured number of MLDv1 queries. The global value determines the number of queries that the switch waits 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
```

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	Configures an SDM template to optimize system resources based on how the switch is being used.
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.

ipv6 mld snooping tcn {**flood query count** *integer_value* | **query solicit**}

no ipv6 mld snooping tcn {**flood query count** *integer_value* | **query solicit**}



Note

This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

Syntax Description

flood query count <i>integer_value</i>	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(46)EY	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 {default | vlan}** 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.
```

You can verify your settings by entering the **show ipv6 mld snooping [vlan *vlan-id*]** user EXEC command.

Related Commands	Command	Description
	sdm prefer	Configures an SDM template to optimize system resources based on how the switch is being used.
	show ipv6 mld snooping	Displays MLD snooping configuration.

ipv6 mld snooping vlan

Use the **ipv6 mld snooping vlan** global configuration command to configure IP version 6 (IPv6) Multicast Listener Discovery (MLD) snooping parameters on the VLAN interface. Use the **no** form of this command to reset the parameters to the default settings.

ipv6 mld snooping vlan *vlan-id* [**immediate-leave** | **mrouter interface** *interface-id* | **static** *ipv6-multicast-address* **interface** *interface-id*]

no ipv6 mld snooping vlan *vlan-id* [**immediate-leave** | **mrouter interface** *interface-id* | **static** *ip-address* **interface** *interface-id*]



Note

This command is available only if you have configured a dual IPv4 and IPv6 Switch Database Management (SDM) template on the switch.

Syntax Description

vlan <i>vlan-id</i>	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.
mrouter interface	(Optional) Configure a multicast router port. The no form of the command removes the configuration.
static <i>ipv6-multicast-address</i>	(Optional) Configure a multicast group with the specified IPv6 multicast address.
interface <i>interface-id</i>	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.
By default, there are no static IPv6 multicast groups.
By default, there are no multicast router ports.

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

To configure the dual IPv4 and IPv6 template, enter the **sdm prefer dual-ipv4-and-ipv6 {default | vlan}** global configuration command and reload the switch.

You should only configure the Immediate-Leave feature when there is only one receiver on every port in the VLAN. The configuration is saved in NVRAM.

The **static** keyword is used for configuring the MLD member ports statically.

The configuration and the static ports and groups are saved in NVRAM.

When the IPv6 multicast router is a Catalyst 6500 switch and you are using extended VLANs (in the range 1006 to 4094), IPv6 MLD snooping must be enabled on the extended VLAN on the Catalyst 6500 switch in order for the Catalyst 2350 switch to receive queries on the VLAN. For normal-range VLANs (1 to 1005), it is not necessary to enable IPv6 MLD snooping on the VLAN on the Catalyst 6500 switch.

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 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 gigabitethernet0/2
```

This example shows how to configure a static multicast group:

```
Switch(config)# ipv6 mld snooping vlan 2 static FF12::34 interface gigabitethernet0/2
```

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	Enables IPv6 MLD snooping.
ipv6 mld snooping vlan	Configures IPv6 MLD snooping on the VLAN.
sdm prefer	Configures an SDM template to optimize system resources based on how the switch is being used.
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	<i>priority</i>	Port priority for LACP. The range is 1 to 65535.
---------------------------	-----------------	--

Defaults	The default is 32768.
-----------------	-----------------------

Command Modes	Interface configuration
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Command History	Release	Modification
	12.2(46)EY	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 <i>[channel-group-number]</i> 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

<i>priority</i>	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(46)EY	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.

link state group

Use the **link state group** interface configuration command to configure a port as a member of a link-state group. Use the **no** form of this command to remove the port from the link-state group.

link state group *[number]* { **upstream** | **downstream** }

no link state group *[number]* { **upstream** | **downstream** }

Syntax Description	<i>number</i>	(Optional) Specify the link-state group number. The group number can be from 1 to 2. The default is 1.
	upstream	Configure a port as an upstream port for a specific link-state group.
	downstream	Configure a port as a downstream port for a specific link-state group.

Defaults	The default group is group 1.
----------	-------------------------------

Command Modes	Interface configuration
---------------	-------------------------

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	<p>Use the link state group interface configuration command to configure a port as an upstream or downstream interface for the specified link-state group. If the group number is omitted, the default group number is 1.</p>
------------------	--

To enable link-state tracking, create a *link-state group*, and specify the interfaces that are assigned to the link-state group. An interface can be an aggregation of ports (an EtherChannel), a single physical port in access or trunk mode, or a routed port. In a link-state group, these interfaces are bundled together. The *downstream interfaces* are bound to the *upstream interfaces*. Interfaces connected to servers are referred to as downstream interfaces, and interfaces connected to distribution switches and network devices are referred to as upstream interfaces.

For more information about the interactions between the downstream and upstream interfaces, see the “Configuring EtherChannels and Link-State Tracking” chapter of the software configuration guide for this release.

Follow these guidelines to avoid configuration problems:

- An interface that is defined as an upstream interface cannot also be defined as a downstream interface in the same or a different link-state group. The reverse is also true.
- An interface cannot be a member of more than one link-state group.
- You can configure only two link-state groups per switch.

Examples

This example shows how to configure the interfaces as **upstream** in group 2:

```
Switch# configure terminal
Switch(config)# interface range gigabitethernet0/11 - 14
Switch(config-if-range)# link state group 2 upstream
Switch(config-if-range)# end
Switch(config-if)# end
```

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

Related Commands

Command	Description
link state track	Enables a link-state group.
show running-config	Displays the operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

link state track

Use the **link state track** global configuration command to enable a link-state group. Use the **no** form of this command to disable a link-state group.

link state track [*number*]

no link state track [*number*]

Syntax Description	<i>number</i>	(Optional) Specify the link-state group number. The group number can be from 1 to 2. The default is 1.
---------------------------	---------------	--

Defaults	Link-state tracking is disabled for all groups.
-----------------	---

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	Use the link state track global configuration command to enable a link-state group.
-------------------------	--

Examples	This example shows how enable link-state group 2:
-----------------	---

```
Switch(config)# link state track 2
```

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

Related Commands	Command	Description
	link state group	Configures an interface as a member of a link-state group.
	show running-config	Displays the operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_comm_and_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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 <i>id</i>	Specify the ID for the civic location or the elin location. The ID range is 1 to 4095.
<i>string</i>	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(46)EY	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.

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 location 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.
civic-location-id	Configure global civic location information for an interface.
elin-location-id	Configure emergency location information for an interface.
<i>id</i>	Specify the ID for the civic location or the elin location. The ID range is 1 to 4095.
<i>word</i>	Specify a word or phrase that provides additional location information.

Defaults

This command has no default setting.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(46)EY	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.

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
```

```
Switch(config-if)# interface gigabitethernet0/2
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)# interface gigabitethernet 0/2
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 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

<i>filesystem:filename</i>	Alias for a flash file system. Contains the path and name of the file that contains the log messages. The syntax for the local flash file system: flash:
<i>max-file-size</i>	(Optional) Specify the maximum logging file size. The range is 4096 to 2147483647.
nomax	(Optional) Specify the maximum file size of 2147483647.
<i>min-file-size</i>	(Optional) Specify the minimum logging file size. The range is 1024 to 2147483647.
<i>severity-level-number</i>	(Optional) Specify the logging severity level. The range is 0 to 7. See the <i>type</i> option for the meaning of each level.
<i>type</i>	(Optional) Specify the logging type. These keywords are valid: <ul style="list-style-type: none"> • 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(46)EY	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 operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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.
	<i>10-1000000</i>	Aging time in seconds. The range is 10 to 1000000 seconds.
	vlan <i>vlan-id</i>	(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(46)EY	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 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	<i>mac-addr</i>	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 <i>vlan-id</i>	Specify the VLAN for which the packet with the specified MAC address is received. The range is 1 to 4094.
	interface <i>interface-id</i>	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(46)EY	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

<i>mac-addr</i>	Unicast source or destination MAC address. Packets with this MAC address are dropped.
vlan <i>vlan-id</i>	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(46)EY	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.

match (class-map configuration)

Use the **match** class-map configuration command to define the match criteria to classify traffic. Use the **no** form of this command to remove the match criteria.

```
match {access-group acl-index-or-name | input-interface interface-id-list | ip dscp dscp-list | ip
precedence ip-precedence-list}

no match {access-group acl-index-or-name | input-interface interface-id-list | ip dscp dscp-list |
ip precedence ip-precedence-list}
```

Syntax Description

access-group <i>acl-index-or-name</i>	Number or name of an IP standard or extended access control list (ACL). For an IP standard ACL, the ACL index range is 1 to 99 and 1300 to 1999. For an IP extended ACL, the ACL index range is 100 to 199 and 2000 to 2699.
input-interface <i>interface-id-list</i>	Specify the physical ports to which the interface-level class map in a hierarchical policy map applies. This command can only be used in the child-level policy map and must be the only match condition in the child-level policy map. You can specify up to six entries in the list by specifying a port (counts as one entry), a list of ports separated by a space (each port counts as an entry), or a range of ports separated by a hyphen (counts as two entries).
ip dscp <i>dscp-list</i>	List of up to eight IP Differentiated Services Code Point (DSCP) values to match against incoming packets. Separate each value with a space. The range is 0 to 63. You also can enter a mnemonic name for a commonly-used value.
ip precedence <i>ip-precedence-list</i>	List of up to eight IP-precedence values to match against incoming packets. Separate each value with a space. The range is 0 to 7. You also can enter a mnemonic name for a commonly-used value

Defaults

No match criteria are defined.

Command Modes

Class-map configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

The **match** command is used to specify which fields in the incoming packets are examined to classify the packets. Only the IP access group or the MAC access group matching to the Ether Type/Len are supported.

If you enter the **class-map** {**match-all** | **match-any**} *class-map-name* global configuration command, you can enter these **match** commands:

- **match access-group** *acl-name*



Note The ACL must be an extended named ACL.

- **match input-interface** *interface-id-list*
- **match ip dscp** *dscp-list*
- **match ip precedence** *ip-precedence-list*

You cannot enter the **match access-group** *acl-index* command.

To define packet classification on a physical-port basis, only one **match** command per class map is supported. In this situation, the **match-all** and **match-any** keywords are equivalent.

For the **match ip dscp** *dscp-list* or the **match ip precedence** *ip-precedence-list* command, you can enter a mnemonic name for a commonly used value. For example, you can enter the **match ip dscp af11** command, which is the same as entering the **match ip dscp 10** command. You can enter the **match ip precedence critical** command, which is the same as entering the **match ip precedence 5** command. For a list of supported mnemonics, enter the **match ip dscp ?** or the **match ip precedence ?** command to see the command-line help strings.

Use the **input-interface** *interface-id-list* keyword when you are configuring an interface-level class map in a hierarchical policy map. For the *interface-id-list*, you can specify up to six entries.

Examples

This example shows how to create a class map called *class2*, which matches all the incoming traffic with DSCP values of 10, 11, and 12:

```
Switch(config)# class-map class2
Switch(config-cmap)# match ip dscp 10 11 12
Switch(config-cmap)# exit
```

This example shows how to create a class map called *class3*, which matches all the incoming traffic with IP-precedence values of 5, 6, and 7:

```
Switch(config)# class-map class3
Switch(config-cmap)# match ip precedence 5 6 7
Switch(config-cmap)# exit
```

This example shows how to delete the IP-precedence match criteria and to classify traffic using *acl1*:

```
Switch(config)# class-map class2
Switch(config-cmap)# match ip precedence 5 6 7
Switch(config-cmap)# no match ip precedence
Switch(config-cmap)# match access-group acl1
Switch(config-cmap)# exit
```

This example shows how to specify a list of physical ports to which an interface-level class map in a hierarchical policy map applies:

```
Switch(config)# class-map match-all class4
Switch(config-cmap)# match input-interface gigabitethernet0/1 gigabitethernet0/2
Switch(config-cmap)# exit
```

match (class-map configuration)

This example shows how to specify a range of physical ports to which an interface-level class map in a hierarchical policy map applies:

```
Switch(config)# class-map match-all class4  
Switch(config-cmap)# match input-interface gigabitethernet0/1 - gigabitethernet0/5  
Switch(config-cmap)# exit
```

You can verify your settings by entering the **show class-map** privileged EXEC command.

Related Commands

Command	Description
class-map	Creates a class map to be used for matching packets to the class whose name you specify.
show class-map	Displays quality of service (QoS) class maps.

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.
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Defaults	Auto-MDIX is enabled.
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Command Modes	Interface configuration
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Command History	Release	Modification
	12.2(46)EY	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 and on 10/100/1000BASE-TX small form-factor pluggable (SFP) module interfaces. It is not supported on 1000BASE-SX or -LX 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
	<code>show controllers ethernet-controller interface-id phy</code>	Displays general information about internal registers of an interface, including the operational state of auto-MDIX.

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(46)EY	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 aggregate-policer

Use the **mls qos aggregate-policer** global configuration command to define policer parameters, which can be shared by multiple classes within the same policy map. A policer defines a maximum permissible rate of transmission, a maximum burst size for transmissions, and an action to take if either maximum is exceeded. Use the **no** form of this command to delete an aggregate policer.

mls qos aggregate-policer *aggregate-policer-name* *rate-bps* *burst-byte* **exceed-action** {**drop** | **policed-dscp-transmit**}

no mls qos aggregate-policer *aggregate-policer-name*

Syntax Description	<i>aggregate-policer-name</i>	Name of the aggregate policer referenced by the police aggregate policy-map class configuration command.
	<i>rate-bps</i>	Specify the average traffic rate in bits per second (b/s). The range is 8000 to 1000000000.
	<i>burst-byte</i>	Specify the normal burst size in bytes. The range is 8000 to 1000000.
	exceed-action drop	When the specified rate is exceeded, specify that the switch drop the packet.
	exceed-action policed-dscp-transmit	When the specified rate is exceeded, specify that the switch change the Differentiated Services Code Point (DSCP) of the packet to that specified in the policed-DSCP map and then send the packet.

Defaults No aggregate policers are defined.

Command Modes Global configuration

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines

Define an aggregate policer if the policer is shared with multiple classes.

Policers for a port cannot be shared with other policers for another port; traffic from two different ports cannot be aggregated for policing purposes.

The port ASIC device, which controls more than one physical port, supports 256 policers on the switch (255 user-configurable policers plus 1 policer reserved for internal use). The maximum number of configurable policers supported per port is 63. Policers are allocated on demand by the software and are constrained by the hardware and ASIC boundaries. You cannot reserve policers per port (there is no guarantee that a port will be assigned to any policer).

You apply an aggregate policer to multiple classes in the same policy map; you cannot use an aggregate policer across different policy maps.

You cannot delete an aggregate policer if it is being used in a policy map. You must first use the **no police aggregate aggregate-policer-name** policy-map class configuration command to delete the aggregate policer from all policy maps before using the **no mls qos aggregate-policer aggregate-policer-name** command.

Policing uses a token-bucket algorithm. You configure the bucket depth (the maximum burst that is tolerated before the bucket overflows) by using the *burst-byte* option of the **police** policy-map class configuration command or the **mls qos aggregate-policer** global configuration command. You configure how fast (the average rate) that the tokens are removed from the bucket by using the *rate-bps* option of the **police** policy-map class configuration command or the **mls qos aggregate-policer** global configuration command. For more information, see the software configuration guide for this release.

Examples

This example shows how to define the aggregate policer parameters and how to apply the policer to multiple classes in a policy map:

```
Switch(config)# mls qos aggregate-policer agg_policer1 1000000 1000000 exceed-action drop
Switch(config)# policy-map policy2
Switch(config-pmap)# class class1
Switch(config-pmap-c)# police aggregate agg_policer1
Switch(config-pmap-c)# exit
Switch(config-pmap)# class class2
Switch(config-pmap-c)# set dscp 10
Switch(config-pmap-c)# police aggregate agg_policer1
Switch(config-pmap-c)# exit
Switch(config-pmap)# class class3
Switch(config-pmap-c)# trust dscp
Switch(config-pmap-c)# police aggregate agg_policer2
Switch(config-pmap-c)# exit
```

You can verify your settings by entering the **show mls qos aggregate-policer** privileged EXEC command.

Related Commands

Command	Description
police aggregate	Creates a policer that is shared by different classes.
show mls qos aggregate-policer	Displays the quality of service (QoS) aggregate policer configuration.

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

<i>default-cos</i>	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(46)EY	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 dscp-mutation

Use the **mls qos dscp-mutation** interface configuration command to apply a Differentiated Services Code Point (DSCP)-to-DSCP-mutation map to a DSCP-trusted port. Use the **no** form of this command to return the map to the default settings (no DSCP mutation).

mls qos dscp-mutation *dscp-mutation-name*

no mls qos dscp-mutation *dscp-mutation-name*

Syntax Description	<i>dscp-mutation-name</i>	Name of the DSCP-to-DSCP-mutation map. This map was previously defined with the mls qos map dscp-mutation global configuration command.
---------------------------	---------------------------	--

Defaults	The default DSCP-to-DSCP-mutation map is a null map, which maps incoming DSCPs to the same DSCP values.
-----------------	---

Command Modes	Interface configuration
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Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	If two quality of service (QoS) domains have different DSCP definitions, use the DSCP-to-DSCP-mutation map to translate one set of DSCP values to match the definition of another domain. You apply the DSCP-to-DSCP-mutation map to the receiving port (ingress mutation) at the boundary of a quality of service (QoS) administrative domain.
	With ingress mutation, the new DSCP value overwrites the one in the packet, and QoS handles the packet with this new value. The switch sends the packet out the port with the new DSCP value.
	You can configure multiple DSCP-to-DSCP-mutation maps on ingress ports.
	You apply the map only to DSCP-trusted ports. If you apply the DSCP mutation map to an untrusted port, to class of service (CoS) or IP-precedence trusted port, the command has no immediate effect until the port becomes DSCP-trusted.

Examples	This example shows how to define the DSCP-to-DSCP-mutation map named <i>dscpmutation1</i> and to apply the map to a port:
	Switch(config)# mls qos map dscp-mutation dscpmutation1 10 11 12 13 to 30
	Switch(config)# interface gigabitethernet0/1
	Switch(config-if)# mls qos trust dscp
	Switch(config-if)# mls qos dscp-mutation dscpmutation1

This example show how to remove the DSCP-to-DSCP-mutation map name *dscpmutation1* from the port and to reset the map to the default:

```
Switch(config-if)# no mls qos dscp-mutation dscpmutation1
```

You can verify your settings by entering the **show mls qos maps** privileged EXEC command.

Related Commands	Command	Description
	mls qos map dscp-mutation	Defines the DSCP-to-DSCP-mutation map.
	mls qos trust	Configures the port trust state.
	show mls qos maps	Displays QoS mapping information.

mls qos map

Use the **mls qos map** global configuration command to define the class of service (CoS)-to-Differentiated Services Code Point (DSCP) map, DSCP-to-CoS map, the DSCP-to-DSCP-mutation map, the IP-precedence-to-DSCP map, and the policed-DSCP map. Use the **no** form of this command to return to the default map.

```
mls qos map { cos-dscp dscp1...dscp8 | dscp-cos dscp-list to cos | dscp-mutation
dscp-mutation-name in-dscp to out-dscp | ip-prec-dscp dscp1...dscp8 | policed-dscp dscp-list
to mark-down-dscp }
```

```
no mls qos map { cos-dscp | dscp-cos | dscp-mutation dscp-mutation-name | ip-prec-dscp |
policed-dscp }
```

Syntax Description

cos-dscp <i>dscp1...dscp8</i>	<p>Define the CoS-to-DSCP map.</p> <p>For <i>dscp1...dscp8</i>, enter eight DSCP values that correspond to CoS values 0 to 7. Separate each DSCP value with a space. The range is 0 to 63.</p>
dscp-cos <i>dscp-list</i> to <i>cos</i>	<p>Define the DSCP-to-CoS map.</p> <p>For <i>dscp-list</i>, enter up to eight DSCP values, with each value separated by a space. The range is 0 to 63. Then enter the to keyword.</p> <p>For <i>cos</i>, enter a single CoS value to which the DSCP values correspond. The range is 0 to 7.</p>
dscp-mutation <i>dscp-mutation-name in-dscp</i> to <i>out-dscp</i>	<p>Define the DSCP-to-DSCP-mutation map.</p> <p>For <i>dscp-mutation-name</i>, enter the mutation map name.</p> <p>For <i>in-dscp</i>, enter up to eight DSCP values, with each value separated by a space. Then enter the to keyword.</p> <p>For <i>out-dscp</i>, enter a single DSCP value.</p> <p>The range is 0 to 63.</p>
ip-prec-dscp <i>dscp1...dscp8</i>	<p>Define the IP-precedence-to-DSCP map.</p> <p>For <i>dscp1...dscp8</i>, enter eight DSCP values that correspond to the IP precedence values 0 to 7. Separate each DSCP value with a space. The range is 0 to 63.</p>
policed-dscp <i>dscp-list</i> to <i>mark-down-dscp</i>	<p>Define the policed-DSCP map.</p> <p>For <i>dscp-list</i>, enter up to eight DSCP values, with each value separated by a space. Then enter the to keyword.</p> <p>For <i>mark-down-dscp</i>, enter the corresponding policed (marked down) DSCP value.</p> <p>The range is 0 to 63.</p>

Defaults

Table 2-2 shows the default CoS-to-DSCP map:

Table 2-2 Default CoS-to-DSCP Map

CoS Value	DSCP Value
0	0
1	8
2	16
3	24
4	32
5	40
6	48
7	56

Table 2-3 shows the default DSCP-to-CoS map:

Table 2-3 Default DSCP-to-CoS Map

DSCP Value	CoS Value
0–7	0
8–15	1
16–23	2
24–31	3
32–39	4
40–47	5
48–55	6
56–63	7

Table 2-4 shows the default IP-precedence-to-DSCP map:

Table 2-4 Default IP-Precedence-to-DSCP Map

IP Precedence Value	DSCP Value
0	0
1	8
2	16
3	24
4	32
5	40
6	48
7	56

The default DSCP-to-DSCP-mutation map is a null map, which maps an incoming DSCP value to the same DSCP value.

The default policed-DSCP map is a null map, which maps an incoming DSCP value to the same DSCP value.

Command Modes Global configuration

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines All the maps are globally defined. All the maps, except the DSCP-to-DSCP-mutation map, are applied to all ports. The DSCP-to-DSCP-mutation map is applied to a specific port.

Examples This example shows how to define the IP-precedence-to-DSCP map and to map IP-precedence values 0 to 7 to DSCP values of 0, 10, 20, 30, 40, 50, 55, and 60:

```
Switch# configure terminal
Switch(config)# mls qos map ip-prec-dscp 0 10 20 30 40 50 55 60
```

This example shows how to define the policed-DSCP map. DSCP values 1, 2, 3, 4, 5, and 6 are marked down to DSCP value 0. Marked DSCP values that not explicitly configured are not modified:

```
Switch# configure terminal
Switch(config)# mls qos map policed-dscp 1 2 3 4 5 6 to 0
```

This example shows how to define the DSCP-to-CoS map. DSCP values 20, 21, 22, 23, and 24 are mapped to CoS 1. DSCP values 10, 11, 12, 13, 14, 15, 16, and 17 are mapped to CoS 0:

```
Switch# configure terminal
Switch(config)# mls qos map dscp-cos 20 21 22 23 24 to 1
Switch(config)# mls qos map dscp-cos 10 11 12 13 14 15 16 17 to 0
```

This example shows how to define the CoS-to-DSCP map. CoS values 0 to 7 are mapped to DSCP values 0, 5, 10, 15, 20, 25, 30, and 35:

```
Switch# configure terminal
Switch(config)# mls qos map cos-dscp 0 5 10 15 20 25 30 35
```

This example shows how to define the DSCP-to-DSCP-mutation map. All the entries that are not explicitly configured are not modified (remain as specified in the null map):

```
Switch# configure terminal
Switch(config)# mls qos map dscp-mutation mutation1 1 2 3 4 5 6 7 to 10
Switch(config)# mls qos map dscp-mutation mutation1 8 9 10 11 12 13 to 10
Switch(config)# mls qos map dscp-mutation mutation1 20 21 22 to 20
Switch(config)# mls qos map dscp-mutation mutation1 0 31 32 33 34 to 30
```

You can verify your settings by entering the **show mls qos maps** privileged EXEC command.

Related Commands	Command	Description
	mls qos dscp-mutation	Applies a DSCP-to-DSCP-mutation map to a DSCP-trusted port.
	show mls qos maps	Displays quality of service (QoS) mapping information.

mls qos queue-set output buffers

Use the **mls qos queue-set output buffers** global configuration command to allocate buffers to a queue-set (four egress queues per port). Use the **no** form of this command to return to the default setting.

mls qos queue-set output *qset-id* **buffers** *allocation1 ... allocation4*

no mls qos queue-set output *qset-id* **buffers**

Syntax Description	<i>qset-id</i>	ID of the queue-set. Each port belongs to a queue-set, which defines all the characteristics of the four egress queues per port. The range is 1 to 2.
	<i>allocation1 ... allocation4</i>	Buffer space allocation (percentage) for each queue (four values for queues 1 to 4). For <i>allocation1</i> , <i>allocation3</i> , and <i>allocation4</i> , the range is 0 to 99. For <i>allocation2</i> , the range is 1 to 100 (including the CPU buffer). Separate each value with a space.

Defaults All allocation values are equally mapped among the four queues (25, 25, 25, 25). Each queue has 1/4 of the buffer space.

Command Modes Global configuration

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines Specify four allocation values, and separate each with a space.

Allocate buffers according to the importance of the traffic; for example, give a large percentage of the buffer to the queue with the highest-priority traffic.

To configure different classes of traffic with different characteristics, use this command with the **mls qos queue-set output** *qset-id* **threshold** global configuration command.



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 QoS solution.

Examples This example shows how to map a port to queue-set 2. It allocates 40 percent of the buffer space to egress queue 1 and 20 percent to egress queues 2, 3, and 4:

```
Switch(config)# mls qos queue-set output 2 buffers 40 20 20 20
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# queue-set 2
```

You can verify your settings by entering the **show mls qos interface** *[interface-id]* **buffers** or the **show mls qos queue-set** privileged EXEC command.

Related Commands	Command	Description
	mls qos queue-set output threshold	Configures the weighted tail-drop (WTD) thresholds, guarantees the availability of buffers, and configures the maximum memory allocation to a queue-set.
	queue-set	Maps a port to a queue-set.
	show mls qos interface buffers	Displays quality of service (QoS) information.
	show mls qos queue-set	Displays egress queue settings for the queue-set.

mls qos queue-set output threshold

Use the **mls qos queue-set output threshold** global configuration command to configure the weighted tail-drop (WTD) thresholds, to guarantee the availability of buffers, and to configure the maximum memory allocation to a queue-set (four egress queues per port). Use the **no** form of this command to return to the default setting.

mls qos queue-set output *qset-id* **threshold** *queue-id* *drop-threshold1* *drop-threshold2*
reserved-threshold *maximum-threshold*

no mls qos queue-set output *qset-id* **threshold** [*queue-id*]

Syntax Description

<i>qset-id</i>	ID of the queue-set. Each port belongs to a queue-set, which defines all the characteristics of the four egress queues per port. The range is 1 to 2.
<i>queue-id</i>	Specific queue in the queue-set on which the command is performed. The range is 1 to 4.
<i>drop-threshold1</i> <i>drop-threshold2</i>	Two WTD thresholds expressed as a percentage of the allocated memory of the queue. The range is 1 to 3200 percent.
<i>reserved-threshold</i>	Amount of memory to be guaranteed (reserved) for the queue and expressed as a percentage of the allocated memory. The range is 1 to 100 percent.
<i>maximum-threshold</i>	Enable a queue in the full condition to get more buffers than are reserved for it. This is the maximum memory the queue can have before the packets are dropped. The range is 1 to 3200 percent.

Defaults

When quality of service (QoS) is enabled, WTD is enabled.

[Table 2-5](#) shows the default WTD threshold settings.

Table 2-5 Default Egress Queue WTD Threshold Settings

Feature	Queue 1	Queue 2	Queue 3	Queue 4
WTD drop threshold 1	100 percent	200 percent	100 percent	100 percent
WTD drop threshold 2	100 percent	200 percent	100 percent	100 percent
Reserved threshold	50 percent	100 percent	50 percent	50 percent
Maximum threshold	400 percent	400 percent	400 percent	400 percent

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

Use the **mls qos queue-set output *qset-id* buffers** global configuration command to allocate a fixed number of buffers to the four queues in a queue-set.

The drop-threshold percentages can exceed 100 percent and can be up to the maximum (if the maximum threshold exceeds 100 percent).

While buffer ranges allow individual queues in the queue-set to use more of the common pool when available, the maximum number of packets for each queue is still internally limited to 400 percent, or 4 times the allocated number of buffers. One packet can use one 1 or more buffers.

**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 QoS solution.

The switch uses a buffer allocation scheme to reserve a minimum amount of buffers for each egress queue, to prevent any queue or port from consuming all the buffers and depriving other queues, and to decide whether to grant buffer space to a requesting queue. The switch decides whether the target queue has not consumed more buffers than its reserved amount (under-limit), whether it has consumed all of its maximum buffers (over-limit), and whether the common pool is empty (no free buffers) or not empty (free buffers). If the queue is not over-limit, the switch can allocate buffer space from the reserved pool or from the common pool (if it is not empty). If there are no free buffers in the common pool or if the queue is over-limit, the switch drops the frame.

Examples

This example shows how to map a port to queue-set 2. It configures the drop thresholds for queue 2 to 40 and 60 percent of the allocated memory, guarantees (reserves) 100 percent of the allocated memory, and configures 200 percent as the maximum memory this queue can have before packets are dropped:

```
Switch(config)# mls qos queue-set output 2 threshold 2 40 60 100 200
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# queue-set 2
```

You can verify your settings by entering the **show mls qos interface *interface-id* buffers** or the **show mls qos queue-set** privileged EXEC command.

Related Commands

Command	Description
mls qos queue-set output buffers	Allocates buffers to a queue-set.
queue-set	Maps a port to a queue-set.
show mls qos interface buffers	Displays QoS information.
show mls qos queue-set	Displays egress queue settings for the queue-set.

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(46)EY	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.
-------------------------	--

Examples	This example shows how to enable DSCP transparency and configure the switch to not change the DSCP value of the incoming IP packet:
-----------------	---

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. For syntax information, select Cisco IOS Release 12.2 Configuration Guides and Command References > Cisco IOS Fundamentals Command Reference, Release 12.2 > File Management Commands > Configuration File Management Commands .

mls qos srr-queue input bandwidth

Use the **mls qos srr-queue input bandwidth** global configuration command to assign shaped round robin (SRR) weights to an ingress queue. The ratio of the weights is the ratio of the frequency in which the SRR scheduler dequeues packets from each queue. Use the **no** form of this command to return to the default setting.

mls qos srr-queue input bandwidth *weight1 weight2*

no mls qos srr-queue input bandwidth

Syntax Description	<i>weight1 weight2</i>	Ratio of <i>weight1</i> and <i>weight2</i> determines the ratio of the frequency in which the SRR scheduler dequeues packets from ingress queues 1 and 2. The range is 1 to 100. Separate each value with a space.
---------------------------	------------------------	--

Defaults	Weight1 and weight2 are 4 (1/2 of the bandwidth is equally shared between the two queues).
-----------------	--

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	SRR services the priority queue for its configured weight as specified by the bandwidth keyword in the mls qos srr-queue input priority-queue <i>queue-id</i> bandwidth <i>weight</i> 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 <i>weight1 weight2</i> global configuration command.
-------------------------	---

You specify which ingress queue is the priority queue by using the **mls qos srr-queue input priority-queue** global configuration command.

Examples	This example shows how to assign the ingress bandwidth for the queues in the stack. Priority queueing is disabled, and the shared bandwidth ratio allocated to queue 1 is 25/(25+75) and to queue 2 is 75/(25+75):
-----------------	---

```
Switch(config)# mls qos srr-queue input priority-queue 2 bandwidth 0
Switch(config)# mls qos srr-queue input bandwidth 25 75
```

In this example, queue 2 has three times the bandwidth of queue 1; queue 2 is serviced three times as often as queue 1.

This example shows how to assign the ingress bandwidths for the queues in the stack. Queue 1 is the priority queue with 10 percent of the bandwidth allocated to it. The bandwidth ratio allocated to queues 1 and 2 is 4/(4+4). 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
Switch(config)# mls qos srr-queue input bandwidth 4 4
```

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 buffers	Allocates the buffers between the ingress queues.
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.
mls qos srr-queue input dscp-map	Maps Differentiated Services Code Point (DSCP) values to an ingress queue or maps DSCP 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 input threshold	Assigns weighted tail-drop (WTD) threshold percentages to an ingress queue.
show mls qos input-queue	Displays ingress queue settings.
show mls qos interface queueing	Displays quality of service (QoS) information.

mls qos srr-queue input buffers

Use the **mls qos srr-queue input buffers** global configuration command to allocate the buffers between the ingress queues. Use the **no** form of this command to return to the default setting.

mls qos srr-queue input buffers *percentage1 percentage2*

no mls qos srr-queue input buffers

Syntax Description	<i>percentage1</i>	Percentage of buffers allocated to ingress queues 1 and 2. The range is 0 to 100. Separate each value with a space.
	<i>percentage2</i>	

Defaults	Ninety percent of the buffers is allocated to queue 1, and 10 percent of the buffers is allocated to queue 2.
----------	---

Command Modes	Global configuration
---------------	----------------------

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	You should allocate the buffers so that the queues can handle any incoming bursty traffic.
------------------	--

Examples	This example shows how to allocate 60 percent of the buffer space to ingress queue 1 and 40 percent of the buffer space to ingress queue 2:
----------	---

```
Switch(config)# mls qos srr-queue input buffers 60 40
```

You can verify your settings by entering the **show mls qos interface** *[interface-id]* **buffers** or the **show mls qos input-queue** privileged EXEC command.

Related Commands	Command	Description
	mls qos srr-queue input bandwidth	Assigns shaped round robin (SRR) weights to an ingress queue.
	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.
	mls qos srr-queue input dscp-map	Maps Differentiated Services Code Point (DSCP) values to an ingress queue or maps DSCP 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 input threshold	Assigns weighted tail-drop (WTD) threshold percentages to an ingress queue.

Command	Description
show mls qos input-queue	Displays ingress queue settings.
show mls qos interface buffers	Displays quality of service (QoS) information.

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 <i>queue-id</i>	Specify a queue number. For <i>queue-id</i> , the range is 1 to 2.
<i>cos1...cos8</i>	Map CoS values to an ingress queue. For <i>cos1...cos8</i> , enter up to eight values, and separate each value with a space. The range is 0 to 7.
threshold <i>threshold-id</i> <i>cos1...cos8</i>	Map CoS values to a queue threshold ID. For <i>threshold-id</i> , the range is 1 to 3. For <i>cos1...cos8</i> , enter up to eight values, and separate each value with a space. The range is 0 to 7.

Defaults

Table 2-6 shows the default CoS input queue threshold map:

Table 2-6 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(46)EY	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 with a drop threshold of 50 percent. It maps CoS values 4 and 5 to ingress queue 1 and to threshold ID 2 with a drop threshold of 70 percent:

```
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
Switch(config)# mls qos srr-queue input threshold 1 50 70
```

You can verify your settings by entering the **show mls qos maps** privileged EXEC command.

Related Commands

Command	Description
mls qos srr-queue input bandwidth	Assigns shaped round robin (SRR) weights to an ingress queue.
mls qos srr-queue input buffers	Allocates the buffers between the ingress queues.
mls qos srr-queue input dscp-map	Maps Differentiated Services Code Point (DSCP) values to an ingress queue or maps DSCP 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 input threshold	Assigns WTD threshold percentages to an ingress queue.
show mls qos maps	Displays QoS mapping information.

mls qos srr-queue input dscp-map

Use the **mls qos srr-queue input dscp-map** global configuration command to map Differentiated Services Code Point (DSCP) values to an ingress queue or to map DSCP 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 dscp-map queue queue-id {dscp1...dscp8 | threshold threshold-id
dscp1...dscp8}
```

```
no mls qos srr-queue input dscp-map
```

Syntax Description		
queue <i>queue-id</i>	Specify a queue number. For <i>queue-id</i> , the range is 1 to 2.	
<i>dscp1...dscp8</i>	Map DSCP values to an ingress queue. For <i>dscp1...dscp8</i> , enter up to eight values, and separate each value with a space. The range is 0 to 63.	
threshold <i>threshold-id</i> <i>dscp1...dscp8</i>	Map DSCP values to a queue threshold ID. For <i>threshold-id</i> , the range is 1 to 3. For <i>dscp1...dscp8</i> , enter up to eight values, and separate each value with a space. The range is 0 to 63.	

Defaults

Table 2-7 shows the default DSCP input queue threshold map:

Table 2-7 Default DSCP Input Queue Threshold Map

DSCP Value	Queue ID–Threshold ID
0–39	1–1
40–47	2–1
48–63	1–1

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

The DSCP 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 DSCP value to a different queue and threshold combination, allowing the frame to follow different behavior.

You can map up to eight DSCP values per command.

Examples

This example shows how to map DSCP values 0 to 6 to ingress queue 1 and to threshold 1 with a drop threshold of 50 percent. It maps DSCP values 20 to 26 to ingress queue 1 and to threshold 2 with a drop threshold of 70 percent:

```
Switch(config)# mls qos srr-queue input dscp-map queue 1 threshold 1 0 1 2 3 4 5 6
Switch(config)# mls qos srr-queue input dscp-map queue 1 threshold 2 20 21 22 23 24 25 26
Switch(config)# mls qos srr-queue input threshold 1 50 70
```

You can verify your settings by entering the **show mls qos maps** privileged EXEC command.

Related Commands

Command	Description
mls qos srr-queue input bandwidth	Assigns shaped round robin (SRR) weights to an ingress queue.
mls qos srr-queue input buffers	Allocates the buffers between the ingress queues.
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 threshold ID.
mls qos srr-queue input priority-queue	Configures the ingress priority queue and guarantees bandwidth.
mls qos srr-queue input threshold	Assigns WTD threshold percentages to an ingress queue.
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

<i>queue-id</i>	Ingress queue ID. The range is 1 to 2.
bandwidth <i>weight</i>	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(46)EY	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, which reduces the delay and jitter under heavy network traffic on an oversubscribed ring (when 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 in the ring. Queue 1 is the priority queue with 10 percent of the bandwidth allocated to it. The bandwidth ratio allocated to queues 1 and 2 is 4/(4+4). 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
Switch(config)# mls qos srr-queue input bandwidth 4 4
```

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 bandwidth	Assigns shaped round robin (SRR) weights to an ingress queue.
mls qos srr-queue input buffers	Allocates the buffers between the ingress queues.
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.
mls qos srr-queue input dscp-map	Maps Differentiated Services Code Point (DSCP) values to an ingress queue or maps DSCP values to a queue and to a threshold ID.
mls qos srr-queue input threshold	Assigns weighted tail-drop (WTD) threshold percentages to an ingress queue.
show mls qos input-queue	Displays ingress queue settings.
show mls qos interface queueing	Displays quality of service (QoS) information.

mls qos srr-queue input threshold

Use the **mls qos srr-queue input threshold** global configuration command to assign weighted tail-drop (WTD) threshold percentages to an ingress queue. Use the **no** form of this command to return to the default setting.

mls qos srr-queue input threshold *queue-id threshold-percentage1 threshold-percentage2*

no mls qos srr-queue input threshold *queue-id*

Syntax Description	<i>queue-id</i>	ID of the ingress queue. The range is 1 to 2.
	<i>threshold-percentage1 threshold-percentage2</i>	Two WTD threshold percentage values. Each threshold value is a percentage of the total number of queue descriptors allocated for the queue. Separate each value with a space. The range is 1 to 100.

Defaults	When quality of service (QoS) is enabled, WTD is enabled. The two WTD thresholds are set to 100 percent.
-----------------	---

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	<p>QoS uses the CoS-to-threshold map or the DSCP-to-threshold map to decide which class of service (CoS) or Differentiated Services Code Points (DSCPs) values are mapped to threshold 1 and to threshold 2. If threshold 1 is exceeded, packets with CoS or DSCPs assigned to this threshold are dropped until the threshold is no longer exceeded. However, packets assigned to threshold 2 continue to be queued and sent as long as the second threshold is not exceeded.</p> <p>Each queue has two configurable (explicit) drop threshold and one preset (implicit) drop threshold (full).</p> <p>You configure the CoS-to-threshold map by using the mls qos srr-queue input cos-map global configuration command. You configure the DSCP-to-threshold map by using the mls qos srr-queue input dscp-map global configuration command.</p>
-------------------------	--

Examples	This example shows how to configure the tail-drop thresholds for the two queues. The queue 1 thresholds are 50 percent and 100 percent, and the queue 2 thresholds are 70 percent and 100 percent:
-----------------	--

```
Switch(config)# mls qos srr-queue input threshold 1 50 100
Switch(config)# mls qos srr-queue input threshold 2 70 100
```

You can verify your settings by entering the **show mls qos interface** *[interface-id]* **buffers** or the **show mls qos input-queue** privileged EXEC command.

Related Commands	Command	Description
	mls qos srr-queue input bandwidth	Assigns shaped round robin (SRR) weights to an ingress queue.
	mls qos srr-queue input buffers	Allocates the buffers between the ingress queues.
	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.
	mls qos srr-queue input dscp-map	Maps Differentiated Services Code Point (DSCP) values to an ingress queue or maps DSCP 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 input-queue	Displays ingress queue settings.
	show mls qos interface buffers	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 <i>queue-id</i>	Specify a queue number. For <i>queue-id</i> , the range is 1 to 4.
<i>cos1...cos8</i>	Map CoS values to an egress queue. For <i>cos1...cos8</i> , enter up to eight values, and separate each value with a space. The range is 0 to 7.
threshold <i>threshold-id</i> <i>cos1...cos8</i>	Map CoS values to a queue threshold ID. For <i>threshold-id</i> , the range is 1 to 3. For <i>cos1...cos8</i> , enter up to eight values, and separate each value with a space. The range is 0 to 7.

Defaults

Table 2-8 shows the default CoS output queue threshold map:

Table 2-8 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(46)EY	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. It configures the drop thresholds for queue 1 to 50 and 70 percent of the allocated memory, guarantees (reserves) 100 percent of the allocated memory, and configures 200 percent as the maximum memory that this queue can have before packets are dropped.

```
Switch(config)# mls qos srr-queue output cos-map queue 1 threshold 1 0 1 2 3
Switch(config)# mls qos queue-set output 1 threshold 1 50 70 100 200
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# queue-set 1
```

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
mls qos srr-queue output dscp-map	Maps Differentiated Services Code Point (DSCP) values to an egress queue or maps DSCP values to a queue and to a threshold ID.
mls qos queue-set output threshold	Configures the WTD thresholds, guarantees the availability of buffers, and configures the maximum memory allocation to a queue-set.
queue-set	Maps a port to a queue-set.
show mls qos interface buffers	Displays QoS information.
show mls qos maps	Displays QoS mapping information.
show mls qos queue-set	Displays egress queue settings for the queue-set.

mls qos srr-queue output dscp-map

Use the **mls qos srr-queue output dscp-map** global configuration command to map Differentiated Services Code Point (DSCP) values to an egress or to map DSCP 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 dscp-map queue queue-id {dscp1...dscp8 | threshold threshold-id
dscp1...dscp8}
```

```
no mls qos srr-queue output dscp-map
```

Syntax Description

queue <i>queue-id</i>	Specify a queue number. For <i>queue-id</i> , the range is 1 to 4.
<i>dscp1...dscp8</i>	Map DSCP values to an egress queue. For <i>dscp1...dscp8</i> , enter up to eight values, and separate each value with a space. The range is 0 to 63.
threshold <i>threshold-id</i> <i>dscp1...dscp8</i>	Map DSCP values to a queue threshold ID. For <i>threshold-id</i> , the range is 1 to 3. For <i>dscp1...dscp8</i> , enter up to eight values, and separate each value with a space. The range is 0 to 63.

Defaults

Table 2-9 shows the default DSCP output queue threshold map:

Table 2-9 Default DSCP Output Queue Threshold Map

DSCP Value	Queue ID–Threshold ID
0–15	2–1
16–31	3–1
32–39	4–1
40–47	1–1
48–63	4–1

Command Modes

Global configuration

Command History

Release	Modification
12.2(46)EY	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 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 DSCP value to a different queue and threshold combination, allowing the frame to follow different behavior.

You can map up to eight DSCP values per command.

Examples

This example shows how to map a port to queue-set 1. It maps DSCP values 0 to 3 to egress queue 1 and to threshold ID 1. It configures the drop thresholds for queue 1 to 50 and 70 percent of the allocated memory, guarantees (reserves) 100 percent of the allocated memory, and configures 200 percent as the maximum memory that this queue can have before packets are dropped.

```
Switch(config)# mls qos srr-queue output dscp-map queue 1 threshold 1 0 1 2 3
Switch(config)# mls qos queue-set output 1 threshold 1 50 70 100 200
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# queue-set 1
```

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
mls qos srr-queue output cos-map	Maps class of service (CoS) values to an egress queue or maps CoS values to a queue and to a threshold ID.
mls qos queue-set output threshold	Configures the WTD thresholds, guarantees the availability of buffers, and configures the maximum memory allocation to a queue-set.
queue-set	Maps a port to a queue-set.
show mls qos interface buffers	Displays quality of service (QoS) information.
show mls qos maps	Displays QoS mapping information.
show mls qos queue-set	Displays egress queue settings for the queue-set.

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 Differentiated Services Code Point (DSCP), class of service (CoS), or IP-precedence field. Use the **no** form of this command to return a port to its untrusted state.

mls qos trust [**cos** | **dscp** | **ip-precedence**]

no mls qos trust [**cos** | **dscp** | **ip-precedence**]

Syntax Description		
cos	(Optional) Classify an ingress packet by using the packet CoS value. For an untagged packet, use the port default CoS value.	
dscp	(Optional) Classify an ingress packet by using the packet DSCP value (most significant 6 bits of 8-bit service-type field). For a non-IP packet, the packet CoS is used if the packet is tagged. For an untagged packet, the default port CoS value is used.	
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 is used if the packet is tagged. For an untagged packet, the port default CoS value is used.	

Defaults	The port is not trusted. If no keyword is specified when you enter the command, the default is dscp .
-----------------	--

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	12.2(46)EY	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.

When a port is configured with trust DSCP or trust IP precedence and the incoming packet is a non-IP packet, the CoS-to-DSCP map is used to derive the corresponding DSCP value from the CoS value. The CoS can be the packet CoS for trunk ports or the port default CoS for nontrunk ports.

If the DSCP is trusted, the DSCP field of the IP packet is not modified. However, it is still possible that the CoS value of the packet is modified (according to DSCP-to-CoS map).

If the CoS is trusted, the CoS field of the packet is not modified, but the DSCP can be modified (according to CoS-to-DSCP map) if the packet is an IP packet.

If you configure the trust setting for DSCP or IP precedence, the DSCP or IP precedence values in the incoming packets are trusted. If you configure the **mls qos cos override** interface configuration command on the switch port connected to the device, the switch overrides the CoS of the incoming packets and assigns the default CoS value to them.

For an inter-QoS domain boundary, you can configure the port to the DSCP-trusted state and apply the DSCP-to-DSCP-mutation map if the DSCP values are different between the QoS domains.

Classification using a port trust state (for example, **mls qos trust [cos | dscp | ip-precedence]** and a policy map (for example, **service-policy input policy-map-name**) are mutually exclusive. The last one configured overwrites the previous configuration.

Examples

This example shows how to configure a port to trust the IP precedence field in the incoming packet:

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# mls qos trust ip-precedence
```

You can verify your settings by entering the **show mls qos interface** privileged EXEC command.

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.
mls qos dscp-mutation	Applies a DSCP-to DSCP-mutation map to a DSCP-trusted port.
mls qos map	Defines the CoS-to-DSCP map, DSCP-to-CoS map, the DSCP-to-DSCP-mutation map, the IP-precedence-to-DSCP map, and the policed-DSCP map.
show mls qos interface	Displays QoS information.

mls qos vlan-based

Use the **mls qos vlan-based** interface configuration command to enable VLAN-based quality of service (QoS) on the physical port. Use the **no** form of this command to disable this feature.

mls qos vlan-based

no mls qos vlan-based

Syntax Description	There are no arguments or keywords.
---------------------------	-------------------------------------

Defaults	VLAN-based QoS is disabled.
-----------------	-----------------------------

Command Modes	Interface configuration
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Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	<p>Before attaching a hierarchical policy map to a switch virtual interface (SVI), use the mls qos vlan-based interface configuration command on a physical port if the port is to be specified in the secondary interface level of the hierarchical policy map.</p> <p>When you configure hierarchical policing, the hierarchical policy map is attached to the SVI and affects all traffic belonging to the VLAN. The individual policer in the interface-level traffic classification only affects the physical ports specified for that classification.</p> <p>For detailed instructions about configuring hierarchical policy maps, see the “Classifying, Policing, and Marking Traffic by Using Hierarchical Policy Maps” section in the software configuration guide for this release.</p>
-------------------------	--

Examples	This example shows how to enable VLAN-based policing on a physical port:
-----------------	--

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# mls qos vlan-based
```

You can verify your settings by entering the **show mls qos interface** privileged EXEC command.

Related Commands	Command	Description
	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 or Remote SPAN (RSPAN) 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 or RSPAN session, and to limit (filter) SPAN source traffic to specific VLANs. Use the **no** form of this command to remove the SPAN or RSPAN session or to remove source or destination interfaces or filters from the SPAN or RSPAN 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 replicate**] [**ingress** {**dot1q vlan** *vlan-id* | **untagged vlan** *vlan-id* | **vlan** *vlan-id*}] } | {**remote vlan** *vlan-id*}

no monitor session *session_number* **destination** {**interface** *interface-id* [, | -] [**encapsulation replicate**] [**ingress** {**dot1q vlan** *vlan-id* | **untagged vlan** *vlan-id* | **vlan** *vlan-id*}] } | {**remote 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**] } | {**remote vlan** *vlan-id*}

no monitor session {*session_number* | **all** | **local** | **remote**}

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**] } | {**remote vlan** *vlan-id*}

Syntax Description

<i>session_number</i>	Specify the session number identified with the SPAN or RSPAN session. The range is 1 to 66.
destination	Specify the SPAN or RSPAN destination. A destination must be a physical port.
interface <i>interface-id</i>	Specify the destination or source interface for a SPAN or RSPAN session. Valid interfaces are physical ports (including type, module, and port number). For source interface , port channel is also a valid interface type, and the valid range is 1 to 48.
encapsulation replicate	(Optional) Specify that the destination interface replicates the source interface encapsulation method. If not selected, the default is to send packets in native form (untagged). These keywords are valid only for local SPAN. For RSPAN, the RSPAN VLAN ID overwrites the original VLAN ID; therefore, packets are always sent untagged.
ingress	(Optional) Enable ingress traffic forwarding.
dot1q vlan <i>vlan-id</i>	Accept incoming packets with IEEE 802.1Q encapsulation with the specified VLAN as the default VLAN.
untagged vlan <i>vlan-id</i>	Accept incoming packets with untagged encapsulation with the specified VLAN as the default VLAN.

vlan <i>vlan-id</i>	When used with only the ingress keyword, set default VLAN for ingress traffic.
remote vlan <i>vlan-id</i>	Specify the remote VLAN for an RSPAN source or destination session. The range is 2 to 1001 and 1006 to 4094. The RSPAN VLAN cannot be VLAN 1 (the default VLAN) or VLAN IDs 1002 to 1005 (reserved for Token Ring and FDDI VLANs).
,	(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 <i>vlan-id</i>	Specify a list of VLANs as filters on trunk source ports to limit SPAN source traffic to specific VLANs. The <i>vlan-id</i> range is 1 to 4094.
source	Specify the SPAN or RSPAN 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 <i>vlan-id</i>	Specify the SPAN source interface as a VLAN ID. The range is 1 to 4094.
all, local, remote	Specify all , local , or remote with the no monitor session command to clear all SPAN and RSPAN, all local SPAN, or all RSPAN sessions.

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(46)EY	This command was introduced.

Usage Guidelines

Traffic that enters or leaves source ports or source VLANs can be monitored by using SPAN or RSPAN. Traffic routed to source ports or source VLANs cannot be monitored.

You can set a combined maximum of two local SPAN sessions and RSPAN source sessions. You can have a total of 66 SPAN and RSPAN sessions 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 or RSPAN 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 or RSPAN 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 RSPAN source interface.

A port used as a destination port cannot be a SPAN or RSPAN source, nor can a port be a destination port for more than one session at a time.

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**, **isl**, 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. (This applies to local SPAN only; RSPAN does not support encapsulation replication.)
- 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**. (This applies to local SPAN only; RSPAN does not support encapsulation replication.)

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 RSPAN source session 1 to monitor multiple source interfaces and to configure the destination RSPAN VLAN 900.

```
Switch(config)# monitor session 1 source interface gigabitethernet0/1
Switch(config)# monitor session 1 source interface port-channel 2 tx
Switch(config)# monitor session 1 destination remote vlan 900
Switch(config)# end
```

This example shows how to configure an RSPAN destination session 10 in the switch receiving the monitored traffic.

```
Switch(config)# monitor session 10 source remote vlan 900
Switch(config)# monitor session 10 destination interface gigabitethernet0/2
```

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 2 destination interface gigabitethernet0/2 encapsulation
dot1q 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 2 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, RSPAN, FSPAN, and FRSPAN 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
remote-span	Configures an RSPAN VLAN in vlan configuration mode.
show monitor	Displays SPAN and RSPAN session information.
show running-config	Displays the operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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(46)EY	This command was introduced.

Usage Guidelines

The learn method must be configured the same at both ends of the link.



Note

The switch supports address learning only on aggregate ports even though the **physical-port** keyword is provided in the command-line interface (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 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 operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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	<i>priority</i>	A priority number ranging from 0 to 255.
--------------------	-----------------	--

Defaults	The default is 128.
----------	---------------------

Command Modes	Interface configuration
---------------	-------------------------

Command History12. 2(46)EY	Release	Modification
	12.2(46)EY	This command was introduced.

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 switch supports address learning only on aggregate ports even though the **physical-port** keyword is provided in the command-line interface (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 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 operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

police

Use the **police** policy-map class configuration command to define a policer for classified traffic. A policer defines a maximum permissible rate of transmission, a maximum burst size for transmissions, and an action to take if either maximum is exceeded. Use the **no** form of this command to remove an existing policer.

police *rate-bps burst-byte* [**exceed-action** {**drop** | **policed-dscp-transmit**}]

no police *rate-bps burst-byte* [**exceed-action** {**drop** | **policed-dscp-transmit**}]

Syntax Description

<i>rate-bps</i>	Specify the average traffic rate in bits per second (b/s). The range is 1000000 to 1000000000.
<i>burst-byte</i>	Specify the normal burst size in bytes. The range is 8000 to 1000000.
exceed-action drop	(Optional) When the specified rate is exceeded, specify that the switch drop the packet.
exceed-action policed-dscp-transmit	(Optional) When the specified rate is exceeded, specify that the switch changes the Differentiated Services Code Point (DSCP) of the packet to that specified in the policed-DSCP map and then sends the packet.

Defaults

No policers are defined.

Command Modes

Policy-map class configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Usage Guidelines

When configuring hierarchical policy maps, you can only use the **police** policy-map command in a secondary interface-level policy map.

The port ASIC device, which controls more than one physical port, supports 256 policers on the switch (255 user-configurable policers plus 1 policer reserved for internal use). The maximum number of configurable policers supported per port is 63. Policers are allocated on demand by the software and are constrained by the hardware and ASIC boundaries. You cannot reserve policers per port. There is no guarantee that a port will be assigned to any policer.

To return to policy-map configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.

Policing uses a token-bucket algorithm. You configure the bucket depth (the maximum burst that is tolerated before the bucket overflows) by using the *burst-byte* option of the **police** policy-map class configuration command or the **mls qos aggregate-policer** global configuration command. You configure how quickly (the average rate) the tokens are removed from the bucket by using the *rate-bps* option of the **police** policy-map class configuration command or the **mls qos aggregate-policer** global configuration command. For more information, see the software configuration guide for this release.

Examples

This example shows how to configure a policer that drops packets if traffic exceeds 1 Mb/s average rate with a burst size of 20 KB. The DSCPs of incoming packets are trusted, and there is no packet modification.

```
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 drop
Switch(config-pmap-c)# exit
```

This example shows how to configure a policer, which marks down the DSCP values with the values defined in policed-DSCP map and sends the packet:

```
Switch(config)# policy-map policy2
Switch(config-pmap)# class class2
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
class	Defines a traffic classification match criteria (through the police , set , and trust policy-map class configuration commands) for the specified class-map name.
mls qos map policed-dscp	Applies a policed-DSCP map to a DSCP-trusted port.
policy-map	Creates or modifies a policy map that can be attached to multiple ports to specify a service policy.
set	Classifies IP traffic by setting a DSCP or IP-precedence value in the packet.
show policy-map	Displays quality of service (QoS) policy maps.
trust	Defines a trust state for traffic classified through the class policy-map configuration or the class-map global configuration command.

police aggregate

Use the **police aggregate** policy-map class configuration command to apply an aggregate policer to multiple classes in the same policy map. A policer defines a maximum permissible rate of transmission, a maximum burst size for transmissions, and an action to take if either maximum is exceeded. Use the **no** form of this command to remove the specified policer.

police aggregate *aggregate-policer-name*

no police aggregate *aggregate-policer-name*

Syntax Description	<i>aggregate-policer-name</i> Name of the aggregate policer.	
Defaults	No aggregate policers are defined.	
Command Modes	Policy-map class configuration	
Command History	Release	Modification
	12.2(46)EY	This command was introduced.
Usage Guidelines	The port ASIC device, which controls more than one physical port, supports 256 policers on the switch (255 user-configurable policers plus 1 policer reserved for internal use). The maximum number of configurable policers supported per port is 63. Policers are allocated on demand by the software and are constrained by the hardware and ASIC boundaries. You cannot reserve policers per port. There is no guarantee that a port will be assigned to any policer.	
	You set aggregate policer parameters by using the mls qos aggregate-policer global configuration command. You apply an aggregate policer to multiple classes in the same policy map; you cannot use an aggregate policer across different policy maps.	
	To return to policy-map configuration mode, use the exit command. To return to privileged EXEC mode, use the end command.	
	You cannot configure aggregate policers in hierarchical policy maps.	

Examples

This example shows how to define the aggregate policer parameters and to apply the policer to multiple classes in a policy map:

```
Switch(config)# mls qos aggregate-policer agg_policer1 10000 1000000 exceed-action drop
Switch(config)# policy-map policy2
Switch(config-pmap)# class class1
Switch(config-pmap-c)# police aggregate agg_policer1
Switch(config-pmap-c)# exit
Switch(config-pmap)# class class2
Switch(config-pmap-c)# set dscp 10
Switch(config-pmap-c)# police aggregate agg_policer1
Switch(config-pmap-c)# exit
Switch(config-pmap)# class class3
Switch(config-pmap-c)# trust dscp
Switch(config-pmap-c)# police aggregate agg_policer2
Switch(config-pmap-c)# exit
```

You can verify your settings by entering the **show mls qos aggregate-policer** privileged EXEC command.

Related Commands

Command	Description
mls qos aggregate-policer	Defines policer parameters, which can be shared by multiple classes within a policy map.
show mls qos aggregate-policer	Displays the quality of service (QoS) aggregate policer configuration.

policy-map

Use the **policy-map** global configuration command to create or modify a policy map that can be attached to multiple physical ports or switch virtual interfaces (SVIs) and to enter policy-map configuration mode. Use the **no** form of this command to delete an existing policy map and to return to global configuration mode.

```

policy-map policy-map-name

no policy-map policy-map-name

```

Syntax Description	<i>policy-map-name</i> Name of the policy map.
---------------------------	--

Defaults	<p>No policy maps are defined.</p> <p>The default behavior is to set the Differentiated Services Code Point (DSCP) to 0 if the packet is an IP packet and to set the class of service (CoS) to 0 if the packet is tagged. No policing is performed.</p>
-----------------	---

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	<p>After entering the policy-map command, you enter policy-map configuration mode, and these configuration commands are available:</p> <ul style="list-style-type: none"> • class: defines the classification match criteria for the specified class map. For more information, see the “class” section on page 2-22. • description: describes the policy map (up to 200 characters). • exit: exits policy-map configuration mode and returns you to global configuration mode. • no: removes a previously defined policy map. • rename: renames the current policy map. <p>To return to global configuration mode, use the exit command. To return to privileged EXEC mode, use the end command.</p> <p>Before configuring policies for classes whose match criteria are defined in a class map, use the policy-map command to specify the name of the policy map to be created, added to, or modified. Entering the policy-map command also enables the policy-map configuration mode in which you can configure or modify the class policies for that policy map.</p> <p>You can configure class policies in a policy map only if the classes have match criteria defined for them. To configure the match criteria for a class, use the class-map global configuration and match class-map configuration commands. You define packet classification on a physical-port basis.</p>
-------------------------	--

Only one policy map per ingress port or SVI is supported. You can apply the same policy map to multiple physical ports or SVIs.

You can apply a nonhierarchical policy maps to physical ports or to SVIs. However, you can only apply a hierarchical policy map to SVIs.

A hierarchical policy map has two levels. The first level, the VLAN level, specifies the actions to be taken against a traffic flow on an SVI. The second level, the interface level, specifies the actions to be taken against the traffic on the physical ports that belong to the SVI and are specified in the interface-level policy map.

In a primary VLAN-level policy map, you can only configure the trust state or set a new DSCP or IP precedence value in the packet. In a secondary interface-level policy map, you can only configure individual policers on physical ports that belong to the SVI.

After the hierarchical policy map is attached to an SVI, an interface-level policy map cannot be modified or removed from the hierarchical policy map. A new interface-level policy map also cannot be added to the hierarchical policy map. If you want these changes to occur, the hierarchical policy map must first be removed from the SVI.

For more information about hierarchical policy maps, see the “Policing on SVIs” section in the “Configuring QoS” chapter of the software configuration guide for this release.

Examples

This example shows how to create a policy map called *policy1*. When attached to the ingress port, it matches all the incoming traffic defined in *class1*, sets the IP DSCP to 10, and polices the traffic at an average rate of 1 Mb/s and bursts at 20 KB. Traffic exceeding the profile is marked down to a DSCP value gotten from the policed-DSCP map and then sent.

```
Switch(config)# policy-map policy1
Switch(config-pmap)# class class1
Switch(config-pmap-c)# set dscp 10
Switch(config-pmap-c)# police 1000000 20000 exceed-action policed-dscp-transmit
Switch(config-pmap-c)# exit
```

This example shows how to configure multiple classes in a policy map called *polycymap2*:

```
Switch(config)# policy-map polycymap2
Switch(config-pmap)# class class1
Switch(config-pmap-c)# set dscp 10
Switch(config-pmap-c)# police 100000 20000 exceed-action policed-dscp-transmit
Switch(config-pmap-c)# exit
Switch(config-pmap)# class class2
Switch(config-pmap-c)# trust dscp
Switch(config-pmap-c)# police 100000 20000 exceed-action drop
Switch(config-pmap-c)# exit
Switch(config-pmap)# class class3
Switch(config-pmap-c)# set dscp 0 (no policer)
Switch(config-pmap-c)# exit
```

This example shows how to create a hierarchical policy map and attach it to an SVI:

```
Switch(config)# class-map cm-non-int
Switch(config-cmap)# match access-group 101
Switch(config-cmap)# exit
Switch(config)# class-map cm-non-int-2
Switch(config-cmap)# match access-group 102
Switch(config-cmap)# exit
Switch(config)# class-map cm-test-int
Switch(config-cmap)# match input-interface gigabitethernet0/2 - gigabitethernet0/3
Switch(config-cmap)# exit
Switch(config)# policy-map pm-test-int
```

```

Switch(config-pmap)# class cm-test-int
Switch(config-pmap-c)# police 18000000 8000 exceed-action drop
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# policy-map pm-test-pm-2
Switch(config-pmap)# class cm-non-int
Switch(config-pmap-c)# set dscp 7
Switch(config-pmap-c)# service-policy pm-test-int
Switch(config-pmap)# class cm-non-int-2
Switch(config-pmap-c)# set dscp 15
Switch(config-pmap-c)# service-policy pm-test-int
Switch(config-pmap-c)# end
Switch(config-cmap)# exit
Switch(config)# interface vlan 10
Switch(config-if)# service-policy input pm-test-pm-2

```

This example shows how to delete *polycymap2*:

```
Switch(config)# no policy-map polycymap2
```

You can verify your settings by entering the **show policy-map** privileged EXEC command.

Related Commands	Command	Description
	class	Defines a traffic classification match criteria (through the police , set , and trust policy-map class configuration command) for the specified class-map name.
	class-map	Creates a class map to be used for matching packets to the class whose name you specify.
	service-policy	Applies a policy map to a port.
	show mls qos vlan	Displays the quality of service (QoS) policy maps attached to an SVI.
	show policy-map	Displays QoS policy maps.

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(46)EY	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 operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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(46)EY	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 share** 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.
	srr-queue bandwidth shape	Assigns the shaped weights and enables bandwidth shaping on the four egress queues mapped to a port.
	srr-queue bandwidth share	Assigns the shared weights and enables bandwidth sharing on the four egress queues mapped to a port.

queue-set

Use the **queue-set** interface configuration command to map a port to a queue-set. Use the **no** form of this command to return to the default setting.

queue-set *qset-id*

no queue-set *qset-id*

Syntax Description

<i>qset-id</i>	ID of the queue-set. Each port belongs to a queue-set, which defines all the characteristics of the four egress queues per port. The range is 1 to 2.
----------------	---

Defaults

The queue-set ID is 1.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(46)EY	This command was introduced.

Examples

This example shows how to map a port to queue-set 2:

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

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

Related Commands

Command	Description
mls qos queue-set output buffers	Allocates buffers to a queue-set.
mls qos queue-set output threshold	Configures the weighted tail-drop (WTD) thresholds, guarantees the availability of buffers, and configures the maximum memory allocation to a queue-set.
show mls qos interface buffers	Displays quality of service (QoS) information.

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(46)EY	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 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 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 <i>retries</i>	Specifies the number of times that the switch tries to reach the RADIUS servers before considering the servers to be unavailable. For syntax information, select Cisco IOS Security Command Reference, Release 12.2 > Server Security Protocols > RADIUS Commands .
	radius-server timeout <i>seconds</i>	Specifies the time in seconds during which the switch waits for a RADIUS server to respond before the authentication times out. For syntax information, select Cisco IOS Security Command Reference, Release 12.2 > Server Security Protocols > RADIUS Commands .
	show running-config	Displays the operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

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 <i>udp-port</i>	(Optional) Specify the UDP port for the RADIUS accounting server. The range is from 0 to 65536.
auth-port <i>udp-port</i>	(Optional) Specify the UDP port for the RADIUS authentication server. The range is from 0 to 65536.
key <i>string</i>	(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.
test username <i>name</i>	(Optional) Enable automatic server testing of the RADIUS server status, and specify the username to be used.
idle-time <i>time</i>	(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.

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(46)EY	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 <i>string</i> 7 <i>string</i> <i>string</i> }	Sets the authentication and encryption key for all RADIUS communications between the router and the RADIUS daemon. For syntax information, select Cisco IOS Security Command Reference, Release 12.2 > Server Security Protocols > RADIUS Commands .
show running-config	Displays the operating configuration. For syntax information, use this link to the Cisco IOS Release 12.2 Command Reference listing page: http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/prod_command_reference_list.html Select the Cisco IOS Commands Master List, Release 12.2 to navigate to the command.

rcommand

Use the **rcommand** user EXEC command on the cluster command switch 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	<i>n</i>	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 <i>hw-addr</i>	MAC address of the cluster member switch.

Command Modes	User EXEC
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Command History	Release	Modification
	12.2(46)EY	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 2350, 2940, 2950, 2960, 2970, 3550, 3560, 3560-E, 3750, and 3750-E 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.

reload

Use the **reload** privileged EXEC command to reload the switch and to put a configuration change into effect.

reload [*LINE* | **at** | **cancel** | **in** | **standby-cpu**]

Syntax Description	<i>LINE</i>	Specify the reason for the reload.
	at	Specify the time in hh:mm for the reload to occur.
	cancel	Cancel the pending reload.
	in	Specify a time interval in mmm or hhh:mm for reloads to occur.
	standby-cpu	Reload the standby route processor (RP).

Defaults Immediately reloads the switch and puts a configuration change into effect.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Examples This example shows how to reload the switch:

```
Switch(config)# reload
System configuration has been modified. Save? [yes/no]: y
```

Related Commands	Command	Description
	rcommand	Accesses a specific cluster member.
	show system mtu	Displays the global maximum transmission unit (MTU) or maximum packet size set for the switch.

remote-span

Use the **remote-span** VLAN configuration command to configure a VLAN as a Remote Switched Port Analyzer (RSPAN) VLAN. Use the **no** form of this command to remove the RSPAN designation from the VLAN.

remote-span

no remote-span

Syntax Description	This command has no arguments or keywords.
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Defaults	No RSPAN VLANs are defined.
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Command Modes	VLAN configuration (config-VLAN)
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Command History	Release	Modification
	12.2(46)EY	This command was introduced.

Usage Guidelines	You can configure RSPAN VLANs only in config-VLAN mode (entered by using the vlan global configuration command).
	If VLAN Trunking Protocol (VTP) is enabled, the RSPAN feature is propagated by VTP for VLAN-IDs that are lower than 1005. If the RSPAN VLAN ID is in the extended range, you must manually configure intermediate switches (those in the RSPAN VLAN between the source switch and the destination switch).
	Before you configure the RSPAN remote-span command, use the vlan (global configuration) command to create the VLAN.
	The RSPAN VLAN has these characteristics: <ul style="list-style-type: none">• No MAC address learning occurs on it.• RSPAN VLAN traffic flows only on trunk ports.• Spanning Tree Protocol (STP) can run in the RSPAN VLAN, but it does not run on RSPAN destination ports.
When an existing VLAN is configured as an RSPAN VLAN, the VLAN is first deleted and then recreated as an RSPAN VLAN. Any access ports are made inactive until the RSPAN feature is disabled.	

Examples

This example shows how to configure a VLAN as an RSPAN VLAN.

```
Switch(config)# vlan 901  
Switch(config-vlan)# remote-span
```

This example shows how to remove the RSPAN feature from a VLAN.

```
Switch(config)# vlan 901  
Switch(config-vlan)# no remote-span
```

You can verify your settings by entering the **show vlan remote-span** user EXEC command.

Related Commands

Command	Description
monitor session	Enables Switched Port Analyzer (SPAN) and RSPAN monitoring on a port and configures a port as a source or destination port.
vlan (global configuration)	Changes to config-vlan mode where you can configure VLANs 1 to 4094.