



# Catalyst 4500 Series Switch Cisco IOS Command Reference

Release 12.2(31)SG

Corporate Headquarters  
Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA  
<http://www.cisco.com>  
Tel: 408 526-4000  
800 553-NETS (6387)  
Fax: 408 526-4100

Text Part Number: OL-8849-01



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APPENDIX A

**Acronyms** A-1

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APPENDIX B

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## Preface

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This preface describes the audience, organization, and conventions of this publication, and provides information on how to obtain related documentation.

## Audience

This publication is for experienced network administrators who are responsible for configuring and maintaining Catalyst 4500 series switches.

## Organization

This publication is organized as follows:

Chapter	Title	Description
Chapter 1	<a href="#">Command-Line Interface</a>	Describes the Catalyst 4500 series switch CLI.
Chapter 2	<a href="#">Cisco IOS Commands for the Catalyst 4500 Series Switches</a>	Lists all Catalyst 4500 series Cisco IOS commands alphabetically and provides detailed information on each command.
Appendix A	<a href="#">Acronyms</a>	Defines the acronyms used in this publication.
Appendix B	<a href="#">Acknowledgments for Open-Source Software</a>	Provides the acknowledgments for Open-Source Software.

## Related Documentation

The Catalyst 4500 series Cisco IOS documentation set includes these publications:

- *Catalyst 4500 Series Switch Installation Guide*
- *Catalyst 4500 Series Switch Supervisor Engine III Installation Note*
- *Catalyst 4500 Series Switch Supervisor Engine IV Installation Note*
- *Catalyst 4500 Series Switch Cisco IOS Software Configuration Guide*

- *Catalyst 4500 Series Switch Cisco IOS System Message Guide*
- *Release Notes for Catalyst 4500 Series Switch Software Release 12.1(13)EW*

Other documents in the Cisco IOS documentation set include:

- *Cisco IOS Release 12.2 Configuration Guides*
- *Cisco IOS Release 12.2 Command References*

For information about MIBs, refer to this URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>

## Conventions

This document uses these conventions:

Convention	Description
<b>boldface font</b>	Boldface text indicates commands and keywords that you enter literally as shown.
<i>italic font</i>	<i>Italic</i> text indicates arguments for which you supply values.
[x]	Square brackets enclose an optional element (keyword or argument).
	A vertical line indicates a choice within an optional or required set of keywords or arguments.
[x   y]	Square brackets enclosing keywords or arguments separated by a vertical line indicate an optional choice.
{x   y}	Braces enclosing keywords or arguments separated by a vertical line indicate a required choice.
[x {y   z}]	Braces and a vertical line within square brackets indicate a required choice within an optional element.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
screen font	Terminal sessions and information the system displays are in <b>screen font</b> .
<b>boldface screen font</b>	Information you must enter is in <b>boldface screen font</b> .
<i>italic screen font</i>	Arguments for which you supply values are in <i>italic screen font</i> .
^	The symbol ^ represents the key labeled Control—for example, the key combination ^D in a screen display means hold down the Control key while you press the D key.
< >	Nonprinting characters, such as passwords, are in angle brackets.



Convention	Description
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Notes use this convention:



**Note**

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the publication.



**Caution**

Cautions use this convention:

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

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[http://www.cisco.com/en/US/products/products\\_security\\_vulnerability\\_policy.html](http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html)

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[http://www.cisco.com/en/US/products/products\\_psirt\\_rss\\_feed.html](http://www.cisco.com/en/US/products/products_psirt_rss_feed.html)

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- Nonemergencies—[psirt@cisco.com](mailto:psirt@cisco.com)



Tip

We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.



Tip

We encourage you to use Pretty Good Privacy (PGP) or a compatible product (for example, GnuPG) to encrypt any sensitive information that you send to Cisco. PSIRT can work with information that has been encrypted with PGP versions 2.x through 9.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

[http://www.cisco.com/en/US/products/products\\_security\\_vulnerability\\_policy.html](http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html)

The link on this page has the current PGP key ID in use.

If you do not have or use PGP, contact PSIRT at the aforementioned e-mail addresses or phone numbers before sending any sensitive material to find other means of encrypting the data.

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

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The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year, at this URL:

<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>

**Note**

Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support Website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

## Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

## Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

**Severity 1 (S1)**—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

**Severity 2 (S2)**—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

**Severity 3 (S3)**—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

## Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

<http://www.cisco.com/go/marketplace/>

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

<http://www.cisco.com/packet>

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

<http://www.cisco.com/go/iqmagazine>

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

<http://www.cisco.com/ipj>

- World-class networking training is available from Cisco. You can view current offerings at this URL:

<http://www.cisco.com/en/US/learning/index.html>





# Command-Line Interface

This chapter provides information for understanding and using the Cisco IOS command-line interface (CLI) on the Catalyst 4500 series switch. This chapter includes the following sections:

- [Getting Help, page 1-1](#)
- [How to Find Command Options, page 1-2](#)
- [Understanding Command Modes, page 1-4](#)
- [Using the No and Default Forms of Commands, page 1-6](#)
- [Using the CLI String Search, page 1-6](#)
- [Saving Configuration Changes, page 1-11](#)

For an overview of the Catalyst 4500 series switch Cisco IOS configuration, refer to the *Catalyst 4500 Series Switch Cisco IOS Software Configuration Guide*.

## Getting Help

To display a list of commands that you can use within a command mode, enter a question mark (?) at the system prompt. You also can display keywords and arguments for each command with this context-sensitive help feature.

**Table 1-1** lists commands you can enter to get help that is specific to a command mode, a command, a keyword, or an argument.

**Table 1-1**      *Getting Help*

Command	Purpose
<i>abbreviated-command-entry?</i>	Displays a list of commands that begin with a particular character string. (Do not leave a space between the command and question mark.)
<i>abbreviated-command-entry</i> <Tab>	Completes a partial command name.
<b>?</b>	Lists all commands for the command mode.
<i>command ?</i>	Lists all keywords for the command. Leave a space between the command and the question mark.
<i>command keyword ?</i>	Lists all arguments for the keyword. Leave a space between the keyword and the question mark.

# How to Find Command Options

This section provides an example of how to display syntax for a command. The syntax can consist of optional or required keywords. To display keywords for a command, enter a question mark (?) at the command prompt or after entering part of a command followed by a space. The Catalyst 4500 series switch software displays a list of available keywords along with a brief description of the keywords. For example, if you are in global configuration mode and want to see all the keywords for the **arap** command, you enter **arap ?**.

Table 1-2 shows examples of how you can use the question mark (?) to assist you in entering commands and also guides you through entering the following commands:

- **interface gigabitethernet 1/1**
- **channel-group 1 mode auto**

**Table 1-2**      *How to Find Command Options*

Command	Purpose
Switch> <b>enable</b> Password: <password> Switch#	Enter the <b>enable</b> command and password to access privileged EXEC commands.  You are in privileged EXEC mode when the prompt changes to Switch#.
Switch# <b>configure terminal</b> Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#	Enter global configuration mode.  You are in global configuration mode when the prompt changes to Switch(config)#.
Switch(config)# <b>interface gigabitethernet ?</b> <1-9> GigabitEthernet interface number Switch(config)# <b>interface gigabitethernet 1/1</b> Switch(config-if)#	Enter interface configuration mode by specifying the Gigabit Ethernet interface that you want to configure using the <b>interface gigabitethernet</b> global configuration command.  Enter a ? to display what you must enter next on the command line. In this example, you must enter an interface number from 1 to 9 in the format <i>module-number/port-number</i> .  You are in interface configuration mode when the prompt changes to Switch(config-if)#.



**Table 1-2**      *How to Find Command Options (continued)*

Command	Purpose
Switch(config-if)#? Interface configuration commands: access-expression    Build a bridge boolean access expression apollo                Apollo interface subcommands appletalk            Appletalk interface subcommands arp                   Set arp type (arpa, probe, snap) or timeout backup                Modify backup parameters bandwidth            Set bandwidth informational parameter bgp-policy            Apply policy propagated by bgp community string bridge-group        Transparent bridging interface parameters carrier-delay        Specify delay for interface transitions cdp                   CDP interface subcommands channel-group        Etherchannel/port bundling configuration clns                  CLNS interface subcommands cmns                  OSI CMNS custom-queue-list    Assign a custom queue list to an interface decnet                Interface DECnet config commands default               Set a command to its defaults delay                Specify interface throughput delay description          Interface specific description dls                   DLSw interface subcommands dspu                  Down Stream PU exit                   Exit from interface configuration mode fair-queue            Enable Fair Queuing on an Interface flowcontrol          Configure flow operation. fras                  DLC Switch Interface Command help                  Description of the interactive help system hold-queue           Set hold queue depth ip                    Interface Internet Protocol config commands ipx                   Novell/IPX interface subcommands isis                  IS-IS commands iso-igrp              ISO-IGRP interface subcommands  . . .	Enter a ? to display a list of all the interface configuration commands available for the Gigabit Ethernet interface.
Switch(config-if)# Switch(config-if)# <b>channel-group ?</b> group    channel-group of the interface  Switch(config-if)#channel-group	<p>Enter the command that you want to configure for the controller. In this example, the <b>channel-group</b> command is used.</p> <p>Enter a ? to display what you must enter next on the command line. In this example, you must enter the <b>group</b> keyword.</p> <p>Because a &lt;cr&gt; is not displayed, it indicates that you must enter more information to complete the command.</p>

**Table 1-2**      *How to Find Command Options (continued)*

Command	Purpose
<pre>Switch(config-if)# channel-group ? &lt;1-256&gt; Channel group number  Switch(config-if)#channel-group</pre>	<p>After you enter the <b>group</b> keyword, enter a <b>?</b> to display what you must enter next on the command line. In this example, you must enter a channel group number from 1 to 256.</p> <p>Because a <b>&lt;cr&gt;</b> is not displayed, it indicates that you must enter more information to complete the command.</p>
<pre>Switch(config-if)# channel-group 1 ? mode Etherchannel Mode of the interface  Switch(config-if)#</pre>	<p>After you enter the channel group number, enter a <b>?</b> to display what you must enter next on the command line. In this example, you must enter the <b>mode</b> keyword.</p> <p>Because a <b>&lt;cr&gt;</b> is not displayed, it indicates that you must enter more information to complete the command.</p>
<pre>Switch(config-if)# channel-group 1 mode ? auto      Enable PAgP only if a PAgP device is detected desirable Enable PAgP unconditionally on        Enable Etherchannel only  Switch(config-if)#</pre>	<p>After you enter the <b>mode</b> keyword, enter a <b>?</b> to display what you must enter next on the command line. In this example, you must enter the <b>auto</b>, <b>desirable</b>, or <b>on</b> keyword.</p> <p>Because a <b>&lt;cr&gt;</b> is not displayed, it indicates that you must enter more information to complete the command.</p>
<pre>Switch(config-if)# channel-group 1 mode auto ? &lt;cr&gt;  Switch(config-if)#</pre>	<p>In this example, the <b>auto</b> keyword is entered. After you enter the <b>auto</b> keyword, enter a <b>?</b> to display what you must enter next on the command line.</p> <p>Because a <b>&lt;cr&gt;</b> is displayed, it indicates that you can press Return to complete the command. If additional keywords are listed, you can enter more keywords or press Return to complete the command.</p>
<pre>Switch(config-if)# channel-group 1 mode auto Switch(config-if)#</pre>	<p>In this example, press Return to complete the command.</p>

## Understanding Command Modes

The Cisco IOS user interface on the Catalyst 4500 series switch has many different modes. The commands that are available to you depend on which mode you are currently in. You can obtain a list of commands available for each command mode by entering a question mark (?) at the system prompt.

When you start a session on the Catalyst 4500 series switch, you begin in user mode, often called EXEC mode. Only a limited subset of the commands are available in EXEC mode. In order to have access to all commands, you must enter privileged EXEC mode. Normally, you must enter a password to enter privileged EXEC mode. From privileged EXEC mode, you can enter any EXEC command or enter global configuration mode. Most EXEC commands are one-time commands, such as **show** commands, which show the current status of a given item, and **clear** commands, which clear counters or interfaces. The EXEC commands are not saved across reboots of the Catalyst 4500 series switch.

The configuration modes provide a way for you to make changes to the running configuration. When you save changes to the configuration, the changes remain intact when the Catalyst 4500 series switch reboots. From global configuration mode, you can enter interface configuration mode, subinterface configuration mode, and other protocol-specific modes.

ROM-monitor mode is a separate mode used when the Catalyst 4500 series switch cannot boot properly. If your Catalyst 4500 series switch or access server does not find a valid system image when it is booting, or if its configuration file is corrupted at startup, the system might enter ROM-monitor mode.

Table 1-3 provides a summary of the main command modes.

**Table 1-3**      *Summary of Main Command Modes*

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Log in.	Switch>	Use the <b>logout</b> command.
Privileged EXEC	From user EXEC mode, enter the <b>enable</b> EXEC command.	Switch#	To exit to user EXEC mode, enter the <b>disable</b> command.  To enter global configuration mode, enter the <b>configure terminal</b> privileged EXEC command.
Global configuration	From privileged EXEC mode, enter the <b>configure terminal</b> privileged EXEC command.	Switch(config)#	To exit to privileged EXEC mode, enter the <b>exit</b> or <b>end</b> command or press <b>Ctrl-Z</b> .  To enter interface configuration mode, enter an <b>interface</b> configuration command.
Interface configuration	From global configuration mode, enter by specifying an interface with an <b>interface</b> command.	Switch(config-if)#	To exit to global configuration mode, enter the <b>exit</b> command.  To exit to privileged EXEC mode, enter the <b>exit</b> command or press <b>Ctrl-Z</b> .  To enter subinterface configuration mode, specify a subinterface with the <b>interface</b> command.

Table 1-3 Summary of Main Command Modes (continued)

Command Mode	Access Method	Prompt	Exit Method
Subinterface configuration	From interface configuration mode, specify a subinterface with an <b>interface</b> command.	Switch(config-subif)#	To exit to global configuration mode, enter the <b>exit</b> command.  To enter privileged EXEC mode, enter the <b>end</b> command or press <b>Ctrl-Z</b> .
ROM monitor	From privileged EXEC mode, enter the <b>reload</b> EXEC command. Press the Break key during the first 60 seconds while the system is booting.	Rommon>	To exit ROM-monitor mode, you must reload the image by entering the <b>boot</b> command. If you use the <b>boot</b> command without specifying a file or any other boot instructions, the system boots from the default Flash image (the first image in onboard Flash memory). Otherwise, you can instruct the system to boot from a specific Flash image (using the <b>boot system flash filename</b> command).

For more information on command modes, refer to the “Using the Command Line Interface” chapter of the *Configuration Fundamentals Configuration Guide*.

## Using the No and Default Forms of Commands

Almost every configuration command has a **no** form. In general, enter the **no** form to disable a function. Use the command without the keyword **no** to reenable a disabled function or to enable a function that is disabled by default. For example, IP routing is enabled by default. To disable IP routing, specify the **no ip routing** command and specify **ip routing** to reenable it. This publication provides the complete syntax for the configuration commands and describes what the **no** form of a command does.

Some configuration commands have a **default** form. The **default** form of a command returns the command setting to its default settings. Most commands are disabled by default, so the **default** form is the same as the **no** form. However, some commands are enabled by default, with variables set to certain default values. In these cases, the **default** form of the command enables the command and returns its variables to their default values.

## Using the CLI String Search

The pattern in the command output is referred to as a string. The CLI string search feature allows you to search or filter any **show** or **more** command output and allows you to search and filter at --More-- prompts. This feature is useful when you need to sort through large amounts of output, or if you want to exclude output that you do not need to see.

With the search function, you can begin unfiltered output at the first line that contains a regular expression you specify. You can then specify a maximum of one filter per command or start a new search from the --More-- prompt.

A regular expression is a pattern (a phrase, number, or more complex pattern) software uses to match against **show** or **more** command output. Regular expressions are case sensitive and allow for complex matching requirements. Examples of simple regular expressions are Serial, misses, and 138. Examples of complex regular expressions are 00210..., ( is ), and [Oo]utput.

You can perform three types of filtering:

- Use the **begin** keyword to begin output with the line that contains a specified regular expression.
- Use the **include** keyword to include output lines that contain a specified regular expression.
- Use the **exclude** keyword to exclude output lines that contain a specified regular expression.

You can then search this filtered output at the --More-- prompts.



**Note**

The CLI string search function does not allow you to search or filter backward through previous output; filtering cannot be specified using HTTP access to the CLI.

## Regular Expressions

A regular expression can be a single character that matches the same single character in the command output or multiple characters that match the same multiple characters in the command output. This section describes how to create both single-character patterns and multiple-character patterns and how to create more complex regular expressions using multipliers, alternation, anchoring, and parentheses.

### Single-Character Patterns

The simplest regular expression is a single character that matches the same single character in the command output. You can use any letter (A-Z, a-z) or digit (0-9) as a single-character pattern. You can also use other keyboard characters (such as ! or ~) as single-character patterns, but certain keyboard characters have special meaning when used in regular expressions. [Table 1-4](#) lists the keyboard characters that have special meaning.

**Table 1-4** Characters with Special Meaning

Character	Special Meaning
.	Matches any single character, including white space.
*	Matches 0 or more sequences of the pattern.
+	Matches 1 or more sequences of the pattern.
?	Matches 0 or 1 occurrences of the pattern.
^	Matches the beginning of the string.
\$	Matches the end of the string.
_ (underscore)	Matches a comma (,), left brace ({), right brace (}), left parenthesis ( ( ), right parenthesis ( ) ), the beginning of the string, the end of the string, or a space.

To enter these special characters as single-character patterns, remove the special meaning by preceding each character with a backslash (\). These examples are single-character patterns matching a dollar sign, an underscore, and a plus sign, respectively.

```
\$ \_ \+
```

You can specify a range of single-character patterns to match against command output. For example, you can create a regular expression that matches a string containing one of the following letters: a, e, i, o, or u. One and only one of these characters must exist in the string for pattern matching to succeed. To specify a range of single-character patterns, enclose the single-character patterns in square brackets ([ ]). For example,

**[aeiou]**

matches any one of the five vowels of the lowercase alphabet, while

**[abcdABCD]**

matches any one of the first four letters of the lower- or uppercase alphabet.

You can simplify ranges by entering only the end points of the range separated by a dash (-). Simplify the previous range as follows:

**[a-zA-Z]**

To add a dash as a single-character pattern in your range, include another dash and precede it with a backslash:

**[a-zA-Z\-]**

You can also include a right square bracket (]) as a single-character pattern in your range. To do so, enter the following:

**[a-zA-Z\-\]]**

The previous example matches any one of the first four letters of the lower- or uppercase alphabet, a dash, or a right square bracket.

You can reverse the matching of the range by including a caret (^) at the start of the range. This example matches any letter except the ones listed:

**[^a-dqsv]**

This example matches anything except a right square bracket (]) or the letter d:

**[^\]]d]**

## Multiple-Character Patterns

When creating regular expressions, you can also specify a pattern containing multiple characters. You create multiple-character regular expressions by joining letters, digits, or keyboard characters that do not have special meaning. For example, a4% is a multiple-character regular expression. Put a backslash in front of the keyboard characters that have special meaning when you want to remove their special meaning.

With multiple-character patterns, order is important. The regular expression a4% matches the character a followed by a 4 followed by a % sign. If the string does not have a4%, in that order, pattern matching fails. This multiple-character regular expression:

**a.**

uses the special meaning of the period character to match the letter a followed by any single character. With this example, the strings ab, a!, or a2 are all valid matches for the regular expression.

You can remove the special meaning of the period character by putting a backslash in front of it. In the following expression:

**a\.**

only the string a. matches this regular expression.

You can create a multiple-character regular expression containing all letters, all digits, all keyboard characters, or a combination of letters, digits, and other keyboard characters. These examples are all valid regular expressions:

**telebit 3107 v32bis**

## Multipliers

You can create more complex regular expressions to match multiple occurrences of a specified regular expression by using some special characters with your single- and multiple-character patterns. [Table 1-5](#) lists the special characters that specify “multiples” of a regular expression.

**Table 1-5** *Special Characters Used as Multipliers*

Character	Description
*	Matches 0 or more single- or multiple-character patterns.
+	Matches 1 or more single- or multiple-character patterns.
?	Matches 0 or 1 occurrences of the single- or multiple-character patterns.

This example matches any number of occurrences of the letter a, including none:

**a\***

This pattern requires that at least one letter a in the string is matched:

**a+**

This pattern matches the string bb or bab:

**ba?b**

This string matches any number of asterisks (\*):

**\\*\***

To use multipliers with multiple-character patterns, you enclose the pattern in parentheses. In the following example, the pattern matches any number of the multiple-character string ab:

**(ab)\***

As a more complex example, this pattern matches one or more instances of alphanumeric pairs (but not none; that is, an empty string is not a match):

**([A-Za-z][0-9])+**

The order for matches using multipliers (\*, +, or ?) is to put the longest construct first. Nested constructs are matched from outside to inside. Concatenated constructs are matched beginning at the left side of the construct. Thus, the regular expression matches A9b3, but not 9Ab3 because the letters are specified before the numbers.

## Alternation

Alternation allows you to specify alternative patterns to match against a string. You separate the alternative patterns with a vertical bar (|). Exactly one of the alternatives can match the string. For example, the regular expression

**codex | telebit**

matches the string codex or the string telebit, but not both codex and telebit.

## Anchoring

You can match a regular expression pattern against the beginning or the end of the string. That is, you can specify that the beginning or end of a string contains a specific pattern. You “anchor” these regular expressions to a portion of the string using the special characters shown in [Table 1-6](#).

**Table 1-6** *Special Characters Used for Anchoring*

Character	Description
<code>^</code>	Matches the beginning of the string.
<code>\$</code>	Matches the end of the string.

This regular expression matches a string only if the string starts with abcd:

**`^abcd`**

In contrast, this expression is in a range that matches any single letter, as long as it is not the letters a, b, c, or d:

**`[^abcd]`**

With this example, the regular expression matches a string that ends with .12:

**`$\12`**

Contrast these anchoring characters with the special character underscore (`_`). The underscore matches the beginning of a string (`^`), the end of a string (`$`), parentheses (`()`), space (), braces `{ }`, comma (`,`), or underscore (`_`). With the underscore character, you can specify that a pattern exist anywhere in the string.

For example:

**`_1300_`**

matches any string that has 1300 somewhere in the string. The string’s 1300 can be preceded by or end with a space, brace, comma, or underscore. For example:

**`{1300_`**

matches the regular expression, but 21300 and 13000 do not.

Using the underscore character, you can replace long regular expression lists, such as the following:

**`^1300$ ^1300(space) (space)1300 {1300, ,1300, {1300} ,1300, (1300`**

with

**`_1300_`**

## Parentheses for Recall

As shown in the [“Multipliers” section on page 1-9](#), you use parentheses with multiple-character regular expressions to multiply the occurrence of a pattern. You can also use parentheses around a single- or multiple-character pattern to remember a pattern for use elsewhere in the regular expression.



To create a regular expression that recalls a previous pattern, you use parentheses to indicate a remembered specific pattern and a backslash (\) followed by an integer to reuse the remembered pattern. The integer specifies the occurrence of the parentheses in the regular expression pattern. If you have more than one remembered pattern in your regular expression, then \1 indicates the first remembered pattern, \2 indicates the second remembered pattern, and so on.

This regular expression uses parentheses for recall:

**a(.)bc(.)\1\2**

This regular expression matches an a followed by any character (call it character 1), followed by bc followed by any character (character 2), followed by character 1 again, followed by character 2 again. So, the regular expression can match aZbcTZT. The software remembers that character 1 is Z and character 2 is T and then uses Z and T again later in the regular expression.

## Saving Configuration Changes

To save your configuration changes to your startup configuration so that they will not be lost if there is a system reload or power outage, enter the following command:

```
Switch# copy system:running-config nvram:startup-config
Building configuration...
```

It might take a minute or two to save the configuration. After the configuration has been saved, the following output appears:

```
[OK]
Switch#
```

On most platforms, this step saves the configuration to NVRAM. On the Class A Flash file system platforms, this step saves the configuration to the location specified by the CONFIG\_FILE environment variable. The CONFIG\_FILE environment variable defaults to NVRAM.

## show platform Commands

You should use these commands only when you are working directly with your technical support representative, while troubleshooting a problem. Do not use these commands unless your technical support representative asks you to do so.



**Note**

---

The **show platform** commands are not described in this document.

---





# Cisco IOS Commands for the Catalyst 4500 Series Switches

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This chapter contains an alphabetical listing of Cisco IOS commands for the Catalyst 4500 series switches. For information about Cisco IOS commands that are not included in this publication, refer to Cisco IOS Release 12.2 Configuration Guides and Command References at this URL:

[http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/products\\_product\\_indices\\_list.html](http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/products_product_indices_list.html)

# #macro keywords

To specify the help string for the macro keywords, use the **#macro keywords** command.

**#macro keywords** [keyword1] [keyword2] [keyword3]

Syntax Description	<b>keyword 1</b>	(Optional) Specifies a keyword that is needed while applying a macro to an interface.
	<b>keyword 2</b>	(Optional) Specifies a keyword that is needed while applying a macro to an interface.
	<b>keyword 3</b>	(Optional) Specifies a keyword that is needed while applying a macro to an interface.

**Defaults** This command has no default settings.

**Command Modes** Global configuration

Command History	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** If you do not specify the mandatory keywords for a macro, the macro is to be considered invalid and fails when you attempt to apply it. By entering the **#macro keywords** command, you will receive a message indicating what you need to include to make the syntax valid.

**Examples** This example shows how to specify the help string for keywords associated with a macro named test:

```
Switch(config)# macro name test
macro name test
Enter macro commands one per line. End with the character '@'.
#macro keywords $VLAN $MAX
switchport
@

Switch(config)# int g1/1
Switch(config-if)# macro apply test ?
WORD Keyword to replace with a value e.g $VLAN, $MAX << It is shown as help
<cr>
```

**Related Commands**

- [macro apply cisco-desktop](#)
- [macro apply cisco-phone](#)
- [macro apply cisco-router](#)
- [macro apply cisco-switch](#)

# aaa accounting dot1x default start-stop group radius

To enable accounting for 802.1X authentication sessions, use the **aaa accounting dot1x default start-stop group radius** command. To disable accounting, use the **no** form of this command.

**aaa accounting dot1x default start-stop group radius**

**no aaa accounting dot1x default start-stop group radius**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Accounting is disabled.
-----------------	-------------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>802.1X accounting requires a RADIUS server.</p> <p>This command enables the Authentication, Authorization, and Accounting (AAA) client's accounting feature to forward 802.1X update and watchdog packets from the 802.1X supplicant (workstation client) to the authentication (RADIUS) server. (Watchdog packets are defined as EAPOL-LOGON, EAPOL-LOGOFF, and EAPOL-INTERIM messages.) Successful authentication and authorization of the supplicant by the authentication server is required before these packets are considered valid and are forwarded. When the client is reauthenticated, an interim-update accounting notice is sent to the accounting server.</p>
-------------------------	--

<b>Examples</b>	This example shows how to configure 802.1X accounting:
-----------------	--

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

**Note**

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

<b>Related Commands</b>	<a href="#">aaa accounting system default start-stop group radius</a>
-------------------------	---

# aaa accounting system default start-stop group radius

To receive the session termination messages after the switch reboots, use the **aaa accounting system default start-stop group radius** command. To disable accounting, use the **no** form of this command.

**aaa accounting system default start-stop group radius**

**no aaa accounting system default start-stop group radius**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Accounting is disabled.
-----------------	-------------------------

<b>Command Modes</b>	Global configuration mode
----------------------	---------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>802.1X accounting requires the RADIUS server.</p> <p>This command enables the AAA client's accounting feature to forward 802.1X update and watchdog packets from the 802.1X supplicant (workstation client) to the authentication (RADIUS) server. (Watchdog packets are defined as EAPOL-LOGON, EAPOL-LOGOFF, and EAPOL-INTERIM messages.) Successful authentication and authorization of the supplicant by the authentication server is required before these packets are considered valid and are forwarded. When the client is reauthenticated, an interim-update accounting notice is sent to the accounting server.</p>
-------------------------	--

<b>Examples</b>	This example shows how to generate a logoff after a switch reboots:
-----------------	---

```
Switch(config)# aaa accounting system default start-stop group radius
```



**Note**

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

<b>Related Commands</b>	<a href="#">aaa accounting dot1x default start-stop group radius</a>
-------------------------	--

# access-group mode

To specify the override modes (for example, VACL overrides PACL) and the non-override modes (for example, merge or strict mode), use the **access-group mode** command. To return to preferred port mode, use the **no** form of this command.

**access-group mode {prefer {port | vlan} | merge}**

**no access-group mode {prefer {port | vlan} | merge}**

## Syntax Description

<b>prefer port</b>	Specifies that the PACL mode take precedence if PACLs are configured. If no PACL features are configured on the port, other features applicable to the interface are merged and applied on the interface.
<b>prefer vlan</b>	Specifies that the VLAN-based ACL mode take precedence. If no VLAN-based ACL features are configured on the port's VLAN, the PACL features on the port are applied.
<b>merge</b>	Merges applicable ACL features before they are programmed into the hardware.

## Defaults

PACL override mode

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

On the Layer 2 interface, prefer port, prefer VLAN, and merge modes are supported. A Layer 2 interface can have one IP ACL applied in either direction (one inbound and one outbound).

## Examples

This example shows how to make the PACL mode on the switch take effect:

```
(config-if)# access-group mode prefer port
```

This example shows how to merge applicable ACL features:

```
(config-if)# access-group mode merge
```

## Related Commands

[show access-group mode interface](#)  
[show ip interface](#) (refer to Cisco IOS documentation)  
[show mac access-group interface](#)

# access-list hardware entries

To designate how ACLs are programmed into the switch hardware, use the **access-list hardware entries** command.

**access-list hardware entries {packed | scattered}**

Syntax Description	<b>packed</b>	Directs the software to use the first entry with a matching mask when selecting an entry from the ACL TCAM for programming the ACEs in an ACL.
	<b>scattered</b>	Directs the software to use the first entry with a free mask when selecting an entry from the ACL TCAM for programming the ACEs in an ACL.

**Defaults** The ACLs are programmed as packed.

**Command Modes** Global configuration

Command History	Release	Modification
	12.2(20)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** Two types of hardware resources are used when ACLs are programmed: entries and masks. If one of these resources is consumed, no additional ACLs can be programmed into the hardware. If the masks are consumed, but the entries are available, change the programming algorithm from **packed** to **scattered** to make the masks available. This action allows additional ACLs to be programmed into the hardware.

The goal is to use TCAM resources more efficiently; that is, to minimize the number of masks per ACL entries. To compare TCAM utilization when using the **scattered** or **packed** algorithms, use the **show platform hardware acl statistics utilization brief** command. To change the algorithm from **packed** to **scattered**, use the **access-list hardware entries** command.

**Examples** This example shows how to program ACLs into the hardware as packed. After they are programmed, you will need 89 percent of the masks to program only 49 percent of the ACL entries.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# access-list hardware entries packed
Switch(config)# end
Switch#
01:15:34: %SYS-5-CONFIG_I: Configured from console by console
Switch#
Switch# show platform hardware acl statistics utilization brief
Entries/Total(%)  Masks/Total(%)
-----
Input  Acl(PortAndVlan)  2016 / 4096 ( 49)   460 /  512 ( 89)
Input  Acl(PortOrVlan)    6 / 4096 (  0)    4 /  512 (  0)
Input  Qos(PortAndVlan)   0 / 4096 (  0)    0 /  512 (  0)
```



```

Input  Qos(PortOrVlan)      0 / 4096 ( 0)      0 / 512 ( 0)
Output Acl(PortAndVlan)    0 / 4096 ( 0)      0 / 512 ( 0)
Output Acl(PortOrVlan)     0 / 4096 ( 0)      0 / 512 ( 0)
Output Qos(PortAndVlan)    0 / 4096 ( 0)      0 / 512 ( 0)
Output Qos(PortOrVlan)     0 / 4096 ( 0)      0 / 512 ( 0)

```

L4Ops: used 2 out of 64

Switch#

This example shows how to reserve space (scatter) between ACL entries in the hardware. The number of masks required to program 49 percent of the entries has decreased to 49 percent.

Switch# **configure terminal**

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)# **access-list hardware entries scattered**

Switch(config)# **end**

Switch#

01:39:37: %SYS-5-CONFIG\_I: Configured from console by console

Switch#

Switch# **show platform hardware acl statistics utilization brief**

Entries/Total(%) Masks/Total(%)

```

-----
Input  Acl(PortAndVlan)  2016 / 4096 ( 49)   252 / 512 ( 49)
Input  Acl(PortOrVlan)   6 / 4096 ( 0)      5 / 512 ( 0)
Input  Qos(PortAndVlan)  0 / 4096 ( 0)      0 / 512 ( 0)
Input  Qos(PortOrVlan)  0 / 4096 ( 0)      0 / 512 ( 0)
Output Acl(PortAndVlan)  0 / 4096 ( 0)      0 / 512 ( 0)
Output Acl(PortOrVlan)  0 / 4096 ( 0)      0 / 512 ( 0)
Output Qos(PortAndVlan)  0 / 4096 ( 0)      0 / 512 ( 0)
Output Qos(PortOrVlan)  0 / 4096 ( 0)      0 / 512 ( 0)

```

L4Ops: used 2 out of 64

Switch#

# access-list hardware region

To modify the balance between TCAM regions in hardware, use the **access-list hardware region** command.

**access-list hardware region {feature | qos} {input | output} balance {bal-num}**

## Syntax Description

<b>feature</b>	Specifies adjustment of region balance for ACLs.
<b>qos</b>	Specifies adjustment of region balance for QoS.
<b>input</b>	Specifies adjustment of region balance for input ACL and QoS.
<b>output</b>	Specifies adjustment of region balance for output ACL and QoS.
<b>balance bal-num</b>	Specifies relative sizes of the PandV and PorV regions in the TCAM; valid values are between 1 and 99.

## Defaults

The default region balance for each TCAM is 50.

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

PandV is a TCAM region containing entries which mask in both the port and VLAN tag portions of the flow label.

PorV is a TCAM region containing entries which mask in either the port or VLAN tag portion of the flow label, but not both.

A balance of 1 allocates the minimum number of PandV region entries and the maximum number of PorV region entries. A balance of 99 allocates the maximum number of PandV region entries and the minimum number of PorV region entries. A balance of 50 allocates equal numbers of PandV and PorV region entries in the specified TCAM.

Balances for the four TCAMs can be modified independently.

## Examples

This example shows how to enable the MAC notification trap when a MAC address is added to a port:

```
Switch# configure terminal
Switch(config)# access-list hardware region feature input balance 75
Switch(config)#
```

# action

To specify an action to be taken when a match occurs in a VACL, use the **action** command. To remove an action clause, use the **no** form of this command.

**action {drop | forward}**

**no action {drop | forward}**

Syntax Description	<b>drop</b>	Sets the action to drop packets.
	<b>forward</b>	Sets the action to forward packets to their destination.

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

Command Modes	VLAN access-map
---------------	-----------------

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>In a VLAN access map, if at least one ACL is configured for a packet type (IP or MAC), the default action for the packet type is <b>drop</b> (deny).</p> <p>If an ACL is not configured for a packet type, the default action for the packet type is <b>forward</b> (permit).</p> <p>If an ACL for a packet type is configured and the ACL is empty or undefined, the configured action will be applied to the packet type.</p>
------------------	--

Examples	<p>This example shows how to define a drop action:</p> <pre>Switch(config-access-map)# <b>action drop</b> Switch(config-access-map)#</pre> <p>This example shows how to define a forward action:</p> <pre>Switch(config-access-map)# <b>action forward</b> Switch(config-access-map)#</pre>
----------	---

Related Commands	<p><a href="#">match</a></p> <p><a href="#">show vlan access-map</a></p> <p><a href="#">vlan access-map</a></p>
------------------	---

# apply

To implement a new VLAN database, increment the configuration number, save the configuration number in NVRAM, and propagate the configuration number throughout the administrative domain, use the **apply** command.

## apply

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

**Defaults** This command has no default settings.

**Command Modes** VLAN configuration

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The **apply** command implements the configuration changes that you made after you entered VLAN database mode and uses them for the running configuration. This command keeps you in VLAN database mode.

You cannot use this command when the switch is in the VTP client mode.

You can verify that the VLAN database changes occurred by entering the **show vlan** command from privileged EXEC mode.

**Examples** This example shows how to implement the proposed new VLAN database and to recognize it as the current database:

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

**Related Commands**

- abort** (refer to Cisco IOS documentation)
- exit** (refer to Cisco IOS documentation)
- reset**
- show vlan**
- shutdown vlan** (refer to Cisco IOS documentation)
- vtp (global configuration mode)**

# arp access-list

To define an ARP access list or add clauses at the end of a predefined list, use the **arp access-list** command.

**arp access-list** *name*

Syntax Description	<i>name</i> Specifies the access control list name.
--------------------	---

Defaults	None
----------	------

Command Modes	Configuration
---------------	---------------

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to define an ARP access list named static-hosts:

```
Switch(config)# arp access-list static-hosts
Switch(config)#
```

**Related Commands**

- [deny](#)
- [ip arp inspection filter vlan](#)
- [permit](#)

# attach module

To remotely connect to a specific module, use the **attach module** configuration command.

**attach module** *mod*

Syntax Description	<i>mod</i> Target module for the command.
--------------------	---

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

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

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	This command applies only to the Access Gateway Module on Catalyst 4500 series switches.
	The valid values for <i>mod</i> depend on the chassis that are used. For example, if you have a Catalyst 4006 chassis, valid values for the module are from 2 to 6. If you have a 4507R chassis, valid values are from 3 to 7.
	When you execute the <b>attach module</b> <i>mod</i> command, the prompt changes to Gateway#.
	This command is identical in the resulting action to the <b>session module</b> <i>mod</i> and the <b>remote login module</b> <i>mod</i> commands.

Examples	This example shows how to remotely log in to an Access Gateway Module:
----------	--

```
Switch# attach module 5
Attaching console to module 5
Type 'exit' at the remote prompt to end the session

Gateway>
```

Related Commands	<a href="#">remote login module</a> <a href="#">session module</a>
------------------	---

# auto qos voip

To automatically configure quality of service (auto-QoS) for voice over IP (VoIP) within a QoS domain, use the **auto qos voip** interface configuration command. To change the auto-QoS configuration settings to the standard QoS defaults, use the **no** form of this command.

**auto qos voip { cisco-phone | trust }**

**no auto qos voip { cisco-phone | trust }**

Syntax Description	<b>cisco-phone</b>	Connects the interface to a Cisco IP phone and automatically configures QoS for VoIP. The CoS labels of incoming packets are trusted only when the telephone is detected.
	<b>trust</b>	Connects the interface to a trusted switch or router and automatically configures QoS for VoIP. The CoS and DSCP labels of incoming packets are trusted.

**Defaults** Auto-QoS is disabled on all interfaces.

**Command Modes** Interface configuration

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** Use this command to configure the QoS that is appropriate for VoIP traffic within the QoS domain. The QoS domain includes the switch, the interior of the network, and the edge devices that can classify incoming traffic for QoS.

Use the **cisco-phone** keyword on the ports at the edge of the network that are connected to Cisco IP phones. The switch detects the telephone through the Cisco Discovery Protocol (CDP) and trusts the CoS labels in packets that are received from the telephone.

Use the **trust** keyword on the ports that are connected to the interior of the network. Because it is assumed that the traffic has already been classified by the other edge devices, the CoS/DSCP labels in these packets are trusted.

When you enable the auto-QoS feature on the specified interface, these actions automatically occur:

- QoS is globally enabled (**qos** global configuration command).
- DBL is enabled globally (**qos dbl** global configuration command).
- When you enter the **auto qos voip cisco-phone** interface configuration command, the trusted boundary feature is enabled. It uses the Cisco Discovery Protocol (CDP) to detect the presence or absence of a Cisco IP phone. When a Cisco IP phone is detected, the ingress classification on the specific interface is set to trust the CoS label that is received in the packet because some old phones do not mark DSCP. When a Cisco IP phone is absent, the ingress classification is set to not trust the CoS label in the packet.

- When you enter the **auto qos voip trust** interface configuration command, the ingress classification on the specified interface is set to trust the CoS label that is received in the packet if the specified interface is configured as Layer 2 (and is set to trust DSCP if the interface is configured as Layer 3).

You can enable auto-QoS on static, dynamic-access, voice VLAN access, and trunk ports.

To display the QoS configuration that is automatically generated when auto-QoS is enabled, enable debugging before you enable auto-QoS. Use the **debug auto qos** privileged EXEC command to enable auto-QoS debugging.

To disable auto-QoS on an interface, use the **no auto qos voip** interface configuration command. When you enter this command, the switch enables standard QoS and changes the auto-QoS settings to the standard QoS default settings for that interface. This action will not change any global configuration performed by auto-QoS; the global configuration remains the same.

## Examples

This example shows how to enable auto-QoS and to trust the CoS and DSCP labels that are received in the incoming packets when the switch or router that is connected to Gigabit Ethernet interface 1/1 is a trusted device:

```
Switch(config)# interface gigabitethernet1/1
Switch(config-if)# auto qos voip trust
```

This example shows how to enable auto-QoS and to trust the CoS labels that are received in incoming packets when the device connected to Fast Ethernet interface 2/1 is detected as a Cisco IP phone:

```
Switch(config)# interface fastethernet2/1
Switch(config-if)# auto qos voip cisco-phone
```

This example shows how to display the QoS configuration that is automatically generated when auto-QoS is enabled:

```
Switch# debug auto qos
AutoQoS debugging is on
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitethernet1/1
Switch(config-if)# auto qos voip trust
Switch(config-if)#
00:00:56:qos
00:00:57:qos map cos 3 to dscp 26
00:00:57:qos map cos 5 to dscp 46
00:00:58:qos map dscp 32 to tx-queue 1
00:00:58:qos dbl
00:01:00:policy-map autoqos-voip-policy
00:01:00: class class-default
00:01:00: dbl
00:01:00:interface GigabitEthernet1/1
00:01:00: qos trust cos
00:01:00: tx-queue 3
00:01:00: priority high
00:01:00: shape percent 33
00:01:00: service-policy output autoqos-voip-policy
Switchconfig-if)# interface gigabitethernet1/1
Switch(config-if)# auto qos voip cisco-phone
Switch(config-if)#
00:00:55:qos
00:00:56:qos map cos 3 to dscp 26
00:00:57:qos map cos 5 to dscp 46
00:00:58:qos map dscp 32 to tx-queue 1
00:00:58:qos dbl
00:00:59:policy-map autoqos-voip-policy
```



```
00:00:59: class class-default
00:00:59:   dbl
00:00:59: interface GigabitEthernet1/1
00:00:59:   qos trust device cisco-phone
00:00:59:   qos trust cos
00:00:59:   tx-queue 3
00:00:59:   priority high
00:00:59:   shape percent 33
00:00:59:   bandwidth percent 33
00:00:59:   service-policy output autoqos-voip-policy
```

You can verify your settings by entering the **show auto qos interface** command.

---

**Related Commands**

**debug auto qos** (refer to Cisco IOS documentation)

**qos map cos**

**qos trust**

**show auto qos**

**show qos**

**show qos interface**

**show qos maps**

# auto-sync

To enable automatic synchronization of the configuration files in NVRAM, use the **auto-sync** command. To disable automatic synchronization, use the **no** form of this command.

**auto-sync** { **startup-config** | **config-register** | **bootvar** | **standard** }

**no auto-sync** { **startup-config** | **config-register** | **bootvar** | **standard** }

Syntax Description	<b>startup-config</b>	Specifies automatic synchronization of the startup configuration.
	<b>config-register</b>	Specifies automatic synchronization of the configuration register configuration.
	<b>bootvar</b>	Specifies automatic synchronization of the BOOTVAR configuration.
	<b>standard</b>	Specifies automatic synchronization of the startup configuration, BOOTVAR, and configuration registers.

**Defaults** Standard automatic synchronization of all configuration files

**Command Modes** Redundancy main-cpu

Command History	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch (Catalyst 4507R only).

**Usage Guidelines** If you enter the **no auto-sync standard** command, no automatic synchronizations occur.

**Examples** This example shows how (from the default configuration) to enable automatic synchronization of the configuration register in the main CPU:

```
Switch# config terminal
Switch (config)# redundancy
Switch (config-r)# main-cpu
Switch (config-r-mc)# no auto-sync standard
Switch (config-r-mc)# auto-sync configure-register
Switch (config-r-mc)#
```

**Related Commands** [redundancy](#)

# channel-group

To assign and configure an EtherChannel interface to an EtherChannel group, use the **channel-group** command. To remove a channel group configuration from an interface, use the **no** form of this command.

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

**no channel-group**

Syntax Description		
<i>number</i>		Specifies the channel-group number; valid values are from 1 to 64.
<b>mode</b>		Specifies the EtherChannel mode of the interface.
<b>active</b>		Enables LACP unconditionally.
<b>on</b>		Forces the port to channel without PAgP.
<b>auto</b>		Places a port into a passive negotiating state, in which the port responds to PAgP packets it receives but does not initiate PAgP packet negotiation.
<b>non-silent</b>		(Optional) Used with the auto or desirable mode when traffic is expected from the other device.
<b>passive</b>		Enables LACP only if an LACP device is detected.
<b>desirable</b>		Places a port into an active negotiating state, in which the port initiates negotiations with other ports by sending PAgP packets.

**Defaults** No channel groups are assigned.

**Command Modes** Interface configuration

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(13)EW	Support for LACP was added.

**Usage Guidelines** You do not have to create a port-channel interface before assigning a physical interface to a channel group. If a port-channel interface has not been created, it is automatically created when the first physical interface for the channel group is created.

If a specific channel number is used for the PAgP-enabled interfaces of a channel group, that same channel number cannot be used for configuring a channel that has LACP-enabled interfaces or vice versa.

You can also create port channels by entering the **interface port-channel** command. This will create a Layer 3 port channel. To change the Layer 3 port channel into a Layer 2 port channel, use the **switchport** command before you assign physical interfaces to the channel group. A port channel cannot be changed from Layer 3 to Layer 2 or vice versa when it contains member ports.

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

Any configuration or attribute changes that you make to the port-channel interface are propagated to all interfaces within the same channel group as the port channel (for example, configuration changes are also propagated to the physical interfaces that are not part of the port channel, but are part of the channel group).

You can create in **on** mode a usable EtherChannel by connecting two port groups together.

**Caution**

Do not enable Layer 3 addresses on the physical EtherChannel interfaces. Do not assign bridge groups on the physical EtherChannel interfaces because it creates loops.

---

**Examples**

This example shows how to add Gigabit Ethernet interface 1/1 to the EtherChannel group that is specified by port-channel 45:

```
Switch(config-if)# channel-group 45 mode on  
Creating a port-channel interface Port-channel45  
Switch(config-if)#
```

---

**Related Commands**

**interface port-channel**

**show interfaces port-channel** (refer to Cisco IOS documentation)

# channel-protocol

To enable LACP or PAgP on an interface, use the **channel-protocol** command. To disable the protocols, use the **no** form of this command.

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

**no channel-protocol {lacp | pagp}**

Syntax Description	<b>lacp</b>	Enables LACP to manage channeling.
	<b>pagp</b>	Enables PAgP to manage channeling.

Defaults	PAgP
----------	------

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

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switches.

Usage Guidelines	This command is not supported on systems that are configured with a Supervisor Engine I.
	You can also select the protocol using the <b>channel-group</b> command.
	If the interface belongs to a channel, the <b>no</b> form of this command is rejected.
	All ports in an EtherChannel must use the same protocol; you cannot run two protocols on one module.
	PAgP and LACP are not compatible; both ends of a channel must use the same protocol.
	You can manually configure a switch with PAgP on one side and LACP on the other side in the <b>on</b> mode.
	You can change the protocol at any time, but this change causes all existing EtherChannels to reset to the default channel mode for the new protocol. You can use the <b>channel-protocol</b> command to restrict anyone from selecting a mode that is not applicable to the selected protocol.
	Configure all ports in an EtherChannel to operate at the same speed and duplex mode (full duplex only for LACP mode).
	For a complete list of guidelines, refer to the “Configuring EtherChannel” section of the <i>Catalyst 4500 Series Switch Cisco IOS Software Configuration Guide</i> .

Examples	This example shows how to select LACP to manage channeling on the interface:
----------	--

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

■ channel-protocol

---

**Related Commands**

[channel-group](#)  
[show etherchannel](#)

# class-map

To access the QoS class map configuration mode to configure QoS class maps, use the **class-map** command. To delete a class map, use the **no** form of this command.

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

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

Syntax Description	<b>match-all</b>	(Optional) Specifies that all match criteria in the class map must be matched.
	<b>match-any</b>	(Optional) Specifies that one or more match criteria must match.
	<i>name</i>	Name of the class map.

Defaults	Match all criteria.
----------	---------------------

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	The <i>name</i> and <i>acl_name</i> arguments are case sensitive.
	Use the <b>class-map</b> command and its subcommands on individual interfaces to define packet classification, marking, aggregate, and flow policing as part of a globally named service policy.

These commands are available in QoS class map configuration mode:

- **exit**—Exits you from QoS class map configuration mode.
- **no**—Removes a match statement from a class map.
- **match**—Configures classification criteria.

These optional subcommands are also available:

- **access-group** {*acl\_index* | **name** *acl\_name*}
- **ip** {**dscp** | **precedence**} *value1 value2... value8*
- **any**

The following subcommands appear in the CLI help, but they are not supported on LAN interfaces:

- **input-interface** {*interface interface\_number* | **null** *number* | **vlan** *vlan\_id*}
- **protocol** *linktype*
- **destination-address** **mac** *mac\_address*
- **source-address** **mac** *mac\_address*
- **qos-group**

- **mpls**
- **no**

After you have configured the class map name and are in class map configuration mode, you can enter the **match** subcommands. The syntax for these subcommands is as follows:

```
match {[access-group {acl_index | name acl_name}] | [ip {dscp | precedence} value1 value2...  
value8]}
```

See [Table 2-1](#) for a syntax description of the **match** subcommands.

**Table 2-1** Syntax Description for the match Command

Optional Subcommand	Description
<b>access-group</b> <i>acl_index</i>   <i>acl_name</i>	Specifies the access list index or access list names; valid access list index values are from 1 to 2699.
<b>access-group</b> <i>acl_name</i>	Specifies the named access list.
<b>ip dscp</b> <i>value1 value2</i> ... <i>value8</i>	Specifies the IP DSCP values to match; valid values are from 0 to 63. Enter up to eight DSCP values separated by white spaces.
<b>ip precedence</b> <i>value1</i> <i>value2 ... value8</i>	Specifies the IP precedence values to match; valid values are from 0 to 7. Enter up to eight precedence values separated by white spaces.

## Examples

This example shows how to access the **class-map** commands and subcommands and to configure a class map named **ipp5** and enter a match statement for ip precedence 5:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# class-map ipp5
Switch(config-cmap)# match ip precedence 5
Switch(config-cmap)#
```

This example shows how to configure the class map to match an already configured access list:

```
Switch(config-cmap)# match access-group IPacl1
Switch(config-cmap)#
```

## Related Commands

**policy-map**  
**service-policy**  
**show class-map**  
**show policy-map**  
**show policy-map interface**



# clear counters

To clear the interface counters, use the **clear counters** command.

```
clear counters [{FastEthernet interface_number} | {GigabitEthernet interface_number} |
{null interface_number} | {port-channel number} | {vlan vlan_id}]
```

Syntax Description	<b>FastEthernet</b> <i>interface_number</i>	(Optional) Specifies the Fast Ethernet interface; valid values are from 1 to 9.
	<b>GigabitEthernet</b> <i>interface_number</i>	(Optional) Specifies the Gigabit Ethernet interface; valid values are from 1 to 9.
	<b>null</b> <i>interface_number</i>	(Optional) Specifies the null interface; the valid value is 0.
	<b>port-channel</b> <i>number</i>	(Optional) Specifies the channel interface; valid values are from 1 to 64.
	<b>vlan</b> <i>vlan_id</i>	(Optional) Specifies the VLAN; valid values are from 1 to 4096.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended VLAN addresses was added.

**Usage Guidelines** This command clears all the current interface counters from all the interfaces unless you specify an interface.



## Note

This command does not clear the counters that are retrieved using SNMP, but only those seen when you enter the **show interface counters** command.

**Examples** This example shows how to clear all the interface counters:

```
Switch# clear counters
Clear "show interface" counters on all interfaces [confirm] y
Switch#
```

This example shows how to clear the counters on a specific interface:

```
Switch# clear counters vlan 200
Clear "show interface" counters on this interface [confirm] y
Switch#
```

■ clear counters

---

**Related Commands**    **show interface counters** (refer to Cisco IOS documentation)

# clear hw-module slot password

To clear the password on an intelligent line module, use the **clear hw-module slot password** command.

**clear hw-module slot** *slot\_num* **password**

Syntax Description	<i>slot_num</i> Slot on a line module.	
Defaults	The password is not cleared.	
Command Modes	Privileged EXEC	
Command History	Release	Modification
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	You only need to change the password once unless the password is reset.	
Examples	This example shows how to clear the password from slot 5 on a line module:  Switch# <b>clear hw-module slot 5 password</b> Switch#	
Related Commands	<a href="#">hw-module power</a>	

# clear interface gigabitethernet

To clear the hardware logic from a Gigabit Ethernet IEEE 802.3z interface, use the **clear interface gigabitethernet** command.

**clear interface gigabitethernet** *mod/port*

Syntax Description	<i>mod/port</i> Number of the module and port.	
Defaults	This command has no default settings.	
Command Modes	Privileged EXEC	
Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Examples	<p>This example shows how to clear the hardware logic from a Gigabit Ethernet IEEE 802.3z interface:</p> <pre>Switch# clear interface gigabitethernet 1/1 Switch#</pre>	
Related Commands	<a href="#">show interfaces status</a>	

# clear interface vlan

To clear the hardware logic from a VLAN, use the **clear interface vlan** command.

**clear interface vlan** *number*

Syntax Description	<i>number</i> Number of the VLAN interface; valid values are from 1 to 4094.	
Defaults	This command has no default settings.	
Command Modes	Privileged EXEC	
Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended VLAN addresses added.
Examples	This example shows how to clear the hardware logic from a specific VLAN:  Switch# <b>clear interface vlan 5</b> Switch#	
Related Commands	<a href="#">show interfaces status</a>	

# clear ip access-template

To clear the statistical information in access lists, use the **clear ip access-template** command.

**clear ip access-template** *access-list*

Syntax Description	<i>access-list</i>	Number of the access list; valid values are from 100 to 199 for an IP extended access list, and from 2000 to 2699 for an expanded range IP extended access list.
--------------------	--------------------	--

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

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Examples	This example shows how to clear the statistical information for an access list:
----------	---

```
Switch# clear ip access-template 201
Switch#
```

# clear ip arp inspection log

To clear the status of the log buffer, use the **clear ip arp inspection log** command.

**clear ip arp inspection log**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to clear the contents of the log buffer:
-----------------	---

```
Switch# clear ip arp inspection log
Switch#
```

<b>Related Commands</b>	<a href="#">arp access-list</a> <a href="#">show ip arp inspection log</a>
-------------------------	---

# clear ip arp inspection statistics

To clear the dynamic ARP inspection statistics, use the **clear ip arp inspection statistics** command.

**clear ip arp inspection statistics** [**vlan** *vlan-range*]

<b>Syntax Description</b>	<b>vlan</b> <i>vlan-range</i> (Optional) Specifies the VLAN range.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to clear the DAI statistics from VLAN 1 and how to verify the removal:

```
Switch# clear ip arp inspection statistics vlan 1
Switch# show ip arp inspection statistics vlan 1
```

Vlan	Forwarded	Dropped	DHCP Drops	ACL Drops
----	-----	-----	-----	-----
1	0	0	0	0

Vlan	DHCP Permits	ACL Permits	Source MAC Failures
----	-----	-----	-----
1	0	0	0

Vlan	Dest MAC Failures	IP Validation Failures
----	-----	-----
1	0	0

```
Switch#
```

<b>Related Commands</b>	<a href="#">arp access-list</a> <a href="#">clear ip arp inspection log</a> <a href="#">show ip arp inspection</a>
-------------------------	--



# clear ip dhcp snooping database

To clear the DHCP binding database, use the **clear ip dhcp snooping database** command.

## clear ip dhcp snooping database

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to clear the DHCP binding database:
-----------------	--

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

<b>Related Commands</b>	<a href="#">ip dhcp snooping</a> <a href="#">ip dhcp snooping binding interface</a> (refer to Cisco IOS documentation) <a href="#">ip dhcp snooping information option</a> <a href="#">ip dhcp snooping trust</a> <a href="#">ip dhcp snooping vlan</a> <a href="#">show ip dhcp snooping</a> <a href="#">show ip dhcp snooping binding</a>
-------------------------	---

# clear ip dhcp snooping database statistics

To clear the DHCP binding database statistics, use the **clear ip dhcp snooping database statistics** command.

## clear ip dhcp snooping database statistics

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

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to clear the DHCP binding database:

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

**Related Commands**

- [ip dhcp snooping](#)
- [ip dhcp snooping binding](#)
- [ip dhcp snooping information option](#)
- [ip dhcp snooping trust](#)
- [ip dhcp snooping vlan](#)
- [show ip dhcp snooping](#)
- [show ip dhcp snooping binding](#)

# clear ip igmp group

To delete the IGMP group cache entries, use the **clear ip igmp group** command.

```
clear ip igmp group [{fastethernet mod/port} | {GigabitEthernet mod/port} | {host_name |
group_address} {Loopback interface_number} | {null interface_number} |
{port-channel number} | {vlan vlan_id}]
```

Syntax Description		
<b>fastethernet</b>	(Optional)	Specifies the Fast Ethernet interface.
<i>mod/port</i>	(Optional)	Number of the module and port.
<b>GigabitEthernet</b>	(Optional)	Specifies the Gigabit Ethernet interface.
<i>host_name</i>	(Optional)	Hostname, as defined in the DNS hosts table or with the <b>ip host</b> command.
<i>group_address</i>	(Optional)	Address of the multicast group in four-part, dotted notation.
<b>Loopback</b> <i>interface_number</i>	(Optional)	Specifies the loopback interface; valid values are from 0 to 2,147,483,647.
<b>null</b> <i>interface_number</i>	(Optional)	Specifies the null interface; the valid value is 0.
<b>port-channel</b> <i>number</i>	(Optional)	Specifies the channel interface; valid values are from 1 to 64.
<b>vlan</b> <i>vlan_id</i>	(Optional)	Specifies the VLAN; valid values are from 1 to 4094.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The IGMP cache contains a list of the multicast groups of which hosts on the directly connected LAN are members.

To delete all the entries from the IGMP cache, enter the **clear ip igmp group** command with no arguments.

**Examples** This example shows how to clear the entries for a specific group from the IGMP cache:

```
Switch# clear ip igmp group 224.0.255.1
Switch#
```

**clear ip igmp group**

This example shows how to clear the IGMP group cache entries from a specific interface:

```
Switch# clear ip igmp group gigabitethernet 2/2  
Switch#
```

**Related Commands**

**ip host** (refer to Cisco IOS documentation)

**show ip igmp groups** (refer to Cisco IOS documentation)

**show ip igmp interface**

# clear ip igmp snooping membership

To clear the explicit host tracking database, use the **clear ip igmp snooping membership** command.

**clear ip igmp snooping membership** [vlan *vlan\_id*]

Syntax Description	<b>vlan <i>vlan_id</i></b> (Optional) Specifies a VLAN; valid values are from 1 to 1001 and from 1006 to 4094.
--------------------	--

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

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

Command History	Release	Modification
	12.1(20)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	By default, the explicit host tracking database maintains a maximum of 1-KB entries. After you reach this limit, no additional entries can be created in the database. To create more entries, you will need to delete the database with the <b>clear ip igmp snooping statistics vlan</b> command.
------------------	---

Examples	This example shows how to display the IGMP snooping statistics for VLAN 25:  Switch# <b>clear ip igmp snooping membership vlan 25</b> Switch#
----------	--

Related Commands	<a href="#">ip igmp snooping vlan explicit-tracking</a> <a href="#">show ip igmp snooping membership</a>
------------------	---

# clear ip mfib counters

To clear the global MFIB counters and the counters for all active MFIB routes, use the **clear ip mfib counters** command.

**clear ip mfib counters**

---

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

---

**Defaults** This command has no default settings.

---

**Command Modes** Privileged EXEC

---

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---



---

**Examples** This example shows how to clear all the active MFIB routes and global counters:

```
Switch# clear ip mfib counters
Switch#
```

---

**Related Commands** [show ip mfib](#)

# clear ip mfib fastdrop

To clear all the MFIB fast-drop entries, use the **clear ip mfib fastdrop** command.

**clear ip mfib fastdrop**

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

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

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	If new fast-dropped packets arrive, the new fast-drop entries are created.
------------------	--

Examples	This example shows how to clear all the fast-drop entries:
----------	--

```
Switch# clear ip mfib fastdrop
Switch#
```

Related Commands	<a href="#">ip mfib fastdrop</a> <a href="#">show ip mfib fastdrop</a>
------------------	---

# clear lacp counters

To clear the statistics for all the interfaces belonging to a specific channel group, use the **clear lacp counters** command.

**clear lacp** [*channel-group*] **counters**

Syntax Description	<i>channel-group</i> (Optional) Channel-group number; valid values are from 1 to 64.	
Defaults	This command has no default settings.	
Command Modes	Privileged EXEC mode	
Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switches.
Usage Guidelines	<p>This command is not supported on systems that are configured with a Supervisor Engine I.</p> <p>If you do not specify a channel group, all channel groups are cleared.</p> <p>If you enter this command for a channel group that contains members in PAgP mode, the command is ignored.</p>	
Examples	<p>This example shows how to clear the statistics for a specific group:</p> <pre>Switch# clear lacp 1 counters Switch#</pre>	
Related Commands	<a href="#">show lacp</a>	



# clear mac-address-table

To clear the global counter entries from the Layer 2 MAC address table, use the **clear mac-address-table** command.

```
clear mac-address-table {dynamic [{address mac_addr} | {interface interface}] [vlan vlan_id] | notification}
```

Syntax Description	<b>dynamic</b>	Specifies dynamic entry types.
	<b>address</b> <i>mac_addr</i>	(Optional) Specifies the MAC address.
	<b>interface</b> <i>interface</i>	(Optional) Specifies the interface and clears the entries associated with it; valid values are <b>FastEthernet</b> and <b>GigabitEthernet</b> .
	<b>vlan</b> <i>vlan_id</i>	(Optional) Specifies the VLANs; valid values are from 1 to 4094.
	<b>notification</b>	Specifies MAC change notification global counters.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended VLAN addresses added.
	12.2(31)SG	Support for MAC address notification global counters added.

**Usage Guidelines** Enter the **clear mac-address-table dynamic** command with no arguments to remove all dynamic entries from the table.

The **clear mac-address-table notification** command only clears the global counters which are displayed with **show mac-address-table notification** command. It does not clear the global counters and the history table of the CISCO-MAC-NATIFICATION-MIB.

**Examples** This example shows how to clear all the dynamic Layer 2 entries for a specific interface (gi1/1):

```
Switch# clear mac-address-table dynamic interface gi1/1
Switch#
```

This example shows how to clear the MAC address notification counters:

```
Switch# clear mac-address-table notification
Switch#
```

■ clear mac-address-table

---

**Related Commands**

**clear mac-address-table dynamic**  
**mac-address-table aging-time**  
**mac-address-table notification**  
**main-cpu**  
**show mac-address-table address**  
**mac-address-table notification**  
**snmp-server enable traps**  
**snmp trap mac-notification change**

# clear mac-address-table dynamic

To clear the dynamic address entries from the Layer 2 MAC address table, use the **clear mac-address-table dynamic** command.

**clear mac-address-table dynamic** [{**address** *mac\_addr*] | [{**interface** *interface*}] [**vlan** *vlan\_id*]

Syntax Description	<b>address</b> <i>mac_addr</i>	(Optional) Specifies the MAC address.
	<b>interface</b> <i>interface</i>	(Optional) Specifies the interface and clears the entries associated with it; valid values are <b>FastEthernet</b> and <b>GigabitEthernet</b> .
	<b>vlan</b> <i>vlan_id</i>	(Optional) Specifies the VLANs; valid values are from 1 to 4094.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended VLAN addresses added.

**Usage Guidelines** Enter the **clear mac-address-table dynamic** command with no arguments to remove all dynamic entries from the table.

**Examples** This example shows how to clear all the dynamic Layer 2 entries for a specific interface (gi1/1):

```
Switch# clear mac-address-table dynamic interface gi1/1
Switch#
```

**Related Commands**

- [mac-address-table aging-time](#)
- [main-cpu](#)
- [show mac-address-table address](#)

# clear pagp

To clear the port-channel information, use the **clear pagp** command.

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

## Syntax Description

<i>group-number</i>	Channel-group number; valid values are from 1 to 64.
<b>counters</b>	Clears traffic filters.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Examples

This example shows how to clear the port-channel information for a specific group:

```
Switch# clear pagp 32
Switch#
```

This example shows how to clear all the port-channel traffic filters:

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

## Related Commands

[show pagp](#)

# clear port-security

To delete all configured secure addresses or a specific dynamic or sticky secure address on an interface from the MAC address table, use the **clear port-security** command.

**clear port-security dynamic** [**address** *mac-addr* [**vlan** *vlan-id*]] | [**interface** *interface-id*] [**vlan** **access** | **voice**]

Syntax Description	<b>dynamic</b>	Deletes all the dynamic secure MAC addresses.
	<b>address</b> <i>mac-addr</i>	(Optional) Deletes the specified secure MAC address.
	<b>vlan</b> <i>vlan-id</i>	(Optional) Deletes the specified secure MAC address from the specified VLAN.
	<b>interface</b> <i>interface-id</i>	(Optional) Deletes the secure MAC addresses on the specified physical port or port channel.
	<b>vlan access</b>	(Optional) Deletes the secure MAC addresses from access VLANs.
	<b>vlan voice</b>	(Optional) Deletes the secure MAC addresses from voice VLANs.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

**Usage Guidelines** If you enter the **clear port-security all** command, the switch removes all the dynamic secure MAC addresses from the MAC address table.



## Note

You can clear sticky and static secure MAC addresses one at a time with the **no switchport port-security mac-address** command.

If you enter the **clear port-security dynamic interface** *interface-id* command, the switch removes all the dynamic secure MAC addresses on an interface from the MAC address table.

Command History	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	This command was first introduced on the Catalyst 4500 series switch.
	12.2(31)SG	Add support for sticky port security.

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

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

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

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

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

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

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

---

**Related Commands**

[show port-security](#)  
[switchport port-security](#)

# clear qos

To clear the global and per-interface aggregate QoS counters, use the **clear qos** command.

```
clear qos [aggregate-policer name] | interface { {fastethernet | GigabitEthernet}
{mod/interface} } | vlan {vlan_num} | port-channel {number}}
```

## Syntax Description

<b>aggregate-policer</b> <i>name</i>	(Optional) Specifies an aggregate policer.
<b>interface</b>	(Optional) Specifies an interface.
<b>fastethernet</b>	(Optional) Specifies the Fast Ethernet 802.3 interface.
<b>GigabitEthernet</b>	(Optional) Specifies the Gigabit Ethernet 802.3z interface.
<i>mod/interface</i>	(Optional) Number of the module and interface.
<b>vlan</b> <i>vlan_num</i>	(Optional) Specifies a VLAN.
<b>port-channel</b> <i>number</i>	(Optional) Specifies the channel interface; valid values are from 1 to 64.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines



### Note

When you enter the **clear qos** command, the way that the counters work is affected and the traffic that is normally restricted could be forwarded for a short period of time.

The **clear qos** command resets the interface QoS policy counters. If no interface is specified, the **clear qos** command resets the QoS policy counters for all interfaces.

## Examples

This example shows how to clear the global and per-interface aggregate QoS counters for all the protocols:

```
Switch# clear qos
Switch#
```

This example shows how to clear the specific protocol aggregate QoS counters for all the interfaces:

```
Switch# clear qos aggregate-policer
Switch#
```

## Related Commands

[show qos](#)

# clear vlan counters

To clear the software-cached counter values to start from zero again for a specified VLAN or all existing VLANs, use the **clear vlan counters** command.

**clear vlan** [*vlan-id*] **counters**

<b>Syntax Description</b>	<i>vlan-id</i> (Optional) VLAN number; see the “Usage Guidelines” section for valid values.
---------------------------	---

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switches.

<b>Usage Guidelines</b>	If you do not specify a <i>vlan-id</i> value; the software-cached counter values for all the existing VLANs are cleared.
-------------------------	--

<b>Examples</b>	This example shows how to clear the software-cached counter values for a specific VLAN:
-----------------	---

```
Switch# clear vlan 10 counters
Clear "show vlan" counters on this vlan [confirm]y
Switch#
```

<b>Related Commands</b>	<a href="#">show vlan counters</a>
-------------------------	------------------------------------



# clear vmps statistics

To clear the VMPS statistics, use the **clear vmps statistics** command.

## clear vmps statistics

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switches.

<b>Examples</b>	This example shows how to clear the VMPS statistics:
-----------------	--

Switch# <b>clear vmps statistics</b> Switch#
---

<b>Related Commands</b>	<a href="#">show vmps</a> <a href="#">vmps reconfirm (privileged EXEC)</a>
-------------------------	---

# control-plane

To enter control-plane configuration mode, which allows users to associate or modify attributes or parameters (such as a service policy) that are associated with the control plane of the device, use the **control-plane** command.

## control-plane

### Syntax Description

This command has no arguments or keywords.

### Defaults

Default service police named “system-cpp-policy” is attached.

### Command Modes

Global configuration

### Command History

Release	Modification
12.2(31)SG	Support for this command was introduced.

### Usage Guidelines



#### Note

You must set a policy action for every class. If you do not set a policy action for every class, the traffic skips the class that does not have a policy action and matches against the subsequent classes.

After you enter the **control-plane** command, you can define control plane services for your route processor. For example, you can associate a service policy with the control plane to police all traffic that is destined to the control plane.

### Examples

These examples show how to configure trusted hosts with source addresses 10.1.1.1 and 10.1.1.2 to forward Telnet packets to the control plane without constraint, while allowing all remaining Telnet packets to be policed at the specified rate:

```
Switch(config)# access-list 140 deny tcp host 10.1.1.1 any eq telnet
! Allow 10.1.1.2 trusted host traffic.
Switch(config)# access-list 140 deny tcp host 10.1.1.2 any eq telnet
! Rate limit all other Telnet traffic.
Switch(config)# access-list 140 permit tcp any any eq telnet
! Define class-map "telnet-class."
Switch(config)# class-map telnet-class
Switch(config-cmap)# match access-group 140
Switch(config-cmap)# exit
Switch(config)# policy-map control-plane
Switch(config-pmap)# class telnet-class
Switch(config-pmap-c)# police 32000 1000 conform transmit exceed drop
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
! Define aggregate control plane service for the active Route Processor.
Switch(config-cp)# macro global apply system-cpp
```

```
Switch(config)# control-plane
Switch(config-cp)# service-policy input system-cpp-policy
Switch(config-cp)# exit
```

---

**Related Commands**

**class** (refer to the *Cisco IOS Release 12.2 Command Reference*)

**class-map**

**drop** (refer to the *Cisco IOS Release 12.2 Command Reference*)

**match access-group** (refer to the *Cisco IOS Release 12.2 Command Reference*)

**policy-map**

**service-policy**

**show policy-map control-plane**

# debug adjacency

To display information about the adjacency debugging, use the **debug adjacency** command. To disable debugging output, use the **no** form of this command.

**debug adjacency [ipc]**

**no debug adjacency**

Syntax Description	<b>ipc</b> (Optional) Displays the IPC entries in the adjacency database.
--------------------	---

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

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display the information in the adjacency database:

```
Switch# debug adjacency
4d02h: ADJ: add 172.20.52.36 (GigabitEthernet1/1) via ARP will expire: 04:00:00
4d02h: ADJ: add 172.20.52.36 (GigabitEthernet1/1) via ARP will expire: 04:00:00
4d02h: ADJ: add 172.20.52.36 (GigabitEthernet1/1) via ARP will expire: 04:00:00
4d02h: ADJ: add 172.20.52.36 (GigabitEthernet1/1) via ARP will expire: 04:00:00
4d02h: ADJ: add 172.20.52.36 (GigabitEthernet1/1) via ARP will expire: 04:00:00
4d02h: ADJ: add 172.20.52.36 (GigabitEthernet1/1) via ARP will expire: 04:00:00
4d02h: ADJ: add 172.20.52.36 (GigabitEthernet1/1) via ARP will expire: 04:00:00
4d02h: ADJ: add 172.20.52.36 (GigabitEthernet1/1) via ARP will expire: 04:00:00
<... output truncated...>
Switch#
```

**Related Commands** **undebug adjacency** (same as **no debug adjacency**)

# debug backup

To debug the backup events, use the **debug backup** command. To disable the debugging output, use the **no** form of this command.

**debug backup**

**no debug backup**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	<p>This example shows how to debug the backup events:</p> <pre>Switch# debug backup Backup events debugging is on Switch#</pre>
-----------------	---

<b>Related Commands</b>	<b>undebug backup</b> (same as <b>no debug backup</b> )
-------------------------	---

# debug condition interface

To limit the debugging output of interface-related activities, use the **debug condition interface** command. To disable the debugging output, use the **no** form of this command.

**debug condition interface** {**fastethernet** *mod/port* | **GigabitEthernet** *mod/port* |  
**null** *interface\_num* | **port-channel** *interface-num* | **vlan** *vlan\_id*}

**no debug condition interface** {**fastethernet** *mod/port* | **GigabitEthernet** *mod/port* | **null**  
*interface\_num* | **port-channel** *interface-num* | **vlan** *vlan\_id*}

Syntax Description	<b>fastethernet</b>	Limits the debugging to Fast Ethernet interfaces.
	<i>mod/port</i>	Number of the module and port.
	<b>GigabitEthernet</b>	Limits the debugging to Gigabit Ethernet interfaces.
	<b>null</b> <i>interface-num</i>	Limits the debugging to null interfaces; the valid value is 0.
	<b>port-channel</b> <i>interface-num</i>	Limits the debugging to port-channel interfaces; valid values are from 1 to 64.
	<b>vlan</b> <i>vlan_id</i>	Specifies the VLAN interface number; valid values are from 1 to 4094.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended VLAN addresses added.

**Examples** This example shows how to limit the debugging output to VLAN interface 1:

```
Switch# debug condition interface vlan 1
Condition 2 set
Switch#
```

**Related Commands** [debug interface](#)  
**undebug condition interface** (same as **no debug condition interface**)

# debug condition standby

To limit the debugging output for the standby state changes, use the **debug condition standby** command. To disable the debugging output, use the **no** form of this command.

**debug condition standby** {**fastethernet** *mod/port* | **GigabitEthernet** *mod/port* |  
**port-channel** *interface-num* | **vlan** *vlan\_id* *group-number*}

**no debug condition standby** {**fastethernet** *mod/port* | **GigabitEthernet** *mod/port* |  
**port-channel** *interface-num* | **vlan** *vlan\_id* *group-number*}

Syntax Description	<b>fastethernet</b>	Limits the debugging to Fast Ethernet interfaces.
	<i>mod/port</i>	Number of the module and port.
	<b>GigabitEthernet</b>	Limits the debugging to Gigabit Ethernet interfaces.
	<b>port-channel</b> <i>interface_num</i>	Limits the debugging output to port-channel interfaces; valid values are from 1 to 64.
	<b>vlan</b> <i>vlan_id</i>	Limits the debugging of a condition on a VLAN interface; valid values are from 1 to 4094.
	<i>group-number</i>	VLAN group number; valid values are from 0 to 255.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended VLAN addresses added.

**Usage Guidelines** If you attempt to remove the only condition set, you will be prompted with a message asking if you want to abort the removal operation. You can enter **n** to abort the removal or **y** to proceed with the removal. If you remove the only condition set, an excessive number of debugging messages might occur.

**Examples** This example shows how to limit the debugging output to group 0 in VLAN 1:

```
Switch# debug condition standby vlan 1 0
Condition 3 set
Switch#
```

This example shows the display if you try to turn off the last standby debug condition:

```
Switch# no debug condition standby vlan 1 0
This condition is the last standby condition set.
Removing all conditions may cause a flood of debugging
messages to result, unless specific debugging flags
are first removed.

Proceed with removal? [yes/no]: n
% Operation aborted
Switch#
```

---

**Related Commands**     **undebug condition standby** (same as **no debug condition standby**)



# debug condition vlan

To limit the VLAN debugging output for a specific VLAN, use the **debug condition vlan** command. To disable the debugging output, use the **no** form of this command.

**debug condition vlan** {vlan\_id}

**no debug condition vlan** {vlan\_id}

Syntax Description	vlan_id      Number of the VLAN; valid values are from 1 to 4096.	
Defaults	This command has no default settings.	
Command Modes	Privileged EXEC	
Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended VLAN addresses added.
Usage Guidelines	If you attempt to remove the only VLAN condition set, you will be prompted with a message asking if you want to abort the removal operation. You can enter <b>n</b> to abort the removal or <b>y</b> to proceed with the removal. If you remove the only condition set, it could result in the display of an excessive number of messages.	
Examples	This example shows how to limit the debugging output to VLAN 1:  Switch# <b>debug condition vlan 1</b> Condition 4 set Switch#	
	This example shows the message that is displayed when you attempt to disable the last VLAN debug condition:  Switch# <b>no debug condition vlan 1</b> This condition is the last vlan condition set. Removing all conditions may cause a flood of debugging messages to result, unless specific debugging flags are first removed.  Proceed with removal? [yes/no]: <b>n</b> % Operation aborted Switch#	
Related Commands	<b>undebug condition vlan</b> (same as <b>no debug condition vlan</b> )	

# debug dot1x

To enable the debugging for the 802.1X feature, use the **debug dot1x** command. To disable the debugging output, use the **no** form of this command.

**debug dot1x** { **all** | **errors** | **events** | **packets** | **registry** | **state-machine** }

**no debug dot1x** { **all** | **errors** | **events** | **packets** | **registry** | **state-machine** }

## Syntax Description

<b>all</b>	Enables the debugging of all conditions.
<b>errors</b>	Enables the debugging of print statements guarded by the dot1x error flag.
<b>events</b>	Enables the debugging of print statements guarded by the dot1x events flag.
<b>packets</b>	All incoming dot1x packets are printed with packet and interface information.
<b>registry</b>	Enables the debugging of print statements guarded by the dot1x registry flag.
<b>state-machine</b>	Enables the debugging of print statements guarded by the dot1x registry flag.

## Defaults

Debugging is disabled.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Examples

This example shows how to enable the 802.1X debugging for all conditions:

```
Switch# debug dot1x all
Switch#
```

## Related Commands

**show dot1x**  
**undebug dot1x** (same as **no debug dot1x**)

# debug etherchnl

To debug EtherChannel, use the **debug etherchnl** command. To disable the debugging output, use the **no** form of this command.

**debug etherchnl** [**all** | **detail** | **error** | **event** | **idb** | **linecard**]

**no debug etherchnl**

Syntax Description	<b>all</b>	(Optional) Displays all EtherChannel debug messages.
	<b>detail</b>	(Optional) Displays the detailed EtherChannel debug messages.
	<b>error</b>	(Optional) Displays the EtherChannel error messages.
	<b>event</b>	(Optional) Debugs the major EtherChannel event messages.
	<b>idb</b>	(Optional) Debugs the PAgP IDB messages.
	<b>linecard</b>	(Optional) Debugs the SCP messages to the module.

## Defaults

The default settings are as follows:

- Debug is disabled.
- All messages are displayed.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

If you do not specify a keyword, all debug messages are displayed.

## Examples

This example shows how to display all the EtherChannel debug messages:

```
Switch# debug etherchnl
PAgP Shim/FEC debugging is on
22:46:30:FEC:returning agport Po15 for port (Fa2/1)
22:46:31:FEC:returning agport Po15 for port (Fa4/14)
22:46:33:FEC:comparing GC values of Fa2/25 Fa2/15 flag = 1 1
22:46:33:FEC:port_attrib:Fa2/25 Fa2/15 same
22:46:33:FEC:EC - attrib incompatable for Fa2/25; duplex of Fa2/25 is half, Fa2/15 is full
22:46:33:FEC:pagp_switch_choose_unique:Fa2/25, port Fa2/15 in agport Po3 is incompatable
Switch#
```

This example shows how to display the EtherChannel IDB debug messages:

```
Switch# debug etherchnl idb
Agport idb related debugging is on
Switch#
```

This example shows how to disable the debugging:

```
Switch# no debug etherchnl  
Switch#
```

---

**Related Commands**     **undebbug etherchnl** (same as **no debug etherchnl**)

# debug interface

To abbreviate the entry of the **debug condition interface** command, use the **debug interface** command. To disable debugging output, use the **no** form of this command.

**debug interface** { **FastEthernet** *mod/port* | **GigabitEthernet** *mod/port* | **null** | **port-channel** *interface-num* | **vlan** *vlan\_id* }

**no debug interface** { **FastEthernet** *mod/port* | **GigabitEthernet** *mod/port* | **null** | **port-channel** *interface-num* | **vlan** *vlan\_id* }

Syntax Description	<b>FastEthernet</b>	Limits the debugging to Fast Ethernet interfaces.
	<i>mod/port</i>	Number of the module and port.
	<b>GigabitEthernet</b>	Limits the debugging to Gigabit Ethernet interfaces.
	<b>null</b>	Limits the debugging to null interfaces; the only valid value is 0.
	<b>port-channel</b> <i>interface-num</i>	Limits the debugging to port-channel interfaces; valid values are from 1 to 64.
	<b>vlan</b> <i>vlan_id</i>	Specifies the VLAN interface number; valid values are from 1 to 4094.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended VLAN addresses added.

**Examples** This example shows how to limit the debugging to interface VLAN 1:

```
Switch# debug interface vlan 1
Condition 1 set
Switch#
```

**Related Commands** [debug condition interface](#)  
**undebug interface** (same as **no debug interface**)

# debug ipc

To debug the IPC activity, use the **debug ipc** command. To disable the debugging output, use the **no** form of this command.

**debug ipc** { **all** | **errors** | **events** | **headers** | **packets** | **ports** | **seats** }

**no debug ipc** { **all** | **errors** | **events** | **headers** | **packets** | **ports** | **seats** }

## Syntax Description

<b>all</b>	Enables all IPC debugging.
<b>errors</b>	Enables the IPC error debugging.
<b>events</b>	Enables the IPC event debugging.
<b>headers</b>	Enables the IPC header debugging.
<b>packets</b>	Enables the IPC packet debugging.
<b>ports</b>	Enables the debugging of the creation and deletion of ports.
<b>seats</b>	Enables the debugging of the creation and deletion of nodes.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Examples

This example shows how to enable the debugging of the IPC events:

```
Switch# debug ipc events
Special Events debugging is on
Switch#
```

## Related Commands

**undebug ipc** (same as **no debug ipc**)

# debug ip dhcp snooping event

To debug the DHCP snooping events, use the **debug ip dhcp snooping event** command. To disable debugging output, use the **no** form of this command.

**debug ip dhcp snooping event**

**no debug ip dhcp snooping event**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Debugging of snooping event is disabled.
-----------------	--

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to enable the debugging for the DHCP snooping events:
-----------------	--

```
Switch# debug ip dhcp snooping event
Switch#
```

This example shows how to disable the debugging for the DHCP snooping events:
---

```
Switch# no debug ip dhcp snooping event
Switch#
```

<b>Related Commands</b>	<a href="#">debug ip dhcp snooping packet</a>
-------------------------	---

# debug ip dhcp snooping packet

To debug the DHCP snooping messages, use the **debug ip dhcp snooping packet** command. To disable the debugging output, use the **no** form of this command.

**debug ip dhcp snooping packet**

**no debug ip dhcp snooping packet**

---

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

---

Defaults	Debugging of snooping packet is disabled.
----------	---

---

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

---

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---

---

Examples	This example shows how to enable the debugging for the DHCP snooping packets:
----------	---

```
Switch# debug ip dhcp snooping packet
Switch#
```

This example shows how to disable the debugging for the DHCP snooping packets:

```
Switch# no debug ip dhcp snooping packet
Switch#
```

---

Related Commands	<a href="#">debug ip dhcp snooping event</a>
------------------	--



# debug ip verify source packet

To debug the IP source guard messages, use the **debug ip verify source packet** command. To disable the debugging output, use the **no** form of this command.

**debug ip verify source packet**

**no debug ip verify source packet**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Debugging of snooping security packets is disabled.
-----------------	---

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to enable debugging for the IP source guard:
-----------------	---

```
Switch# debug ip verify source packet
Switch#
```

This example shows how to disable debugging for the IP source guard:
--

```
Switch# no debug ip verify source packet
Switch#
```

<b>Related Commands</b>	<a href="#">ip dhcp snooping</a> <a href="#">ip dhcp snooping information option</a> <a href="#">ip dhcp snooping limit rate</a> <a href="#">ip dhcp snooping trust</a> <a href="#">ip verify source vlan dhcp-snooping</a> (refer to Cisco IOS documentation) <a href="#">show ip dhcp snooping</a> <a href="#">show ip dhcp snooping binding</a> <a href="#">show ip verify source</a> (refer to Cisco IOS documentation)
-------------------------	--

# debug lacp

To debug the LACP activity, use the **debug lacp** command. To disable the debugging output, use the **no** form of this command.

**debug lacp** [**all** | **event** | **fsm** | **misc** | **packet**]

**no debug lacp**

Syntax Description	<b>all</b>	(Optional) Enables all LACP debugging.
	<b>event</b>	(Optional) Enables the debugging of the LACP events.
	<b>fsm</b>	(Optional) Enables the debugging of the LACP finite state machine.
	<b>misc</b>	(Optional) Enables the miscellaneous LACP debugging.
	<b>packet</b>	(Optional) Enables the LACP packet debugging.

Defaults	Debugging of LACP activity is disabled.
----------	---

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

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	This command is supported only by the supervisor engine and can be entered only from the Catalyst 4500 series switch console.
------------------	---

Examples	This example shows how to enable the LACP miscellaneous debugging:
----------	--

```
Switch# debug lacp
Port Aggregation Protocol Miscellaneous debugging is on
Switch#
```

Related Commands	<b>undebug pagp</b> (same as <b>no debug pagp</b> )
------------------	---

# debug monitor

To display the monitoring activity, use the **debug monitor** command. To disable the debugging output, use the **no** form of this command.

**debug monitor** { **all** | **errors** | **idb-update** | **list** | **notifications** | **platform** | **requests** }

**no debug monitor** { **all** | **errors** | **idb-update** | **list** | **notifications** | **platform** | **requests** }

Syntax Description	<b>all</b>	Displays all the SPAN debugging messages.
	<b>errors</b>	Displays the SPAN error details.
	<b>idb-update</b>	Displays the SPAN IDB update traces.
	<b>list</b>	Displays the SPAN list tracing and the VLAN list tracing.
	<b>notifications</b>	Displays the SPAN notifications.
	<b>platform</b>	Displays the SPAN platform tracing.
	<b>requests</b>	Displays the SPAN requests.

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

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Examples	This example shows how to debug the monitoring errors:
----------	--

```
Switch# debug monitor errors
SPAN error detail debugging is on
Switch#
```

Related Commands	<b>undebg monitor</b> (same as <b>no debug monitor</b> )
------------------	--

# debug nvram

To debug the NVRAM activity, use the **debug nvram** command. To disable the debugging output, use the **no** form of this command.

**debug nvram**

**no debug nvram**

---

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

---

**Defaults** This command has no default settings.

---

**Command Modes** Privileged EXEC

---

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---



---

**Examples** This example shows how to debug NVRAM:

```
Switch# debug nvram
NVRAM behavior debugging is on
Switch#
```

---

**Related Commands** **undebug nvram** (same as **no debug nvram**)

# debug pagp

To debug the PAgP activity, use the **debug pagp** command. To disable the debugging output, use the **no** form of this command.

**debug pagp** [**all** | **event** | **fsm** | **misc** | **packet**]

**no debug pagp**

Syntax Description	<b>all</b>	(Optional) Enables all PAgP debugging.
	<b>event</b>	(Optional) Enables the debugging of the PAgP events.
	<b>fsm</b>	(Optional) Enables the debugging of the PAgP finite state machine.
	<b>misc</b>	(Optional) Enables the miscellaneous PAgP debugging.
	<b>packet</b>	(Optional) Enables the PAgP packet debugging.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** This command is supported only by the supervisor engine and can be entered only from the Catalyst 4500 series switch console.

**Examples** This example shows how to enable the PAgP miscellaneous debugging:

```
Switch# debug pagp misc
Port Aggregation Protocol Miscellaneous debugging is on
Switch#
*Sep 30 10:13:03: SP: PAgP: pagp_h(Fa5/6) expired
*Sep 30 10:13:03: SP: PAgP: 135 bytes out Fa5/6
*Sep 30 10:13:03: SP: PAgP: Fa5/6 Transmitting information packet
*Sep 30 10:13:03: SP: PAgP: timer pagp_h(Fa5/6) started with interval 30000
<... output truncated...>
Switch#
```

**Related Commands** **undebug pagp** (same as **no debug pagp**)

# debug platform packet protocol lacp

To debug the LACP protocol packets, use the **debug platform packet protocol lacp** command. To disable the debugging output, use the **no** form of this command.

**debug platform packet protocol lacp** [receive | transmit | vlan]

**no debug platform packet protocol lacp** [receive | transmit | vlan]

Syntax Description	<b>receive</b>	(Optional) Enables the platform packet reception debugging functions.
	<b>transmit</b>	(Optional) Enables the platform packet transmission debugging functions.
	<b>vlan</b>	(Optional) Enables the platform packet VLAN debugging functions.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to enable all PM debugging:

```
Switch# debug platform packet protocol lacp
Switch#
```

**Related Commands** **undebug platform packet protocol lacp** (same as **no debug platform packet protocol lacp**)

# debug platform packet protocol pagp

To debug the PAgP protocol packets, use the **debug platform packet protocol pagp** command. To disable the debugging output, use the **no** form of this command.

**debug platform packet protocol pagp** [receive | transmit | vlan]

**no debug platform packet protocol pagp** [receive | transmit | vlan]

Syntax Description	<b>receive</b>	(Optional) Enables the platform packet reception debugging functions.
	<b>transmit</b>	(Optional) Enables the platform packet transmission debugging functions.
	<b>vlan</b>	(Optional) Enables the platform packet VLAN debugging functions.

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

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

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Examples	<p>This example shows how to enable all PM debugging:</p> <pre>Switch# debug platform packet protocol pagp Switch#</pre>
----------	--

Related Commands	<b>undebg platform packet protocol pagp</b> (same as <b>no debug platform packet protocol pagp</b> )
------------------	--

# debug pm

To debug the port manager (PM) activity, use the **debug pm** command. To disable the debugging output, use the **no** form of this command.

**debug pm** { **all** | **card** | **cookies** | **etherchnl** | **messages** | **port** | **registry** | **scp** | **sm** | **span** | **split** | **vlan** | **vp** }

**no debug pm** { **all** | **card** | **cookies** | **etherchnl** | **messages** | **port** | **registry** | **scp** | **sm** | **span** | **split** | **vlan** | **vp** }

## Syntax Description

<b>all</b>	Displays all PM debugging messages.
<b>card</b>	Debugs the module-related events.
<b>cookies</b>	Enables the internal PM cookie validation.
<b>etherchnl</b>	Debugs the EtherChannel-related events.
<b>messages</b>	Debugs the PM messages.
<b>port</b>	Debugs the port-related events.
<b>registry</b>	Debugs the PM registry invocations.
<b>scp</b>	Debugs the SCP module messaging.
<b>sm</b>	Debugs the state machine-related events.
<b>span</b>	Debugs the spanning-tree-related events.
<b>split</b>	Debugs the split-processor.
<b>vlan</b>	Debugs the VLAN-related events.
<b>vp</b>	Debugs the virtual port-related events.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Examples

This example shows how to enable all PM debugging:

```
Switch# debug pm all
Switch#
```

## Related Commands

**undebbug pm** (same as **no debug pm**)



# debug port-security

To debug port security, use the **debug port-security** command. To disable the debugging output, use the **no** form of this command.

**debug port-security**

**no debug port-security**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	<p>This example shows how to enable all PM debugging:</p> <pre>Switch# debug port-security Switch#</pre>
-----------------	--

<b>Related Commands</b>	<a href="#">switchport port-security</a>
-------------------------	--

# debug redundancy

To debug the supervisor engine redundancy, use the **debug redundancy** command. To disable the debugging output, use the **no** form of this command.

**debug redundancy {errors | fsm | kpa | msg | progression | status | timer}**

**no debug redundancy**

## Syntax Description

<b>errors</b>	Enables the redundancy facility for error debugging.
<b>fsm</b>	Enables the redundancy facility for FSM event debugging.
<b>kpa</b>	Enables the redundancy facility for keepalive debugging.
<b>msg</b>	Enables the redundancy facility for messaging event debugging.
<b>progression</b>	Enables the redundancy facility for progression event debugging.
<b>status</b>	Enables the redundancy facility for status event debugging.
<b>timer</b>	Enables the redundancy facility for timer event debugging.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch (Catalyst 4507R only).

## Examples

This example shows how to debug the redundancy facility timer event debugging:

```
Switch# debug redundancy timer
Redundancy timer debugging is on
Switch#
```

# debug spanning-tree

To debug the spanning-tree activities, use the **debug spanning-tree** command. To disable the debugging output, use the **no** form of this command.

**debug spanning-tree** { **all** | **backbonefast** | **pdu** | **bpdu-opt** | **etherchannel** | **config** | **events** | **exceptions** | **general** | **ha** | **mstp** | **pvst+** | **root** | **snmp** | **synchronization** | **uplinkfast** }

**no debug spanning-tree** { **all** | **backbonefast** | **pdu** | **bpdu-opt** | **etherchannel** | **config** | **events** | **exceptions** | **general** | **ha** | **mstp** | **pvst+** | **root** | **snmp** | **synchronization** | **uplinkfast** }

Syntax Description		
<b>all</b>		Displays all the spanning-tree debugging messages.
<b>backbonefast</b>		Debugs the backbonefast events.
<b>bpdu</b>		Debugs the spanning-tree BPDU.
<b>bpdu-opt</b>		Debugs the optimized BPDU handling.
<b>etherchannel</b>		Debugs the spanning-tree EtherChannel support.
<b>config</b>		Debugs the spanning-tree configuration changes.
<b>events</b>		Debugs the TCAM events.
<b>exceptions</b>		Debugs the spanning-tree exceptions.
<b>general</b>		Debugs the general spanning-tree activity.
<b>ha</b>		Debugs the HA events.
<b>mstp</b>		Debugs the multiple spanning-tree events.
<b>pvst+</b>		Debugs the PVST+ events.
<b>root</b>		Debugs the spanning-tree root events.
<b>snmp</b>		Debugs the spanning-tree SNMP events.
<b>switch</b>		Debugs the switch shim events.
<b>synchronization</b>		Debugs the STP state synchronization events.
<b>uplinkfast</b>		Debugs the uplinkfast events.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Examples

This example shows how to debug the spanning-tree PVST+:

```
Switch# debug spanning-tree pvst+
Spanning Tree PVST+ debugging is on
Switch#
```

■ debug spanning-tree

---

**Related Commands**     **undebbug spanning-tree** (same as **no debug spanning-tree**)

# debug spanning-tree backbonefast

To enable debugging of the spanning-tree BackboneFast events, use the **debug spanning-tree backbonefast** command. To disable the debugging output, use the **no** form of this command.

**debug spanning-tree backbonefast** [**detail** | **exceptions**]

**no debug spanning-tree backbonefast**

Syntax Description	<table> <tr> <td><b>detail</b></td><td>(Optional) Displays the detailed BackboneFast debugging messages.</td></tr> <tr> <td><b>exceptions</b></td><td>(Optional) Enables the debugging of spanning-tree BackboneFast exceptions.</td></tr> </table>	<b>detail</b>	(Optional) Displays the detailed BackboneFast debugging messages.	<b>exceptions</b>	(Optional) Enables the debugging of spanning-tree BackboneFast exceptions.
<b>detail</b>	(Optional) Displays the detailed BackboneFast debugging messages.				
<b>exceptions</b>	(Optional) Enables the debugging of spanning-tree BackboneFast exceptions.				
Defaults	This command has no default settings.				
Command Modes	Privileged EXEC				
Command History	<table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>12.1(8a)EW</td><td>Support for this command was introduced on the Catalyst 4500 series switch.</td></tr> </table>	Release	Modification	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Release	Modification				
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.				
Usage Guidelines	This command is supported only by the supervisor engine and can be entered only from the Catalyst 4500 series switch console.				
Examples	<p>This example shows how to enable the debugging and to display the detailed spanning-tree BackboneFast debugging information:</p> <pre>Switch# debug spanning-tree backbonefast detail Spanning Tree backbonefast detail debugging is on Switch#</pre>				
Related Commands	<b>undebug spanning-tree backbonefast</b> (same as <b>no debug spanning-tree backbonefast</b> )				

# debug spanning-tree switch

To enable the switch shim debugging, use the **debug spanning-tree switch** command. To disable the debugging output, use the **no** form of this command.

**debug spanning-tree switch** { **all** | **errors** | **general** | **pm** | **rx** { **decode** | **errors** | **interrupt** | **process** } | **state** | **tx** [ **decode** ] }

**no debug spanning-tree switch** { **all** | **errors** | **general** | **pm** | **rx** { **decode** | **errors** | **interrupt** | **process** } | **state** | **tx** [ **decode** ] }

## Syntax Description

<b>all</b>	Displays all the spanning-tree switch shim debugging messages.
<b>errors</b>	Enables the debugging of switch shim errors or exceptions.
<b>general</b>	Enables the debugging of general events.
<b>pm</b>	Enables the debugging of port manager events.
<b>rx</b>	Displays the received BPDU-handling debugging messages.
<b>decode</b>	Enables the debugging of the decode-received packets of the spanning-tree switch shim.
<b>errors</b>	Enables the debugging of the receive errors of the spanning-tree switch shim.
<b>interrupt</b>	Enables the shim ISR receive BPDU debugging on the spanning-tree switch.
<b>process</b>	Enables the process receive BPDU debugging on the spanning-tree switch.
<b>state</b>	Enables the debugging of the state changes on the spanning-tree port.
<b>tx</b>	Enables the transmit BPDU debugging on the spanning-tree switch shim.
<b>decode</b>	(Optional) Enables the decode-transmitted packets debugging on the spanning-tree switch shim.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

This command is supported only by the supervisor engine and can be entered only from the switch console.

---

**Examples**

This example shows how to enable the transmit BPDU debugging on the spanning-tree switch shim:

```
Switch# debug spanning-tree switch tx
Spanning Tree Switch Shim transmit bpdu debugging is on
*Sep 30 08:47:33: SP: STP SW: TX: bpdu of type ieee-st size 92 on FastEthernet5/9 303
*Sep 30 08:47:33: SP: STP SW: TX: bpdu of type ieee-st size 92 on FastEthernet5/9 304
*Sep 30 08:47:33: SP: STP SW: TX: bpdu of type ieee-st size 92 on FastEthernet5/9 305
*Sep 30 08:47:33: SP: STP SW: TX: bpdu of type ieee-st size 92 on FastEthernet5/9 349
*Sep 30 08:47:33: SP: STP SW: TX: bpdu of type ieee-st size 92 on FastEthernet5/9 350
*Sep 30 08:47:33: SP: STP SW: TX: bpdu of type ieee-st size 92 on FastEthernet5/9 351
*Sep 30 08:47:33: SP: STP SW: TX: bpdu of type ieee-st size 92 on FastEthernet5/9 801
<... output truncated...>
Switch#
```

---

**Related Commands**

**undebg spanning-tree switch** (same as **no debug spanning-tree switch**)

# debug spanning-tree uplinkfast

To enable the debugging of the spanning-tree UplinkFast events, use the **debug spanning-tree uplinkfast** command. To disable the debugging output, use the **no** form of this command.

**debug spanning-tree uplinkfast [exceptions]**

**no debug spanning-tree uplinkfast**

Syntax Description	<b>exceptions</b> (Optional) Enables the debugging of the spanning-tree UplinkFast exceptions.	
Defaults	This command has no default settings.	
Command Modes	Privileged EXEC	
Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	This command is supported only by the supervisor engine and can be entered only from the switch console.	
Examples	<p>This example shows how to debug the spanning-tree UplinkFast exceptions:</p> <pre>Switch# debug spanning-tree uplinkfast exceptions Spanning Tree uplinkfast exceptions debugging is on Switch#</pre>	
Related Commands	<b>undebug spanning-tree uplinkfast</b> (same as <b>no debug spanning-tree uplinkfast</b> )	



# debug sw-vlan

To debug the VLAN manager activities, use the **debug sw-vlan** command. To disable the debugging output, use the **no** form of this command.

**debug sw-vlan** {badpmcookies | events | management | packets | registries}

**no debug sw-vlan** {badpmcookies | events | management | packets | registries}

Syntax Description	<b>badpmcookies</b>	Displays the VLAN manager incidents of bad port-manager cookies.
	<b>events</b>	Debugs the VLAN manager events.
	<b>management</b>	Debugs the VLAN manager management of internal VLANs.
	<b>packets</b>	Debugs the packet handling and encapsulation processes.
	<b>registries</b>	Debugs the VLAN manager registries.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to debug the software VLAN events:

```
Switch# debug sw-vlan events
vlan manager events debugging is on
Switch#
```

**Related Commands** **undebug sw-vlan** (same as **no debug sw-vlan**)

# debug sw-vlan ifs

To enable the VLAN manager Cisco IOS file system (IFS) error tests, use the **debug sw-vlan ifs** command. To disable the debugging output, use the **no** form of this command.

**debug sw-vlan ifs {open {read | write} | read {1 | 2 | 3 | 4} | write}**

**no debug sw-vlan ifs {open {read | write} | read {1 | 2 | 3 | 4} | write}**

Syntax Description	<b>open</b>	Enables the VLAN manager IFS debugging of errors in an IFS file-open operation.
	<b>read</b>	Debugs the errors that occurred when the IFS VLAN configuration file was open for reading.
	<b>write</b>	Debugs the errors that occurred when the IFS VLAN configuration file was open for writing.
	<b>{1   2   3   4}</b>	Determines the file-read operation. See the “Usage Guidelines” section for information about operation levels.
	<b>write</b>	Debugs the errors that occurred during an IFS file-write operation.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The following are four types of file read operations:

- Operation **1**—Reads the file header, which contains the header verification word and the file version number.
- Operation **2**—Reads the main body of the file, which contains most of the domain and VLAN information.
- Operation **3**—Reads TLV descriptor structures.
- Operation **4**—Reads TLV data.

**Examples** This example shows how to debug the TLV data errors during a file-read operation:

```
Switch# debug sw-vlan ifs read 4
vlan manager ifs read # 4 errors debugging is on
Switch#
```

**Related Commands** **undebg sw-vlan ifs** (same as **no debug sw-vlan ifs**)

# debug sw-vlan notification

To enable the debugging of the messages that trace the activation and deactivation of the ISL VLAN IDs, use the **debug sw-vlan notification** command. To disable the debugging output, use the **no** form of this command.

**debug sw-vlan notification { accfwdchange | allowedvlanfgchange | fwdchange | linkchange | modechange | pruningcfgchange | statechange }**

**no debug sw-vlan notification { accfwdchange | allowedvlanfgchange | fwdchange | linkchange | modechange | pruningcfgchange | statechange }**

Syntax Description		
<b>accfwdchange</b>		Enables the VLAN manager notification of aggregated access interface STP forward changes.
<b>allowedvlanfgchange</b>		Enables the VLAN manager notification of changes to allowed VLAN configuration.
<b>fwdchange</b>		Enables the VLAN manager notification of STP forwarding changes.
<b>linkchange</b>		Enables the VLAN manager notification of interface link state changes.
<b>modechange</b>		Enables the VLAN manager notification of interface mode changes.
<b>pruningcfgchange</b>		Enables the VLAN manager notification of changes to pruning configuration.
<b>statechange</b>		Enables the VLAN manager notification of interface state changes.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to debug the software VLAN interface mode change notifications:

```
Switch# debug sw-vlan notification modechange
vlan manager port mode change notification debugging is on
Switch#
```

**Related Commands** **undebug sw-vlan notification** (same as **no debug sw-vlan notification**)

## debug sw-vlan vtp

To enable the debugging of messages to be generated by the VTP protocol code, use the **debug sw-vlan vtp** command. To disable the debugging output, use the **no** form of this command.

**debug sw-vlan vtp { events | packets | pruning [packets | xmit] | xmit }**

**no debug sw-vlan vtp { events | packets | pruning [packets | xmit] | xmit }**

### Syntax Description

<b>events</b>	Displays the general-purpose logic flow and detailed VTP debugging messages generated by the VTP_LOG_RUNTIME macro in the VTP code.
<b>packets</b>	Displays the contents of all incoming VTP packets that have been passed into the VTP code from the Cisco IOS VTP platform-dependent layer, except for pruning packets.
<b>pruning</b>	Enables the debugging message to be generated by the pruning segment of the VTP protocol code.
<b>packets</b>	(Optional) Displays the contents of all incoming VTP pruning packets that have been passed into the VTP code from the Cisco IOS VTP platform-dependent layer.
<b>xmit</b>	(Optional) Displays the contents of all outgoing VTP packets that the VTP code will request that the Cisco IOS VTP platform-dependent layer to send.
<b>xmit</b>	Displays the contents of all outgoing VTP packets that the VTP code will request that the Cisco IOS VTP platform-dependent layer to send; does not include pruning packets.

### Defaults

This command has no default settings.

### Command Modes

Privileged EXEC

### Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

### Usage Guidelines

If you do not enter any more parameters after entering **pruning**, the VTP pruning debugging messages are displayed.

### Examples

This example shows how to debug the software VLAN outgoing VTP packets:

```
Switch# debug sw-vlan vtp xmit
vtp xmit debugging is on
Switch#
```

### Related Commands

**undebug sw-vlan vtp** (same as **no debug sw-vlan vtp**)

# debug udld

To enable the debugging of UDLD activity, use the **debug udld** command. To disable the debugging output, use the **no** form of this command.

**debug udld {events | packets | registries}**

**no debug udld {events | packets | registries}**

Syntax Description	<b>events</b>	Enables the debugging of UDLD process events as they occur.
	<b>packets</b>	Enables the debugging of the UDLD process as it receives packets from the packet queue and attempts to transmit packets at the request of the UDLD protocol code.
	<b>registries</b>	Enables the debugging of the UDLD process as it processes registry upcalls from the UDLD process-dependent module and other feature modules.

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

Command Modes	Privileged EXEC
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Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	This command is supported only by the supervisor engine and can be entered only from the Catalyst 4500 series switch console.
------------------	---

Examples	This example shows how to debug the UDLD events:  Switch# <b>debug udld events</b> UDLD events debugging is on Switch#
	This example shows how to debug the UDLD packets:  Switch# <b>debug udld packets</b> UDLD packets debugging is on Switch#
	This example shows how to debug the UDLD registry events:  Switch# <b>debug udld registries</b> UDLD registries debugging is on Switch#

Related Commands	<b>undebg udld</b> (same as <b>no debug udld</b> )
------------------	--

# debug vqpc

To debug the VLAN Query Protocol (VQP), use the **debug vqpc** command. To disable the debugging output, use the **no** form of this command.

**debug vqpc** [**all** | **cli** | **events** | **learn** | **packet**]

**no debug vqpc** [**all** | **cli** | **events** | **learn** | **packet**]

Syntax Description	<b>all</b>	(Optional) Debugs all the VQP events.
	<b>cli</b>	(Optional) Debugs the VQP command-line interface.
	<b>events</b>	(Optional) Debugs the VQP events.
	<b>learn</b>	(Optional) Debugs the VQP address learning.
	<b>packet</b>	(Optional) Debugs the VQP packets.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to enable all VQP debugging:

```
Switch# debug vqpc all
Switch#
```

**Related Commands** [vmpls reconfirm \(privileged EXEC\)](#)

# define interface-range

To create a macro of interfaces, use the **define interface-range** command.

**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>	List of valid ranges when specifying interfaces; see the “Usage Guidelines” section.

**Defaults** This command has no default settings.

**Command Modes** Global configuration

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines**

The macro name is a character string of up to 32 characters.

A macro can contain up to five ranges. An interface range cannot span modules.

When entering the *interface-range*, use these formats:

- interface-type* {*mod*}/{*first-interface*} - {*last-interface*}
- interface-type* {*mod*}/{*first-interface*} - {*last-interface*}

The valid values for *interface-type* are as follows:

- FastEthernet**
- GigabitEthernet**
- Vlan** *vlan\_id*

**Examples**

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

```
Switch(config)# define interface-range macro1 gigabitethernet 4/1-6, fastethernet 2/1-5
Switch(config)#
```

**Related Commands** [interface range](#)

# deny

To deny an ARP packet based on matches against the DHCP bindings, use the **deny** command. To remove the specified ACEs from the access list, use the **no** form of this command.

```
deny {[request] ip {any | host sender-ip | sender-ip sender-ip-mask} mac {any | host sender-mac | sender-mac sender-mac-mask} | response ip {any | host sender-ip | sender-ip sender-ip-mask} [{any | host target-ip | target-ip target-ip-mask}] mac {any | host sender-mac | sender-mac sender-mac-mask} [{any | host target-mac | target-mac target-mac-mask}}] [log]
```

```
no deny {[request] ip {any | host sender-ip | sender-ip sender-ip-mask} mac {any | host sender-mac | sender-mac sender-mac-mask} | response ip {any | host sender-ip | sender-ip sender-ip-mask} [{any | host target-ip | target-ip target-ip-mask}] mac {any | host sender-mac | sender-mac sender-mac-mask} [{any | host target-mac | target-mac target-mac-mask}}] [log]
```

## Syntax Description

<b>request</b>	(Optional) Requests a match for the ARP request. When <b>request</b> is not specified, matching is performed against all ARP packets.
<b>ip</b>	Specifies the sender IP address.
<b>any</b>	Specifies that any IP or MAC address will be accepted.
<b>host</b> <i>sender-ip</i>	Specifies that only a specific sender IP address will be accepted.
<i>sender-ip sender-ip-mask</i>	Specifies that a specific range of sender IP addresses will be accepted.
<b>mac</b>	Specifies the sender MAC address.
<b>host</b> <i>sender-mac</i>	Specifies that only a specific sender MAC address will be accepted.
<i>sender-mac sender-mac-mask</i>	Specifies that a specific range of sender MAC addresses will be accepted.
<b>response</b>	Specifies a match for the ARP responses.
<b>ip</b>	Specifies the IP address values for the ARP responses.
<b>host</b> <i>target-ip</i>	(Optional) Specifies that only a specific target IP address will be accepted.
<i>target-ip target-ip-mask</i>	(Optional) Specifies that a specific range of target IP addresses will be accepted.
<b>mac</b>	Specifies the MAC address values for the ARP responses.
<b>host</b> <i>target-mac</i>	(Optional) Specifies that only a specific target MAC address will be accepted.
<i>target-mac target-mac-mask</i>	(Optional) Specifies that a specific range of target MAC addresses will be accepted.
<b>log</b>	(Optional) Logs a packet when it matches the access control entry (ACE).

## Defaults

At the end of the ARP access list, there is an implicit **deny ip any mac any** command.

## Command Modes

arp-nacl configuration



Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** Deny clauses can be added to forward or drop ARP packets based on some matching criteria.

**Examples** This example shows a host with a MAC address of 0000.0000.abcd and an IP address of 1.1.1.1. This example shows howto deny both requests and responses from this host:

```
Switch(config)# arp access-list static-hosts
Switch(config-arp-nacl)# deny ip host 1.1.1.1 mac host 0000.0000.abcd
Switch(config-arp-nacl)# end
Switch# show arp access-list

ARP access list static-hosts
    deny ip host 1.1.1.1 mac host 0000.0000.abcd
Switch#
```

**Related Commands**

- [arp access-list](#)
- [ip arp inspection filter vlan](#)
- [permit](#)

# diagnostic monitor action

To direct the action of the switch when it detects a packet memory failure, use the **diagnostic monitor action** command.

**diagnostic monitor action** [**conservative** | **normal** | **aggressive**]

Syntax Description	<b>conservative</b>	(Optional) Specifies that the bootup SRAM diagnostics log all failures and remove all affected buffers from the hardware operation. The ongoing SRAM diagnostics will log events, but will take no other action.
	<b>normal</b>	(Optional) Specifies that the SRAM diagnostics operate as in conservative mode, except that an ongoing failure resets the supervisor engine; allows for the bootup tests to map out the affected memory.
	<b>aggressive</b>	(Optional) Specifies that the SRAM diagnostics operate as in normal mode, except that a bootup failure only logs failures and does not allow the supervisor engine to come online; allows for either a redundant supervisor engine or network-level redundancy to take over.

Defaults	normal mode
----------	-------------

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

Command History	Release	Modification
	12.2(18)EW	This command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines**

Use the **conservative** keyword when you do not want the switch to reboot so that the problem can be fixed.

Use the **aggressive** keyword when you have redundant supervisor engines, or when network-level redundancy has been provided.

**Examples**

This example shows how to configure the switch to initiate an RPR switchover when an ongoing failure occurs:

```
Switch# configure terminal
Switch (config)# diagnostic monitor action normal
```

**Related Commands**

[show diagnostic result module test 2](#)  
[show diagnostic result module test 3](#)

# diagnostic start

To run the specified diagnostic test, use the **diagnostic start** command.

**diagnostic start** {**module** *num*} {**test** *test-id*} [**port** *num*]

Syntax Description	<b>module</b> <i>num</i>	Module number.
	<b>test</b>	Specifies a test to run.
	<i>test-id</i>	Specifies an identification number for the test to be run; can be the cable diagnostic <i>test-id</i> , or the <b>cable-tdr</b> keyword.
	<b>port</b> <i>num</i>	(Optional) Specifies the interface port number.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.2(25)SG	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to run the specified diagnostic test at the specified module:

```
This exec command starts the TDR test on specified interface
Switch# diagnostic start module 1 test cable-tdr port 3
diagnostic start module 1 test cable-tdr port 3
module 1: Running test(s) 5 Run interface level cable diags
module 1: Running test(s) 5 may disrupt normal system operation
Do you want to continue? [no]: yes
yes
Switch#
2d16h: %DIAG-6-TEST_RUNNING: module 1: Running online-diag-tdr{ID=5} ...
2d16h: %DIAG-6-TEST_OK: module 1: online-diag-tdr{ID=5} has completed successfully

Switch#
```



**Note**

The **show cable-diagnostic tdr** command is used to display the results of a TDR test. The test results will not be available until approximately 1 minute after the test starts. If you type the **show cable-diagnostic tdr** command within 1 minute of the test starting, you may see a “TDR test is in progress on interface...” message.

**Related Commands** [show diagnostic content](#)

# dot1x auth-fail max-attempts

To configure the max number of attempts before a port is moved to the auth-fail VLAN, use the **dot1x auth-fail max-attempts** command. To return to the default setting, use the **no** form of this command.

**dot1x auth-fail max-attempts** *max-attempts*

**no dot1x auth-fail max-attempts** *max-attempts*

Syntax Description	<i>max-attempts</i> Specifies a maximum number of attempts before a port is moved to the auth-fail VLAN in the range of 1 to 10.	
Defaults	Default is 3.	
Command Modes	Interface configuration	
Command History	Release	Modification
	12.2(25)SG	Support for this command was introduced on the Catalyst 4500 series switch.
Examples	<p>This example shows how to configure the maximum number of attempts before the port is moved to the auth-fail VLAN on Fast Ethernet interface 4/3:</p> <pre>Switch# configure terminal Enter configuration commands, one per line. End with CNTL/Z. Switch(config)# interface fastethernet4/3 Switch(config-if)# dot1x auth-fail max-attempts 5 Switch(config-if)# end Switch#</pre>	
Related Commands	<a href="#">dot1x max-reauth-req</a> <a href="#">show dot1x</a>	

## dot1x auth-fail vlan

To enable the auth-fail VLAN on a port, use the **dot1x auth-fail vlan** command. To return to the default setting, use the **no** form of this command.

**dot1x auth-fail vlan** *vlan-id*

**no dot1x auth-fail vlan** *vlan-id*

Syntax Description	<i>vlan-id</i>	Specifies a VLAN in the range of 1 to 4094.
--------------------	----------------	---

Defaults	None
----------	------

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

Command History	Release	Modification
	12.2(25)SG	Support for this command was introduced on the Catalyst 4500 series switch.

Examples	This example shows how to configure the auth-fail VLAN on Fast Ethernet interface 4/3:
----------	--

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet4/3
Switch(config-if)# dot1x auth-fail vlan 40
Switch(config-if)# end
Switch#
```

Related Commands	<a href="#">dot1x max-reauth-req</a> <a href="#">show dot1x</a>
------------------	--

# dot1x control-direction

To enable unidirectional port control on a per-port basis on a switch, use the **dot1x control-direction** command. Use the **no** form of this command to disable unidirectional port control.

**dot1x control-direction** [**in** | **both**]

**no dot1x control-direction**

Syntax Description	<b>in</b>	(Optional) Specifies controlling in-bound traffic on a port.
	<b>both</b>	(Optional) Specifies controlling both in-bound and out-bound traffic on a port.

Defaults	Both in-bound and out-bound traffic will be controlled.
----------	---

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

Command History	Release	Modification
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>You can manage remote systems using unidirectional control. Unidirectional control enables you to turn on systems remotely using a specific Ethernet packet, known as a magic packet.</p> <p>Using unidirectional control enables you to remotely manage systems using 802.1X ports. In the past, the port became unauthorized after the systems was turned off. In this state, the port only allowed the receipt and transmission of EAPoL packets. Therefore, there was no way for the unidirectional control magic packet to reach the host and without being turned on there was no way for the system to authenticate and open the port.</p>
------------------	--

Examples	This example shows how to enable unidirectional control on incoming packets:
----------	--

```
Switch(config-if)# dot1x control-direction in
Switch(config-if)#
```

Related Commands	<a href="#">show dot1x</a>
------------------	----------------------------

# dot1x critical

To enable the 802.1X critical authentication on a port, use the **dot1x critical** command. To return to the default setting, use the **no** form of this command.

**dot1x critical**

**no dot1x critical**

<b>Syntax Description</b>	This command has no keywords or variables.
---------------------------	--

<b>Defaults</b>	Critical authentication is disabled.
-----------------	--------------------------------------

<b>Command Modes</b>	Interface configuration
----------------------	-------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>
-------------------------

<b>Examples</b>	This example shows how to enable 802.1x critical authentication:
-----------------	--

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

<b>Related Commands</b>	<a href="#">dot1x critical eapol</a> <a href="#">dot1x critical recovery delay</a> <a href="#">dot1x critical vlan</a> <a href="#">show dot1x</a>
-------------------------	--

# dot1x critical eapol

To enable sending EAPOL success packets when a port is critically authorized partway through an EAP exchange, use the **dot1x critical eapol** command. To return to the default setting, use the **no** form of this command.

**dot1x critical eapol**

**no dot1x critical eapol**

## Syntax Description

This command has no keywords or variables.

## Defaults

The default is to not send EAPOL success packets.

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

## Examples

This example shows how to enable sending EAPOL success packets:

```
Switch(config-if) # dot1x critical eapol
Switch(config-if) #
```

## Related Commands

[dot1x critical](#)  
[dot1x critical recovery delay](#)  
[dot1x critical vlan](#)  
[show dot1x](#)



# dot1x critical recovery delay

To set the time interval between port reinitializations, use the **dot1x critical recovery delay** command. To return to the default setting, use the **no** form of this command.

**dot1x critical recovery delay** *delay-time*

**no dot1x critical recovery delay**

Syntax Description	<i>delay-time</i> Specifies the interval between port reinitializations when AAA transistion occurs; valid values are from 1 to 10,000 milliseconds.	
Defaults	Delay time is set to 100 milliseconds.	
Command Modes	Global configuration	
Command History	Release	Modification
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch.
Examples	This example shows how to set the 802.1x critical recovery delay time to 500:  Switch(config-if)# <b>dot1x critical recovery delay 500</b> Switch(config-if)#	
Related Commands	<b>dot1x critical</b> <b>dot1x critical eapol</b> <b>dot1x critical vlan</b> <b>show dot1x</b>	

# dot1x critical vlan

To assign a critically authenticated port to a specific VLAN, use the **dot1x critical vlan** command. To return to the default setting, use the **no** form of this command

**dot1x critical vlan** *vlan-id*

**no dot1x critical** *vlan-id*

Syntax Description	<i>vlan-id</i> (Optional) Specifies the VLANs; valid values are from 1 to 4094.	
Defaults	Critical authentication is disabled on a ports VLAN.	
Command Modes	Interface configuration	
Command History	Release	Modification
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	<p>The type of VLAN specified must match the type of the port. If the port is an access port, the VLAN must be a regular VLAN. If the port is a private-VLAN host port, the VLAN must be the secondary VLAN of a valid private-VLAN domain. If the port is a routed port, no VLAN may be specified.</p> <p>This command is not supported on platforms such as Layer 3 switches that do not include the Critical Auth VLAN subsystem.</p>	
Examples	<p>This example shows how to enable 802.1x critical authentication on a ports VLAN:</p> <pre>Switch(config-if)# dot1x critical vlan 350 Switch(config-if)#</pre>	
Related Commands	<p><a href="#">dot1x critical</a>  <a href="#">dot1x critical eapol</a>  <a href="#">dot1x critical recovery delay</a>  <a href="#">show dot1x</a></p>	

# dot1x guest-vlan

To enable a guest VLAN on a per-port basis, use the **dot1x guest-vlan** command. To return to the default setting, use the **no** form of this command.

**dot1x guest-vlan** *vlan-id*

**no dot1x guest-vlan** *vlan-id*

Syntax Description	<i>vlan-id</i>	Specifies a VLAN in the range of 1 to 4094.
--------------------	----------------	---

Defaults	None; the guest VLAN feature is disabled.
----------	---

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

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EWA	Support for secondary VLAN as the configured guest VLAN ID was added.

Usage Guidelines	Guest VLANs can be configured only on ports that are statically configured as access ports or private VLAN host ports. Statically configured access ports can be configured with regular VLANs as guest VLANs; statically configured private VLAN host ports can be configured with secondary private VLANs as guest VLANs.
------------------	---

Examples	This example shows how to enable a guest VLAN on Fast Ethernet interface 4/3:
----------	---

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet4/3
Switch(config-if)# dot1x port-control auto
Switch(config-if)# dot1x guest-vlan 26
Switch(config-if)# end
Switch(config)# end
Switch#
```

Related Commands	<a href="#">dot1x max-reauth-req</a> <a href="#">show dot1x</a>
------------------	--

# dot1x guest-vlan supplicant

To place an 802.1X-capable supplicant (host) into a guest VLAN, use the **dot1x guest-vlan supplicant** global configuration command. To return to the default setting, use the **no** form of this command.

**dot1x guest-vlan supplicant**

**no dot1x guest-vlan supplicant**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	802.1X-capable hosts are not put into a guest VLAN.
-----------------	---

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(25)EWA	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	With Cisco Release 12.2(25) EWA, you can use the <b>dot1x guest-vlan supplicant</b> command to place an 802.1X-capable host into a guest VLAN. Prior to Cisco Release 12.2(25)EWA, you could only place non-802.1X capable hosts into a guest VLAN.
-------------------------	---

When guest VLAN supplicant behavior is enabled, the Catalyst 4500 series switch does not maintain EAPOL packet history. The switch allows clients that fail 802.1X authentication to access a guest VLAN, whether or not EAPOL packets have been detected on the interface.

<b>Examples</b>	This example shows how to place an 802.1X-capable supplicant (host) into a guest VLAN:
-----------------	--

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# dot1x guest-vlan supplicant
Switch(config)# end
Switch#
```

<b>Related Commands</b>	<a href="#">dot1x system-auth-control</a> <a href="#">show dot1x</a>
-------------------------	---

# dot1x initialize

To unauthorize an interface before reinitializing 802.1X, use the **dot1x initialize** command.

**dot1x initialize** *interface*

Syntax Description	<i>interface</i>	Number of the interface.
--------------------	------------------	--------------------------

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

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	Use this command to initialize state machines and to set up the environment for fresh authentication.
------------------	---

Examples	<p>This example shows how to initialize the 802.1X state machines on an interface:</p> <pre>Switch# dot1x initialize Switch#</pre>
----------	--

Related Commands	<p><a href="#">dot1x initialize</a></p> <p><a href="#">show dot1x</a></p>
------------------	---

# dot1x mac-auth-bypass

To enable the 802.1X MAC address bypassing on a switch, use the **dot1x mac-auth-bypass** command. Use the **no** form of this command to disable MAC address bypassing.

**dot1x mac-auth-bypass [eap]**

**no dot1x mac-auth-bypass [eap]**

Syntax Description	<b>eap</b> (Optional) Specifies using EAP MAC address authentication.	
Defaults	There is no default setting.	
Command Modes	Interface configuration	
Command History	Release	Modification
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	The removal of the <b>dot1x mac-auth-bypass</b> configuration from a port does not affect the authorization or authentication state of a port. If the port is in unauthenticated state, it remains unauthenticated, and if MAB is active, the authentication will revert back to the 802.1X Authenticator. If the port is authorized with a MAC address, and the MAB configuration is removed the port remains authorized until re-authentication takes place. When re-authentication occurs the MAC address is removed in favor of an 802.1X supplicant, which is detected on the wire.	
Examples	<p>This example shows how to enable EAP MAC address authentication:</p> <pre>Switch(config-if)# dot1x mac-auth-bypass Switch(config-if)#</pre>	

# dot1x max-reauth-req

To set the maximum number of times that the switch will retransmit an EAP-Request/Identity frame to the client before restarting the authentication process, use the **dot1x max-reauth-req** command. To return to the default setting, use the **no** form of this command.

**dot1x max-reauth-req** *count*

**no dot1x max-reauth-req**

Syntax Description	<i>count</i>	Number of times that the switch retransmits EAP-Request/Identity frames before restarting the authentication process; valid values are from 1 to 10.
--------------------	--------------	--

Defaults	The switch sends a maximum of two retransmissions.
----------	--

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

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	You should change the default value of this command only to adjust for unusual circumstances such as unreliable links or specific behavioral problems with certain clients and authentication servers. This setting impacts the wait before a non-dot1x-capable client is admitted to the guest VLAN, if one is configured.
------------------	---

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

Examples	This example shows how to set 5 as the number of times that the switch retransmits an EAP-Request/Identity frame before restarting the authentication process:
----------	--

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

Related Commands	<a href="#">show dot1x</a>
------------------	----------------------------

## dot1x max-req

To set the maximum number of times that the switch retransmits an Extensible Authentication Protocol (EAP)-Request frame of types other than EAP-Request/Identity to the client before restarting the authentication process, use the **dot1x max-req** command. To return to the default setting, use the **no** form of this command.

**dot1x max-req** *count*

**no dot1x max-req**

<b>Syntax Description</b>	<i>count</i> Number of times that the switch retransmits EAP-Request frames of types other than EAP-Request/Identity before restarting the authentication process; valid values are from 1 to 10.	
<b>Defaults</b>	The switch sends a maximum of two retransmissions.	
<b>Command Modes</b>	Interface configuration	
<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(19)EW	This command was modified to control on EAP-Request/Identity retransmission limits.
<b>Usage Guidelines</b>	<p>You should change the default value of this command only to adjust for unusual circumstances such as unreliable links or specific behavioral problems with certain clients and authentication servers.</p> <p>You can verify your settings by entering the <b>show dot1x</b> privileged EXEC command.</p>	
<b>Examples</b>	<p>This example shows how to set 5 as the number of times that the switch retransmits an EAP-Request frame before restarting the authentication process:</p> <pre>Switch(config-if) # dot1x max-req 5 Switch(config-if) #</pre>	
<b>Related Commands</b>	<p><a href="#">dot1x initialize</a></p> <p><a href="#">dot1x max-reauth-req</a></p> <p><a href="#">show dot1x</a></p>	



# dot1x multiple-hosts

To allow multiple hosts (clients) on an 802.1X-authorized port that has the **dot1x port-control** interface configuration command set to **auto**, use the **dot1x multiple-hosts** command. To return to the default setting, use the **no** form of this command.

**dot1x multiple-hosts**

**no dot1x multiple-hosts**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Interface configuration
----------------------	-------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	This command enables you to attach multiple hosts to a single 802.1X-enabled port. In this mode, only one of the attached hosts must be successfully authorized for all hosts to be granted network access. If the port becomes unauthorized (reauthentication fails or an Extensible Authentication Protocol over LAN [EAPOL]-logoff message is received), all attached clients are denied access to the network.
-------------------------	--

<b>Examples</b>	This example shows how to enable 802.1X on Gigabit Ethernet 1/1 and to allow multiple hosts:
-----------------	--

```
Switch(config)# interface gigabitethernet1/1
Switch(config-if)# dot1x port-control auto
Switch(config-if)# dot1x multiple-hosts
```

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

<b>Related Commands</b>	<a href="#">show dot1x</a>
-------------------------	----------------------------

# dot1x port-control

To enable manual control of the authorization state on a port, use the **dot1x port-control** command. To return to the default setting, use the **no** form of this command.

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

**no dot1x port-control {auto | force-authorized | force-unauthorized}**

Syntax Description	<b>auto</b>	Enables 802.1X authentication on the interface and causes the port to transition to the authorized or unauthorized state based on the 802.1X authentication exchange between the switch and the client.
	<b>force-authorized</b>	Disables 802.1X authentication on the interface and causes the port to transition to the authorized state without any authentication exchange required. The port transmits and receives normal traffic without 802.1X-based authentication of the client.
	<b>force-unauthorized</b>	Denies all access through the specified interface by forcing the port to transition to the unauthorized state, ignoring all attempts by the client to authenticate. The switch cannot provide authentication services to the client through the interface.

**Defaults** The port 802.1X authorization is disabled.

**Command Modes** Interface configuration

Command History	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The 802.1X protocol is supported on both the Layer 2 static-access ports and the Layer 3-routed ports. You can use the **auto** keyword only if the port is not configured as follows:

- Trunk port—If you try to enable 802.1X on a trunk port, an error message appears, and 802.1X is not enabled. If you try to change the mode of an 802.1X-enabled port to trunk, the port mode is not changed.
- Dynamic ports—A port in dynamic mode can negotiate with its neighbor to become a trunk port. If you try to enable 802.1X on a dynamic port, an error message appears, and 802.1X is not enabled. If you try to change the mode of an 802.1X-enabled port to dynamic, the port mode is not changed.
- EtherChannel port—Before enabling 802.1X on the port, you must first remove it from the EtherChannel. If you try to enable 802.1X on an EtherChannel or on an active port in an EtherChannel, an error message appears, and 802.1X is not enabled. If you enable 802.1X on an inactive port of an EtherChannel, the port does not join the EtherChannel.

- Switch Port Analyzer (SPAN) destination port—You can enable 802.1X on a port that is a SPAN destination port; however, 802.1X is disabled until the port is removed as a SPAN destination. You can enable 802.1X on a SPAN source port.

To globally disable 802.1X on the switch, you must disable it on each port. There is no global configuration command for this task.

---

### Examples

This example shows how to enable 802.1X on Gigabit Ethernet 1/1:

```
Switch(config)# interface gigabitethernet1/1
Switch(config-if)# dot1x port-control auto
Switch#
```

You can verify your settings by using the **show dot1x all** or **show dot1x interface *int*** commands to show the port-control status. An enabled status indicates that the port-control value is set either to **auto** or to **force-unauthorized**.

---

### Related Commands

[show dot1x](#)

# dot1x re-authenticate

To manually initiate a reauthentication of all 802.1X-enabled ports or the specified 802.1X-enabled port, use the **dot1x re-authenticate** command.

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

Syntax Description	<b>interface</b> <i>interface-id</i> (Optional) Module and port number of the interface.
--------------------	--

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

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

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

Examples	This example shows how to manually reauthenticate the device connected to Gigabit Ethernet interface 1/1:
----------	---

```
Switch# dot1x re-authenticate interface gigabitethernet1/1
Starting reauthentication on gigabitethernet1/1
Switch#
```

# dot1x re-authentication

To enable the periodic reauthentication of the client, use the **dot1x re-authentication** command. To return to the default setting, use the **no** form of this command.

**dot1x re-authentication**

**no dot1x re-authentication**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	The periodic reauthentication is disabled.
-----------------	--

<b>Command Modes</b>	Interface configuration
----------------------	-------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	You configure the amount of time between the periodic reauthentication attempts by using the <b>dot1x timeout re-authperiod</b> global configuration command.
-------------------------	---

<b>Examples</b>	<p>This example shows how to disable the periodic reauthentication of the client:</p> <pre>Switch(config-if)# no dot1x re-authentication Switch(config-if)#</pre> <p>This example shows how to enable the periodic reauthentication and set the number of seconds between the reauthentication attempts to 4000 seconds:</p> <pre>Switch(config-if)# dot1x re-authentication Switch(config-if)# dot1x timeout re-authperiod 4000 Switch#</pre> <p>You can verify your settings by entering the <b>show dot1x</b> privileged EXEC command.</p>
-----------------	---

<b>Related Commands</b>	<a href="#">dot1x timeout</a> <a href="#">show dot1x</a>
-------------------------	---

# dot1x system-auth-control

To enable 802.1X authentication on the switch, use the **dot1x system-auth-control** command. To disable 802.1X authentication on the system, use the **no** form of this command.

**dot1x system-auth-control**

**no dot1x system-auth-control**

---

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

---

**Defaults** The 802.1X authentication is disabled.

---

**Command Modes** Global configuration

---

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---



---

**Usage Guidelines** You must enable **dot1x system-auth-control** if you want to use the 802.1X access controls on any port on the switch. You can then use the **dot1x port-control auto** command on each specific port on which you want the 802.1X access controls to be used.

---

**Examples** This example shows how to enable 802.1X authentication:

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

---

**Related Commands** [dot1x initialize](#)  
[show dot1x](#)

# dot1x timeout

To set the reauthentication timer, use the **dot1x timeout** command. To return to the default setting, use the **no** form of this command.

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

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

## Syntax Description

<b>reauth-period</b> <i>seconds</i>	Number of seconds between reauthentication attempts; valid values are from 1 to 65535. See the “Usage Guidelines” section for more information.
<b>reauth-period</b> <b>server</b>	Number of seconds between reauthentication attempts; valid values are from 1 to 65535 as derived from the Session-Timeout RADIUS attribute. See the “Usage Guidelines” section for more information.
<b>quiet-period</b> <i>seconds</i>	Number of seconds that the switch remains in the quiet state following a failed authentication exchange with the client; valid values are from 0 to 65535 seconds.
<b>tx-period</b> <i>seconds</i>	Number of seconds that the switch waits for a response to an EAP-request/identity frame from the client before retransmitting the request; valid values are from 1 to 65535 seconds.
<b>supp-timeout</b> <i>seconds</i>	Number of seconds that the switch waits for the retransmission of EAP-Request packets; valid values are from 30 to 65535 seconds.
<b>server-timeout</b> <i>seconds</i>	Number of seconds that the switch waits for the retransmission of packets by the back-end authenticator to the authentication server; valid values are from 30 to 65535 seconds.

## Defaults

The default settings are as follows:

- Reauthentication period is 3600 seconds.
- Quiet period is 60 seconds.
- Transmission period is 30 seconds.
- Supplicant timeout is 30 seconds.
- Server timeout is 30 seconds.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(12)EW	Support for this command was introduced on the Catalyst 4500 series switches.
12.2(25)EWA	Support for selecting the reauthentication timer from the “server” was added.

---

**Usage Guidelines**

The periodic reauthentication must be enabled before entering the **dot1x timeout re-authperiod** command. Enter the **dot1x re-authentication** command to enable periodic reauthentication.

---

**Examples**

This example shows how to set 60 as the number of seconds that the switch waits for a response to an EAP-request/identity frame from the client before retransmitting the request:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet4/3
Switch(config-if)# dot1x timeout tx-period 60
Switch(config-if)# end
Switch#
```

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

This example shows how to set up the switch to use a reauthentication timeout derived from a Session-Timeout attribute taken from the RADIUS Access-Accept message received when a host successfully authenticates via 802.1X:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet4/3
Switch(config-if)# dot1x timeout reauth-period server
Switch(config-if)# end
Switch#
```

---

**Related Commands**

**dot1x initialize**  
**show dot1x**



# duplex

To configure the duplex operation on an interface, use the **duplex** command. To return to the default setting, use the **no** form of this command.

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

**no duplex**

## Syntax Description

<b>auto</b>	Specifies the autonegotiation operation.
<b>full</b>	Specifies the full-duplex operation.
<b>half</b>	Specifies the half-duplex operation.

## Defaults

Half-duplex operation

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

[Table 2-2](#) lists the supported command options by interface.

**Table 2-2 Supported duplex Command Options**

Interface Type	Supported Syntax	Default Setting	Guidelines
10/100-Mbps module	<b>duplex [half   full]</b>	<b>half</b>	If the speed is set to <b>auto</b> , you will not be able to set the <b>duplex</b> mode.  If the speed is set to <b>10</b> or <b>100</b> , and you do not configure the duplex setting, the duplex mode is set to <b>half</b> duplex.
100-Mbps fiber modules	<b>duplex [half   full]</b>	<b>half</b>	
Gigabit Ethernet Interface	Not supported.	Not supported.	Gigabit Ethernet interfaces are set to <b>full</b> duplex.
10/100/1000	<b>duplex [half   full]</b>		If the speed is set to <b>auto</b> or <b>1000</b> , you will not be able to set <b>duplex</b> .  If the speed is set to <b>10</b> or <b>100</b> , and you do not configure the duplex setting, the duplex mode is set to <b>half</b> duplex.

If the transmission speed on a 16-port RJ-45 Gigabit Ethernet port is set to **1000**, the duplex mode is set to **full**. If the transmission speed is changed to **10** or **100**, the duplex mode stays at **full**. You must configure the correct duplex mode on the switch when the transmission speed changes to **10** or **100** from 1000 Mbps.

**Note**

Catalyst 4006 switches cannot automatically negotiate interface speed and duplex mode if either connecting interface is configured to a value other than **auto**.

**Caution**

Changing the interface speed and duplex mode configuration might shut down and reenables the interface during the reconfiguration.

Table 2-3 describes the system performance for different combinations of the duplex and speed modes. The specified **duplex** command that is configured with the specified **speed** command produces the resulting action shown in the table.

**Table 2-3 Relationship Between duplex and speed Commands**

duplex Command	speed Command	Resulting System Action
<b>duplex half</b> or <b>duplex full</b>	<b>speed auto</b>	Autonegotiates both speed and duplex modes
<b>duplex half</b>	<b>speed 10</b>	Forces 10 Mbps and half duplex
<b>duplex full</b>	<b>speed 10</b>	Forces 10 Mbps and full duplex
<b>duplex half</b>	<b>speed 100</b>	Forces 100 Mbps and half duplex
<b>duplex full</b>	<b>speed 100</b>	Forces 100 Mbps and full duplex
<b>duplex full</b>	<b>speed 1000</b>	Forces 1000 Mbps and full duplex

**Examples**

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

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

**Related Commands****speed**

**interface** (refer to Cisco IOS documentation)

**show controllers** (refer to Cisco IOS documentation)

**show interfaces** (refer to Cisco IOS documentation)

# erase

To erase a file system, use the **erase** command.

**erase** {/all [non-default | nvram:] | cat4000\_flash | nvram: | startup-config}

Syntax Description	<b>/all nvram:</b>	Erases everything in nvram:.
	<b>/all non-default</b>	Erases files and configuration in non-volatile storage including nvram:, bootflash:, cat4000_flash:, and crashinfo: of the local supervisor engine. Resets the Catalyst 4500 series switch to the factory default settings.
	<b>Note</b>	This command option is intended to work only on a stand-alone supervisor engine.
	<b>cat4000_flash:</b>	Erases the VLAN database configuration file.
	<b>nvram:</b>	Erases the startup-config and private-config file in nvram.
	<b>startup-config:</b>	Erases the startup-config and private-config file in nvram.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.2(25)SG	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines



### Caution

When you use the **erase** command to erase a file system, you cannot recover the files in the file system.

In addition to the command options shown above, options with the prefix slave that are used to identify nvram: and flash (like slavenvram: and slavecat4000\_flash:) appear in the command help messages on the dual supervisor redundancy switch.

The **erase nvram:** command replaces the **write erase** and the **erase startup-config** commands. Like these two commands, it erases both the startup-config and the private-config file.

The **erase /all nvram:** command erases all files in nvram: in addition to startup-config file and private-config file.

The **erase cat4000\_flash:** command erases the VLAN database configuration file.

The **erase /all non-default** command facilitates the work of a manufacturing facility and repair center. It erases the configuration and states stored in the non-volatile storage and resets the Catalyst 4500 series switch to the factory default settings. The default settings include those mentioned in the IOS library (below) as well as those set by the **erase /all non-default** command (vtp mode=transparent, and the ROMMON variables: ConfigReg=0x2101, PS1= "rommon ! >" and EnableAutoConfig=1).

- *Cisco IOS Configuration Fundamentals Configuration Guide*, Release 12.2, at this URL:  
[http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/fun\\_c/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/fun_c/index.htm)
- *Cisco IOS Configuration Fundamentals Configuration Command Reference*, Release 12.2, at this URL:  
[http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/fun\\_r/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/fun_r/index.htm)

**Caution**

The erase /all non-default command can erase IOS images in bootflash:. Ensure that 1) an IOS image can be copied back to the bootflash: (such as, from a accessible TFTP server or a flash card inserted in slot0: (available on most chassis models), or 2) the switch can boot from a image stored in an accessible network server.

**Examples**

This example shows how to erase the files and configuration in a non-volatile storage and reset the switch to factory default settings:

```
Switch# erase /all non-default
Switch#
Erase and format operation will destroy all data in non-volatile storage. Continue?
[confirm]
Formatting bootflash: ...

Format of bootflash complete
Erasing nvram:
Erasing cat4000_flash:
Clearing crashinfo:data
Clearing the last power failure timestamp
Clearing all ROMMON variables
Setting default ROMMON variables:
    ConfigReg=0x2101
    PS1=rommon ! >
    EnableAutoConfig=1
Setting vtp mode to transparent
%WARNING! Please reboot the system for the changes to take effect
Switch#
00:01:48: %SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Switch#
```

This example shows how to erase the contents in nvram.

```
Switch# erase /all nvram:
Erasing the nvram filesystem will remove all files! Continue? [confirm]
[OK]
Erase of nvram: complete
Switch#
00:38:10: %SYS-7-NV_BLOCK_INIT: Initalized the geometry of nvram
Switch#
```

This example shows how to erase filesystem cat4000\_flash.

```
Switch# erase cat4000_flash:
Erasing the cat4000_flash filesystem will remove all files! Continue? [confirm]
[OK]
Erase of cat4000_flash:complete
Switch#
```

---

**Related Commands**

**boot config** (refer to Cisco IOS documentation)

**delete** (refer to Cisco IOS documentation)

**more nvram:startup-config:** (refer to Cisco IOS documentation)

**show bootvar**

**undelete** (refer to Cisco IOS documentation)

# errdisable detect

To enable error-disable detection, use the **errdisable detect** command. To disable the error-disable detection feature, use the **no** form of this command.

**errdisable detect cause {all | arp-inspection | dhcp-rate-limit | dtp-flap | gbic-invalid | l2ptguard | link-flap | pagp-flap}**

**no errdisable detect cause {all | arp-inspection | dhcp-rate-limit | dtp-flap | gbic-invalid | l2ptguard | link-flap | pagp-flap}**

## Syntax Description

<b>cause</b>	Specifies error-disable detection to detect from a specific cause.
<b>all</b>	Specifies error-disable detection for all error-disable causes.
<b>arp-inspection</b>	Specifies the detection for the ARP inspection error-disable cause.
<b>dhcp-rate-limit</b>	Specifies the detection for the DHCP rate-limit error-disable cause.
<b>dtp-flap</b>	Specifies the detection for the DTP flap error-disable cause.
<b>gbic-invalid</b>	Specifies the detection for the GBIC invalid error-disable cause.
<b>l2ptguard</b>	Specifies the detection for the Layer 2 protocol-tunnel error-disable cause.
<b>link-flap</b>	Specifies the detection for the link flap error-disable cause.
<b>pagp-flap</b>	Specifies the detection for the PAgP flap error-disable cause.

## Defaults

All error-disable causes are detected.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

A cause (dtp-flap, link-flap, pagp-flap) is defined as the reason why the error-disabled state occurred. When a cause is detected on an interface, the interface is placed in error-disabled state (an operational state that is similar to link-down state).

You must enter the **shutdown** command and then the **no shutdown** command to recover an interface manually from the error-disable state.

## Examples

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

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

This example shows how to disable error-disable detection for DAI:

```
Switch(config)# no errdisable detect cause arp-inspection
Switch(config)# end
Switch# show errdisable detect
ErrDisable Reason    Detection status
-----
udld                  Enabled
bpduguard             Enabled
security-violatio    Enabled
channel-misconfig    Disabled
psecure-violation    Enabled
vmps                  Enabled
pagp-flap             Enabled
dtp-flap              Enabled
link-flap             Enabled
l2ptguard            Enabled
gbic-invalid          Enabled
dhcp-rate-limit      Enabled
unicast-flood         Enabled
storm-control         Enabled
ilpower               Enabled
arp-inspection        Disabled
Switch#
```

#### Related Commands

[show errdisable detect](#)  
[show interfaces status](#)

## errdisable recovery

To configure the recovery mechanism variables, use the **errdisable recovery** command. To return to the default setting, use the **no** form of this command.

```
errdisable recovery [cause {all | arp-inspection | bpduguard | channel-misconfig |  
dhcp-rate-limit | dtp-flap | gbic-invalid | l2ptguard | link-flap | pagp-flap |  
pesecure-violation | security-violation | storm-control | udld | unicastflood | vmmps}  
[arp-inspection] [interval {interval}]]
```

```
no errdisable recovery [cause {all | arp-inspection | bpduguard | channel-misconfig |  
dhcp-rate-limit | dtp-flap | gbic-invalid | l2ptguard | link-flap | pagp-flap |  
pesecure-violation | security-violation | storm-control | udld | unicastflood | vmmps}  
[arp-inspection] [interval {interval}]]
```

### Syntax Description

<b>cause</b>	(Optional) Enables the error-disable recovery to recover from a specific cause.
<b>all</b>	(Optional) Enables the recovery timers for all error-disable causes.
<b>arp-inspection</b>	(Optional) Enables the recovery timer for the ARP inspection cause.
<b>bpduguard</b>	(Optional) Enables the recovery timer for the BPDU guard error-disable cause.
<b>channel-misconfig</b>	(Optional) Enables the recovery timer for the channel-misconfig error-disable cause.
<b>dhcp-rate-limit</b>	(Optional) Enables the recovery timer for the DHCP rate limit error-disable cause.
<b>dtp-flap</b>	(Optional) Enables the recovery timer for the DTP flap error-disable cause.
<b>gbic-invalid</b>	(Optional) Enables the recovery timer for the GBIC invalid error-disable cause.
<b>l2ptguard</b>	(Optional) Enables the recovery timer for the Layer 2 protocol-tunnel error-disable cause.
<b>link-flap</b>	(Optional) Enables the recovery timer for the link flap error-disable cause.
<b>pagp-flap</b>	(Optional) Enables the recovery timer for the PAgP flap error-disable cause.
<b>pesecure-violation</b>	(Optional) Enables the recovery timer for the pesecure violation error-disable cause.
<b>security-violation</b>	(Optional) Enables the automatic recovery of ports disabled due to 802.1X security violations.
<b>storm-control</b>	(Optional) Enables the timer to recover from storm-control error-disable state.
<b>udld</b>	(Optional) Enables the recovery timer for the UDLD error-disable cause.
<b>unicastflood</b>	(Optional) Enables the recovery timer for the unicast flood error-disable cause.
<b>vmmps</b>	(Optional) Enables the recovery timer for the VMPS error-disable cause.
<b>arp-inspection</b>	(Optional) Enables the ARP inspection cause and recovery timeout.
<b>interval</b> <i>interval</i>	(Optional) Specifies the time to recover from a specified error-disable cause; valid values are from 30 to 86400 seconds.



**Defaults** Error disable recovery is disabled.  
The recovery interval is set to 300 seconds.

**Command Modes** Configuration

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(19)EW	Support for the storm-control feature.

**Usage Guidelines** A cause (bpduguard, dtp-flap, link-flap, pagp-flap, udld) is defined as the reason why the error-disabled state occurred. When a cause is detected on an interface, the interface is placed in error-disabled state (an operational state that is similar to the link-down state). If you do not enable error-disable recovery for the cause, the interface stays in the error-disabled state until a shutdown and no shutdown occurs. If you enable recovery for a cause, the interface is brought out of the error-disabled state and allowed to retry operation again once all the causes have timed out.

You must enter the **shutdown** command and then the **no shutdown** command to recover an interface manually from error disable.

**Examples** This example shows how to enable the recovery timer for the BPDU guard error disable cause:

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

This example shows how to set the timer to 300 seconds:

```
Switch(config)# errdisable recovery interval 300
Switch(config)#
```

This example shows how to enable the errdisable recovery for arp-inspection:

```
Switch(config)# errdisable recovery cause arp-inspection
Switch(config)# end
Switch# show errdisable recovery
ErrDisable Reason    Timer Status
-----
udld                  Disabled
bpduguard             Disabled
security-violatio    Disabled
channel-misconfig    Disabled
vmps                  Disabled
pagp-flap             Disabled
dtp-flap              Disabled
link-flap            Disabled
l2ptguard             Disabled
psecure-violation    Disabled
gbic-invalid          Disabled
dhcp-rate-limit      Disabled
unicast-flood        Disabled
storm-control        Disabled
arp-inspection        Enabled
```

**errdisable recovery**

Timer interval: 300 seconds

Interfaces that will be enabled at the next timeout:

Switch#

**Related Commands**

[show errdisable recovery](#)

[show interfaces status](#)

# flowcontrol

To configure a Gigabit Ethernet interface to send or receive pause frames, use the **flowcontrol** command. To disable the flow control setting, use the **no** form of this command.

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

**no flowcontrol** {receive | send} {off | on | desired}

Syntax Description		
<b>receive</b>		Specifies that the interface processes pause frames.
<b>send</b>		Specifies that the interface sends pause frames.
<b>off</b>		Prevents a local port from receiving and processing pause frames from remote ports or from sending pause frames to remote ports.
<b>on</b>		Enables a local port to receive and process pause frames from remote ports or send pause frames to remote ports.
<b>desired</b>		Obtains predictable results whether a remote port is set to on, off, or desired.

## Defaults

The default settings for Gigabit Ethernet interfaces are as follows:

- Sending pause frames is off—non-oversubscribed Gigabit Ethernet interfaces.
- Receiving pause frames is desired—non-oversubscribed Gigabit Ethernet interfaces.
- Sending pause frames is on—Oversubscribed Gigabit Ethernet interfaces.
- Receiving pause frames is desired—Oversubscribed Gigabit Ethernet interfaces

Table 2-4 shows the default settings for the modules.

**Table 2-4 Default Module Settings**

Module	Ports	Send
All modules except WS-X4418-GB, WS-X4412-2GB-TX, and WS-X4416-2GB-TX	All ports except for the oversubscribed ports	Off
WS-X4418-GB	Uplink ports (1–2)	Off
WS-X4418-GB	Oversubscribed ports (3–18)	On
WS-X4412-2GB-TX	Uplink ports (13–14)	Off
WS-X4412-2GB-TX	Oversubscribed ports (1–12)	On
WS-X4416-2GB-TX	Uplink ports (17–18)	Off

## Command Modes

Interface configuration

**Command History**

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines**

The pause frames are special packets that signal a source to stop sending frames for a specific period of time because the buffers are full.

[Table 2-5](#) describes the guidelines for using the different configurations of the **send** and **receive** keywords with the **flowcontrol** command.

**Table 2-5** *Keyword Configurations for send and receive*

Configuration	Description
<b>send on</b>	Enables a local port to send pause frames to remote ports. To obtain predictable results, use <b>send on</b> only when remote ports are set to <b>receive on</b> or <b>receive desired</b> .
<b>send off</b>	Prevents a local port from sending pause frames to remote ports. To obtain predictable results, use <b>send off</b> only when remote ports are set to <b>receive off</b> or <b>receive desired</b> .
<b>send desired</b>	Obtains predictable results whether a remote port is set to <b>receive on</b> , <b>receive off</b> , or <b>receive desired</b> .
<b>receive on</b>	Enables a local port to process pause frames that a remote port sends. To obtain predictable results, use <b>receive on</b> only when remote ports are set to <b>send on</b> or <b>send desired</b> .
<b>receive off</b>	Prevents remote ports from sending pause frames to a local port. To obtain predictable results, use <b>send off</b> only when remote ports are set to <b>receive off</b> or <b>receive desired</b> .
<b>receive desired</b>	Obtains predictable results whether a remote port is set to <b>send on</b> , <b>send off</b> , or <b>send desired</b> .

[Table 2-6](#) identifies how the flow control will be forced or negotiated on the Gigabit Ethernet interfaces based on their speed settings.

**Note**

Catalyst 4006 switches support flow control only on the gigabit interfaces.

**Table 2-6** *Send Capability by Switch Type, Module, and Port*

Interface Type	Configured Speed	Advertised Flow Control
10/100/1000BASE-TX	Speed 1000	Configured flow control always
1000BASE-T	Negotiation always enabled	Configured flow control always negotiated
1000BASE-X	No speed nonegotiation	Configured flow control negotiated
1000BASE-X	Speed nonegotiation	Configured flow control forced

---

**Examples**

This example shows how to enable send flow control:

```
Switch(config-if)# flowcontrol receive on  
Switch(config-if)#
```

This example shows how to disable send flow control:

```
Switch(config-if)# flowcontrol send off  
Switch(config-if)#
```

This example shows how to set receive flow control to desired:

```
Switch(config-if)# flowcontrol receive desired  
Switch(config-if)#
```

---

**Related Commands**

**interface port-channel**  
**interface range**  
**interface vlan**  
**show flowcontrol**  
**show running-config** (refer to Cisco IOS documentation)  
**speed**

# hw-module power

To turn the power off on a slot or line module, use the **no hw-module power** command. To turn the power back on, use the **hw-module power** command.

**hw-module** [**slot** | **module**] *number* **power**

**no hw-module** [**slot** | **module**] *number* **power**

Syntax Description	<b>slot</b>	(Optional) Specifies a slot on a chassis.
	<b>module</b>	(Optional) Specifies a line module.
	<i>number</i>	(Optional) Slot or module number.

Defaults	After a boot up, the power is on.
----------	-----------------------------------

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(18)EW	Add slot and module keywords.

Examples	This example shows how to shut off power to a module in slot 5:
----------	---

```
Switch# no hw-module slot 5 power
Switch#
```

Related Commands	<a href="#">clear hw-module slot password</a>
------------------	---

# hw-module uplink select

Use the **hw-module uplink select** command to select the 10-Gigabit Ethernet or Gigabit Ethernet uplinks on the Supervisor Engine V-10GE within the W-C4510R chassis.

**hw-module uplink select { tengigabitethernet | gigabitethernet | all }**

Syntax Description	<b>tengigabitethernet</b>	(Optional) Specifies the 10-Gigabit Ethernet uplinks.
	<b>gigabitethernet</b>	(Optional) Specifies the Gigabit Ethernet uplinks.
	<b>all</b>	(Optional) Specifies all uplinks (10-Gigabit Ethernet and Gigabit Ethernet).

Defaults	tengigabitethernet
----------	--------------------

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

Command History	Release	Modification
	12.2(25)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)SG	Support for the <b>all</b> keyword was added.

Usage Guidelines	<p>Supervisor Engine V-10GE and Supervisor Engine II+10GE support 10-Gigabit Ethernet and Gigabit Ethernet uplink ports. On the Supervisor Engine II+10GE, all uplink ports are always available. Similarly, when a Supervisor Engine V-10GE is plugged into a W-C4503, W-4506, or W-4507R chassis, all uplink ports are always available. When a Supervisor Engine V-10GE is plugged into a W-4510R chassis, you can choose to use the 10-Gigabit Ethernet uplink ports, the Gigabit Ethernet uplink ports, or all uplink ports. If you choose to use all uplink ports, then the tenth slot will support only the WS-X4302-GB switching linecard. Be aware that this command takes effect only after a reload (after you have executed the <b>redundancy reload shelf</b> command).</p>
------------------	--

Because the uplink selection is programmed into hardware during initialization, changing the active uplinks requires saving the configuration and reloading the switch. When you are configuring a change to the uplinks, the system responds with a message informing you that the switch must be reloaded and suggesting the appropriate command (depending on redundancy mode) to reload the switch.

If you select the **all** keyword, ensure that the tenth slot is either empty or has a WS-X4302-GB switching module.

A **no** form of this command does not exist. To undo the configuration, you must configure the uplinks.

Examples	This example shows how to select the Gigabit Ethernet uplinks:
----------	--

```
Switch(config)# hw-module uplink select gigabitethernet
A reload of the active supervisor is required to apply the new configuration.
Switch(config)# exit
Switch#
```

**Note**

The Gigabit Ethernet uplinks will be active after the next reload.

This example shows how to select the Gigabit Ethernet uplinks in a redundant system in SSO mode:

```
Switch(config)# hw-module uplink select gigabitethernet
A 'redundancy reload shelf' or power-cycle of chassis is required to apply the new
configuration
Switch(config)# exit
Switch#
```

**Note**

The Gigabit Ethernet uplinks will be active after the next reload of the chassis/shelf. Use the **redundancy reload shelf** command to reload the chassis/shelf.

This example shows how to select the Gigabit Ethernet uplinks in a redundant system in RPR mode:

```
Switch(config)# hw-module uplink select gigabitethernet
A reload of the active supervisor is required to apply the new configuration.
Switch(config)# exit
Switch#
```

**Note**

The Gigabit Ethernet uplinks will be active on a switchover or reload of the active supervisor engine.

This example shows how to select all the uplinks in a redundant system in SSO mode:

```
Switch(config)# hw-module uplink select all
Warning: This configuration mode may disable slot10.
A 'redundancy reload shelf' or power-cycle of chassis is required to apply the new
configuration.
Switch(config)# exit
Switch#
```

**Note**

If you select the **all** keyword, only the Drome board will be supported in the tenth slot of the supervisor engine.

**Related Commands**

[show hw-module uplink](#)



# instance

To map a VLAN or a set of VLANs to an MST instance, use the **instance** command. To return the VLANs to the common instance default, use the **no** form of this command.

**instance** *instance-id* {**vlan**s *vlan-range*}

**no instance** *instance-id*

Syntax Description	<i>instance-id</i>	MST instance to which the specified VLANs are mapped; valid values are from 0 to 15.
	<b>vlan</b> s <i>vlan-range</i>	Specifies the number of the VLANs to be mapped to the specified instance. The number is entered as a single value or a range; valid values are from 1 to 4094.

**Defaults** Mapping is disabled.

**Command Modes** MST configuration

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The mapping is incremental, not absolute. When you enter a range of VLANs, this range is added or removed to the existing ones.

Any unmapped VLAN is mapped to the CIST instance.

**Examples** This example shows how to map a range of VLANs to instance 2:

```
Switch(config-mst)# instance 2 vlans 1-100
Switch(config-mst)#
```

This example shows how to map a VLAN to instance 5:

```
Switch(config-mst)# instance 5 vlans 1100
Switch(config-mst)#
```

This example shows how to move a range of VLANs from instance 2 to the CIST instance:

```
Switch(config-mst)# no instance 2 vlans 40-60
Switch(config-mst)#
```

This example shows how to move all the VLANs mapped to instance 2 back to the CIST instance:

```
Switch(config-mst)# no instance 2
Switch(config-mst)#
```

■ instance

---

**Related Commands**

[name](#)  
[revision](#)  
[show spanning-tree mst](#)  
[spanning-tree mst configuration](#)

# interface

To select an interface to configure and to enter interface configuration mode, use the **interface** command.

**interface** *type number*

Syntax Description	<i>type</i>	Type of interface to be configured; see <a href="#">Table 2-7</a> for valid values.
	<i>number</i>	Module and port number.

**Defaults** No interface types are configured.

**Command Modes** Global configuration

Command History	<b>Release</b>	<b>Modification</b>
	12.2(25)EW	Extended to include the 10-Gigabit Ethernet interface.

**Usage Guidelines** [Table 2-7](#) lists the valid values for *type*.

**Table 2-7 Valid type Values**

Keyword	Definition
<b>ethernet</b>	Ethernet IEEE 802.3 interface.
<b>fastethernet</b>	100-Mbps Ethernet interface.
<b>gigabitethernet</b>	Gigabit Ethernet IEEE 802.3z interface.
<b>tengigabitethernet</b>	10-Gigabit Ethernet IEEE 802.3ae interface.
<b>ge-wan</b>	Gigabit Ethernet WAN IEEE 802.3z interface; supported on Catalyst 4500 series switches that are configured with a Supervisor Engine II only.
<b>pos</b>	Packet OC-3 interface on the Packet over SONET Interface Processor; supported on Catalyst 4500 series switches that are configured with a Supervisor Engine II only.
<b>atm</b>	ATM interface; supported on Catalyst 4500 series switches that are configured with a Supervisor Engine II only.
<b>vlan</b>	VLAN interface; see the <a href="#">interface vlan</a> command.
<b>port-channel</b>	Port channel interface; see the <a href="#">interface port-channel</a> command.
<b>null</b>	Null interface; the valid value is <b>0</b> .
<b>tunnel</b>	Tunnel interface.

---

**Examples**

This example shows how to enter the interface configuration mode on the Fast Ethernet interface 2/4:

```
Switch(config)# interface fastethernet2/4  
Switch(config)#
```

---

**Related Commands**

[show interfaces](#)

# interface port-channel

To access or create a port-channel interface, use the **interface port-channel** command.

**interface port-channel** *channel-group*

Syntax Description	<i>channel-group</i> Port-channel group number; valid values are from 1 to 64.
--------------------	--

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

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	You do not have to create a port-channel interface before assigning a physical interface to a channel group. A port-channel interface is created automatically when the channel group gets its first physical interface, if it is not already created.
------------------	--

You can also create the port channels by entering the **interface port-channel** command. This will create a Layer 3 port channel. To change the Layer 3 port channel into a Layer 2 port channel, use the **switchport** command before you assign the physical interfaces to the channel group. A port channel cannot be changed from Layer 3 to Layer 2 or vice versa when it contains member ports.

Only one port channel in a channel group is allowed.



## Caution

The Layer 3 port-channel interface is the routed interface. Do not enable Layer 3 addresses on the physical Fast Ethernet interfaces.

If you want to use CDP, you must configure it only on the physical Fast Ethernet interface and not on the port-channel interface.

Examples	This example creates a port-channel interface with a channel-group number of 64:  Switch(config)# <b>interface port-channel 64</b> Switch(config)#
----------	---

Related Commands	<b>channel-group</b> <b>show etherchannel</b>
------------------	--

# interface range

To run a command on multiple ports at the same time, use the **interface range** command.

**interface range** { **vlan** *vlan\_id - vlan\_id* } { *port-range* | **macro** *name* }

Syntax Description	<b>vlan</b> <i>vlan_id - vlan_id</i>	Specifies a VLAN range; valid values are from 1 to 4094.
	<i>port-range</i>	Port range; for a list of valid values for <i>port-range</i> , see the “Usage Guidelines” section.
	<b>macro</b> <i>name</i>	Specifies the name of a macro.

**Defaults** This command has no default settings.

**Command Modes** Global configuration  
Interface configuration

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended VLAN addresses added.

**Usage Guidelines** You can use the **interface range** command on the existing VLAN SVIs only. To display the VLAN SVIs, enter the **show running config** command. The VLANs that are not displayed cannot be used in the **interface range** command.

The values that are entered with the **interface range** command are applied to all the existing VLAN SVIs.

Before you can use a macro, you must define a range using the **define interface-range** command.

All configuration changes that are made to a port range are saved to NVRAM, but the port ranges that are created with the **interface range** command do not get saved to NVRAM.

You can enter the port range in two ways:

- Specifying up to five port ranges
- Specifying a previously defined macro

You can either specify the ports or the name of a port-range macro. A port range must consist of the same port type, and the ports within a range cannot span the modules.

You can define up to five port ranges on a single command; separate each range with a comma.

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

```
interface range gigabitethernet 5/1 -20, gigabitethernet4/5 -20.
```

Use these formats when entering the *port-range*:

- *interface-type* {*mod*}/{*first-port*} - {*last-port*}
- *interface-type* {*mod*}/{*first-port*} - {*last-port*}

Valid values for *interface-type* are as follows:

- **FastEthernet**
- **GigabitEthernet**
- **Vlan** *vlan\_id*

You cannot specify both a macro and an interface range in the same command. After creating a macro, you can enter additional ranges. If you have already entered an interface range, the CLI does not allow you to enter a macro.

You can specify a single interface in the *port-range* value. This makes the command similar to the **interface** *interface-number* command.

---

### Examples

This example shows how to use the **interface range** command to interface to FE 5/18 - 20:

```
Switch(config)# interface range fastethernet 5/18 - 20
Switch(config-if)#
```

This command shows how to run a port-range macro:

```
Switch(config)# interface range macro macro1
Switch(config-if)#
```

---

### Related Commands

**define interface-range**

**show running config** (refer to Cisco IOS documentation)

# interface vlan

To create or access a Layer 3 switch virtual interface (SVI), use the **interface vlan** command. To delete an SVI, use the **no** form of this command.

**interface vlan** *vlan\_id*

**no interface vlan** *vlan\_id*

Syntax Description	<i>vlan_id</i> Number of the VLAN; valid values are from 1 to 4094.
--------------------	---

Defaults	Fast EtherChannel is not specified.
----------	-------------------------------------

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended addressing was added.

Usage Guidelines	The SVIs are created the first time that you enter the <b>interface vlan</b> <i>vlan_id</i> command for a particular VLAN. The <i>vlan_id</i> value corresponds to the VLAN tag that is associated with the data frames on an ISL or 802.1Q-encapsulated trunk or the VLAN ID that is configured for an access port. A message is displayed whenever a VLAN interface is newly created, so you can check that you entered the correct VLAN number.
------------------	--

If you delete an SVI by entering the **no interface vlan** *vlan\_id* command, the associated interface is forced into an administrative down state and marked as deleted. The deleted interface will no longer be visible in a **show interface** command.

You can reinstate a deleted SVI by entering the **interface vlan** *vlan\_id* command for the deleted interface. The interface comes back up, but much of the previous configuration will be gone.

Examples	This example shows the output when you enter the <b>interface vlan</b> <i>vlan_id</i> command for a new VLAN number:
----------	--

```
Switch(config)# interface vlan 23
% Creating new VLAN interface.
Switch(config)#
```



# ip arp inspection filter vlan

To permit ARPs from hosts that are configured for static IP when DAI is enabled and to define an ARP access list and apply it to a VLAN, use the **ip arp inspection filter vlan** command. To disable this application, use the **no** form of this command.

**ip arp inspection filter** *arp-acl-name* **vlan** *vlan-range* [*static*]

**no ip arp inspection filter** *arp-acl-name* **vlan** *vlan-range* [*static*]

## Syntax Description

<i>arp-acl-name</i>	Access control list name.
<i>vlan-range</i>	VLAN number or range; valid values are from 1 to 4094.
<i>static</i>	(Optional) Specifies that the access control list should be applied statically.

## Defaults

No defined ARP ACLs are applied to any VLAN.

## Command Modes

Configuration

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

When an ARP access control list is applied to a VLAN for dynamic ARP inspection, the ARP packets containing only the IP-to-Ethernet MAC bindings are compared against the ACLs. All other packet types are bridged in the incoming VLAN without validation.

This command specifies that the incoming ARP packets are compared against the ARP access control list, and the packets are permitted only if the access control list permits them.

If the access control lists deny the packets because of explicit denies, the packets are dropped. If the packets are denied because of an implicit deny, they are then matched against the list of DHCP bindings if the ACL is not applied statically.

## Examples

This example shows how to apply the ARP ACL “static-hosts” to VLAN 1 for DAI:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# ip arp inspection filter static-hosts vlan 1
Switch(config)# end
Switch#
Switch# show ip arp inspection vlan 1
Source Mac Validation      : Enabled
Destination Mac Validation : Disabled
IP Address Validation      : Disabled
```

## ip arp inspection filter vlan

```

Vlan      Configuration      Operation      ACL Match      Static ACL
-----
      1      Enabled              Active          static-hosts    No

Vlan      ACL Logging      DHCP Logging
-----
      1      Acl-Match        Deny

Switch#
```

### Related Commands

[arp access-list](#)  
[show ip arp inspection](#)

# ip arp inspection limit (interface)

To limit the rate of incoming ARP requests and responses on an interface and prevent DAI from consuming all of the system's resources in the event of a DoS attack, use the **ip arp inspection limit** command. To release the limit, use the **no** form of this command.

**ip arp inspection limit** {*rate pps* | *none*} [*burst interval seconds*]

**no ip arp inspection limit**

## Syntax Description

<b>rate</b> <i>pps</i>	Specifies an upper limit on the number of incoming packets processed per second. The rate can range from 1 to 10000.
<b>none</b>	Specifies no upper limit on the rate of the incoming ARP packets that can be processed.
<b>burst interval</b> <i>seconds</i>	(Optional) Specifies the consecutive interval in seconds over which the interface is monitored for the high rate of the ARP packets. The interval is configurable from 1 to 15 seconds.

## Defaults

The rate is set to 15 packets per second on the untrusted interfaces, assuming that the network is a switched network with a host connecting to as many as 15 new hosts per second.

The rate is unlimited on all the trusted interfaces.

The burst interval is set to 1 second by default.

## Command Modes

Interface

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(20)EW	Added support for interface monitoring.

## Usage Guidelines

The trunk ports should be configured with higher rates to reflect their aggregation. When the rate of the incoming packets exceeds the user-configured rate, the interface is placed into an error-disabled state. The error-disable timeout feature can be used to remove the port from the error-disabled state. The rate applies to both the trusted and nontrusted interfaces. Configure appropriate rates on trunks to handle the packets across multiple DAI-enabled VLANs or use the **none** keyword to make the rate unlimited.

The rate of the incoming ARP packets on the channel ports is equal to the sum of the incoming rate of packets from all the channel members. Configure the rate limit for the channel ports only after examining the rate of the incoming ARP packets on the channel members.

After a switch receives more than the configured rate of packets every second consecutively over a period of burst seconds, the interface is placed into an error-disabled state.

**Examples**

This example shows how to limit the rate of the incoming ARP requests to 25 packets per second:

```
Switch# config terminal
Switch(config)# interface fa6/3
Switch(config-if)# ip arp inspection limit rate 25
Switch(config-if)# end
Switch# show ip arp inspection interfaces fastEthernet 6/3
```

Interface	Trust State	Rate (pps)
-----	-----	-----
Fa6/3	Trusted	25

```
Switch#
```

This example shows how to limit the rate of the incoming ARP requests to 20 packets per second and to set the interface monitoring interval to 5 consecutive seconds:

```
Switch# config terminal
Switch(config)# interface fa6/1
Switch(config-if)# ip arp inspection limit rate 20 burst interval 5
Switch(config-if)# end
```

**Related Commands**

[show ip arp inspection](#)

# ip arp inspection log-buffer

To configure the parameters that are associated with the logging buffer, use the **ip arp inspection log-buffer** command. To disable the parameters, use the **no** form of this command.

**ip arp inspection log-buffer** {**entries** *number* | **logs** *number* **interval** *seconds*}

**no ip arp inspection log-buffer** {**entries** | **logs**}

## Syntax Description

<b>entries</b> <i>number</i>	Number of entries from the logging buffer; the range is from 0 to 1024.
<b>logs</b> <i>number</i>	Number of entries to be logged in an interval; the range is from 0 to 1024. A 0 value indicates that entries should not be logged out of this buffer.
<b>interval</b> <i>seconds</i>	Logging rate; the range is from 0 to 86400 (1 day). A 0 value indicates an immediate log.

## Defaults

When dynamic ARP inspection is enabled, denied, or dropped, the ARP packets are logged.

The number of entries is set to 32.

The number of logging entries is limited to 5 per second.

The interval is set to 1.

## Command Modes

Configuration

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The first dropped packet of a given flow is logged immediately. The subsequent packets for the same flow are registered but are not logged immediately. Registering these packets is done in a log buffer that is shared by all the VLANs. Entries from this buffer are logged on a rate-controlled basis.

## Examples

This example shows how to configure the logging buffer to hold up to 45 entries:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# ip arp inspection log-buffer entries 45
Switch(config)# end
Switch# show ip arp inspection log
Total Log Buffer Size : 45
Syslog rate : 5 entries per 1 seconds.
No entries in log buffer.
Switch#
```

This example shows how to configure the logging rate to 10 logs per 3 seconds:

```
Switch(config)# ip arp inspection log-buffer logs 10 interval 3
Switch(config)# end
Switch# show ip arp inspection log
Total Log Buffer Size : 45
Syslog rate : 10 entries per 3 seconds.
No entries in log buffer.
Switch#
```

---

**Related Commands**

[arp access-list](#)  
[show ip arp inspection](#)

# ip arp inspection trust

To set a per-port configurable trust state that determines the set of interfaces where incoming ARP packets are inspected, use the **ip arp inspection trust** command. To make the interfaces untrusted, use the **no** form of this command.

**ip arp inspection trust**

**no ip arp inspection trust**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	None
-----------------	------

<b>Command Modes</b>	Interface
----------------------	-----------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to configure an interface to be trusted:
-----------------	---

```
Switch# config terminal
Switch(config)# interface fastEthernet 6/3
Switch(config-if)# ip arp inspection trust
Switch(config-if)# end
```

To verify the configuration, use the show form of this command:

```
Switch# show ip arp inspection interfaces fastEthernet 6/3
```

Interface	Trust State	Rate (pps)	Burst Interval
Fa6/3	Trusted	None	N/A

Switch#

<b>Related Commands</b>	<a href="#">show ip arp inspection</a>
-------------------------	--

# ip arp inspection validate

To perform specific checks for ARP inspection, use the **ip arp inspection validate** command. To disable checks, use the **no** form of this command.

**ip arp inspection validate** [**src-mac**] [**dst-mac**] [**ip**]

**no ip arp inspection validate** [**src-mac**] [**dst-mac**] [**ip**]

Syntax Description	<b>src-mac</b>	(Optional) Checks the source MAC address in the Ethernet header against the sender's MAC address in the ARP body. This checking is done against both ARP requests and responses.
	<b>Note</b>	When enabled, packets with different MAC addresses are classified as invalid and are dropped.
	<b>dst-mac</b>	(Optional) Checks the destination MAC address in the Ethernet header against the target MAC address in ARP body. This checking is done for ARP responses.
	<b>Note</b>	When enabled, the packets with different MAC addresses are classified as invalid and are dropped.
	<b>ip</b>	(Optional) Checks the ARP body for invalid and unexpected IP addresses. Addresses include 0.0.0.0, 255.255.255.255, and all IP multicast addresses.
		The sender IP addresses are checked in all ARP requests and responses and target IP addresses are checked only in ARP responses.

**Defaults** Checks are disabled.

**Command Modes** Configuration

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** When enabling the checks, specify at least one of the keywords (**src-mac**, **dst-mac**, and **ip**) on the command line. Each command overrides the configuration of the previous command. If a command enables **src** and **dst mac** validations, and a second command enables IP validation only, the **src** and **dst mac** validations are disabled as a result of the second command.

The **no** form of this command disables only the specified checks. If none of the check options are enabled, all the checks are disabled.



---

**Examples**

This example show how to enable the source MAC validation:

```
Switch(config)# ip arp inspection validate src-mac
Switch(config)# end
Switch# show ip arp inspection vlan 1
Source Mac Validation      : Enabled
Destination Mac Validation : Disabled
IP Address Validation      : Disabled
```

Vlan	Configuration	Operation	ACL Match	Static ACL
----	-----	-----	-----	-----
1	Enabled	Active		

Vlan	ACL Logging	DHCP Logging
----	-----	-----
1	Deny	Deny

```
Switch#
```

---

**Related Commands**

[arp access-list](#)  
[show arp access-list](#)

# ip arp inspection vlan

To enable dynamic ARP inspection (DAI) on a per-VLAN basis, use the **ip arp inspection vlan** command. To disable DAI, use the **no** form of this command.

**ip arp inspection vlan** *vlan-range*

**no ip arp inspection vlan** *vlan-range*

<b>Syntax Description</b>	<i>vlan-range</i> VLAN number or range; valid values are from 1 to 4094.
---------------------------	--

<b>Defaults</b>	ARP inspection is disabled on all VLANs.
-----------------	--

<b>Command Modes</b>	Configuration
----------------------	---------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	You must specify on which VLANs to enable DAI. DAI may not function on the configured VLANs if they have not been created or if they are private.
-------------------------	---

<b>Examples</b>	This example shows how to enable DAI on VLAN 1:
-----------------	---

```
Switch(config)# ip arp inspection vlan 1
Switch(config)# end
Switch# show ip arp inspection vlan 1

Source Mac Validation      : Disabled
Destination Mac Validation : Disabled
IP Address Validation      : Disabled
Vlan    Configuration      Operation  ACL Match      Static ACL
----    -
    1    Enabled            Active
Vlan    ACL Logging         DHCP Logging
----    -
    1    Deny               Deny
Switch#
```

<b>Related Commands</b>	<a href="#">arp access-list</a> <a href="#">show ip arp inspection</a>
-------------------------	---

# ip arp inspection vlan logging

To control the type of packets that are logged, use the **ip arp inspection vlan logging** command. To disable this logging control, use the **no** form of this command.

**ip arp inspection vlan** *vlan-range* **logging** {**acl-match** {**matchlog** | **none**} | **dhcp-bindings** {**permit** | **all** | **none**}}

**no ip arp inspection vlan** *vlan-range* **logging** {**acl-match** | **dhcp-bindings**}

## Syntax Description

<i>vlan-range</i>	Number of the VLANs to be mapped to the specified instance. The number is entered as a single value or a range; valid values are from 1 to 4094.
<b>acl-match</b>	Specifies the logging criteria for packets that are dropped or permitted based on ACL matches.
<b>matchlog</b>	Specifies that logging of packets matched against ACLs is controlled by the <b>matchlog</b> keyword in the permit and deny access control entries of the ACL.  <b>Note</b> By default, the <b>matchlog</b> keyword is not available on the ACEs. When the keyword is used, denied packets are not logged. Packets are logged only when they match against an ACE that has the <b>matchlog</b> keyword.
<b>none</b>	Specifies that ACL-matched packets are not logged.
<b>dhcp-bindings</b>	Specifies the logging criteria for packets dropped or permitted based on matches against the DHCP bindings.
<b>permit</b>	Specifies logging when permitted by DHCP bindings.
<b>all</b>	Specifies logging when permitted or denied by DHCP bindings.
<b>none</b>	Prevents all logging of packets permitted or denied by DHCP bindings.

## Defaults

All denied or dropped packets are logged.

## Command Modes

Configuration

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The **acl-match** and **dhcp-bindings** keywords merge with each other. When you set an ACL match configuration, the DHCP bindings configuration is not disabled. You can use the **no** form of this command to reset some of the logging criteria to their defaults. If you do not specify either option, all the logging types are reset to log on when the ARP packets are denied. The two options that are available to you are as follows:

- **acl-match**—Logging on ACL matches is reset to log on deny
- **dhcp-bindings**—Logging on DHCP binding compared is reset to log on deny

**Examples**

This example shows how to configure an ARP inspection on VLAN 1 to add packets to a log on matching against the ACLs with the **logging** keyword:

```
Switch# config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# ip arp inspection vlan 1 logging acl-match matchlog
Switch(config)# end
Switch# show ip arp inspection vlan 1
```

```
Source Mac Validation      : Enabled
Destination Mac Validation : Disabled
IP Address Validation      : Disabled
```

Vlan	Configuration	Operation	ACL Match	Static ACL
1	Enabled	Active		

```
Vlan      ACL Logging      DHCP Logging
-----
1         Acl-Match      Deny
```

Switch#

**Related Commands**

[arp access-list](#)  
[show ip arp inspection](#)

# ip cef load-sharing algorithm

To configure the load-sharing hash function so that the source TCP/UDP port, the destination TCP/UDP port, or both ports can be included in the hash in addition to the source and destination IP addresses, use the **ip cef load-sharing algorithm** command. To revert back to the default, which does not include the ports, use the **no** form of this command.

```
ip cef load-sharing algorithm {include-ports {source source | destination dest} | original |  
                                tunnel | universal}
```

```
no ip cef load-sharing algorithm {include-ports {source source | destination dest} | original |  
                                tunnel | universal}
```

## Syntax Description

<b>include-ports</b>	Specifies the algorithm that includes the Layer 4 ports.
<b>source</b> <i>source</i>	Specifies the source port in the load-balancing hash functions.
<b>destination</b> <i>dest</i>	Specifies the destination port in the load-balancing hash. Uses the source and destination in hash functions.
<b>original</b>	Specifies the original algorithm; not recommended.
<b>tunnel</b>	Specifies the algorithm for use in tunnel-only environments.
<b>universal</b>	Specifies the default Cisco IOS load-sharing algorithm.

## Defaults

Default load-sharing algorithm is disabled.



### Note

This option does not include the source or destination port in the load-balancing hash.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The original algorithm, tunnel algorithm, and universal algorithm are routed through the hardware. For software-routed packets, the algorithms are handled by the software. The **include-ports** option does not apply to the software-switched traffic.

## Examples

This example shows how to configure the IP CEF load-sharing algorithm that includes Layer 4 ports:

```
Switch(config)# ip cef load-sharing algorithm include-ports  
Switch(config)#
```

This example shows how to configure the IP CEF load-sharing algorithm that includes Layer 4 tunneling ports:

```
Switch(config)# ip cef load-sharing algorithm include-ports tunnel
Switch(config)#
```

**Related Commands**    [show ip cef vlan](#)

# ip dhcp snooping

To enable DHCP snooping globally, use the **ip dhcp snooping** command. To disable DHCP snooping, use the **no** form of this command.

**ip dhcp snooping**

**no ip dhcp snooping**

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

**Defaults** DHCP snooping is disabled.

**Command Modes** Global configuration

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** You must enable DHCP snooping globally before you can use DHCP snooping on a VLAN.

**Examples** This example shows how to enable DHCP snooping:

```
Switch(config)# ip dhcp snooping
Switch(config)#
```

This example shows how to disable DHCP snooping:

```
Switch(config)# no ip dhcp snooping
Switch(config)#
```

**Related Commands**

- [ip dhcp snooping information option](#)
- [ip dhcp snooping limit rate](#)
- [ip dhcp snooping trust](#)
- [ip dhcp snooping vlan](#)
- [show ip dhcp snooping](#)
- [show ip dhcp snooping binding](#)

# ip dhcp snooping binding

To set up and generate a DHCP binding configuration to restore bindings across reboots, use the **ip dhcp snooping binding** command. To disable the binding configuration, use the **no** form of this command.

**ip dhcp snooping binding** *mac-address* **vlan** *vlan-#* *ip-address* **interface** *interface* **expiry** *seconds*

**no ip dhcp snooping binding** *mac-address* **vlan** *vlan-#* *ip-address* **interface** *interface*

## Syntax Description

<i>mac-address</i>	Specifies a MAC address.
<b>vlan</b> <i>vlan-#</i>	Specifies a valid VLAN number.
<i>ip-address</i>	Specifies an IP address.
<b>interface</b> <i>interface</i>	Specifies an interface type and number.
<b>expiry</b> <i>seconds</i>	Specifies the interval (in seconds) after which binding is no longer valid.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.2(25)EW	Support for the 10-Gigabit Ethernet interface was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

Whenever a binding is added or removed using this command, the binding database is marked as changed and a write is initiated.

## Examples

This example shows how to generate a DHCP binding configuration on interface gigabitethernet1/1 in VLAN 1 with an expiration time of 1000 seconds:

```
Switch# ip dhcp snooping binding 0001.1234.1234 vlan 1 172.20.50.5 interface gi1/1 expiry 1000
Switch#
```

## Related Commands

[ip dhcp snooping](#)  
[ip dhcp snooping information option](#)  
[ip dhcp snooping trust](#)  
[ip dhcp snooping vlan](#)  
[show ip dhcp snooping](#)  
[show ip dhcp snooping binding](#)



# ip dhcp snooping database

To store the bindings that are generated by DHCP snooping, use the **ip dhcp snooping database** command. To either reset the timeout, reset the write-delay, or delete the agent specified by the URL, use the **no** form of this command.

**ip dhcp snooping database** { *url* | **timeout** *seconds* | **write-delay** *seconds* }

**no ip dhcp snooping database** { **timeout** | **write-delay** }

Syntax Description	
<i>url</i>	Specifies the URL in one of the following forms: <ul style="list-style-type: none"> <li>• tftp://&lt;host&gt;/&lt;filename&gt;</li> <li>• ftp://&lt;user&gt;:&lt;password&gt;@&lt;host&gt;/&lt;filename&gt;</li> <li>• rcp://&lt;user&gt;@&lt;host&gt;/&lt;filename&gt;</li> <li>• nvram:/&lt;filename&gt;</li> <li>• bootflash:/&lt;filename&gt;</li> </ul>
<b>timeout</b> <i>seconds</i>	Specifies when to abort the database transfer process after a change to the binding database.  The minimum value of the delay is 15 seconds. 0 is defined as an infinite duration.
<b>write-delay</b> <i>seconds</i>	Specifies the duration for which the transfer should be delayed after a change to the binding database.

## Defaults

The timeout value is set to 300 seconds (5 minutes).  
The write-delay value is set to 300 seconds.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

You need to create an empty file at the configured URL on network-based URLs (such as TFTP and FTP) before the switch can write the set of bindings for the first time at the URL.



### Note

Because both NVRAM and bootflash have limited storage capacity, using TFTP or network-based files is recommended. If you use flash to store the database file, new updates (by the agent) result in the creation of new files (flash fills quickly). In addition, due to the nature of the filesystem used on the flash, a large number of files cause access to be considerably slowed. When a file is stored in a remote location accessible through TFTP, an RPR/SSO standby supervisor engine can take over the binding list when a switchover occurs.

---

**Examples**

This example shows how to store a database file with the IP address 10.1.1.1 within a directory called directory. A file named file must be present on the TFTP server.

```
Switch# config terminal
Switch(config)# ip dhcp snooping database tftp://10.1.1.1/directory/file
Switch(config)# end
Switch# show ip dhcp snooping database
Agent URL : tftp://10.1.1.1/directory/file
Write delay Timer : 300 seconds
Abort Timer : 300 seconds

Agent Running : Yes
Delay Timer Expiry : Not Running
Abort Timer Expiry : Not Running

Last Succeeded Time : None
Last Failed Time : None
Last Failed Reason : No failure recorded.

Total Attempts      :          1   Startup Failures :          0
Successful Transfers :          0   Failed Transfers :          0
Successful Reads     :          0   Failed Reads    :          0
Successful Writes    :          0   Failed Writes   :          0
Media Failures       :          0

Switch#
```

---

**Related Commands**

[ip dhcp snooping](#)  
[ip dhcp snooping binding](#)  
[ip dhcp snooping information option](#)  
[ip dhcp snooping trust](#)  
[ip dhcp snooping vlan](#)  
[show ip dhcp snooping](#)  
[show ip dhcp snooping binding](#)

# ip dhcp snooping information option

To enable DHCP option 82 data insertion, use the **ip dhcp snooping information option** command. To disable DHCP option 82 data insertion, use the **no** form of this command.

**ip dhcp snooping information option**

**no ip dhcp snooping information option**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	DHCP option 82 data insertion is enabled.
-----------------	---

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to enable DHCP option 82 data insertion:
-----------------	---

```
Switch(config)# ip dhcp snooping information option
Switch(config)#
```

This example shows how to disable DHCP option 82 data insertion:
--

```
Switch(config)# no ip dhcp snooping information option
Switch(config)#
```

<b>Related Commands</b>	<a href="#">ip dhcp snooping</a> <a href="#">ip dhcp snooping limit rate</a> <a href="#">ip dhcp snooping trust</a> <a href="#">ip dhcp snooping vlan</a> <a href="#">show ip dhcp snooping</a> <a href="#">show ip dhcp snooping binding</a>
-------------------------	--

# ip dhcp snooping information option allow-untrusted

To allow DHCP packets with option 82 data inserted to be received from a snooping untrusted port, use the **ip dhcp snooping information option allow-untrusted** command. To disallow receipt of these DHCP packets, use the **no** form of this command.

**ip dhcp snooping information option allow-untrusted**

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

## Syntax Description

This command has no arguments or keywords.

## Defaults

DHCP packets with option 82 are not allowed on snooping untrusted ports.

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(25)EWA	Support for this command was introduced on the Catalyst 4500 series switch.

## Examples

This example shows how to allow DHCP packets with option 82 data inserted to be received from a snooping untrusted port:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# ip dhcp snooping information option allow-untrusted
Switch(config)# end
Switch#
```

## Related Commands

[ip dhcp snooping](#)  
[ip dhcp snooping limit rate](#)  
[ip dhcp snooping trust](#)  
[ip dhcp snooping vlan](#)  
[ip dhcp snooping information option](#)  
[show ip dhcp snooping](#)  
[show ip dhcp snooping binding](#)

# ip dhcp snooping limit rate

To configure the number of the DHCP messages that an interface can receive per second, use the **ip dhcp snooping limit rate** command. To disable the DHCP snooping rate limiting, use the **no** form of this command.

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

**no ip dhcp snooping limit rate**

<b>Syntax Description</b>	<i>rate</i> Number of DHCP messages a switch can receive per second.				
<b>Defaults</b>	DHCP snooping rate limiting is disabled.				
<b>Command Modes</b>	Interface configuration				
<b>Command History</b>	<table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>12.1(12c)EW</td><td>Support for this command was introduced on the Catalyst 4500 series switch.</td></tr> </table>	Release	Modification	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Release	Modification				
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.				
<b>Usage Guidelines</b>	Typically, the rate limit applies to the untrusted interfaces. If you want to set up rate limiting for the trusted interfaces, note that the trusted interfaces aggregate all DHCP traffic in the switch, and you will need to adjust the rate limit of the interfaces to a higher value.				
<b>Examples</b>	<p>This example shows how to enable the DHCP message rate limiting:</p> <pre>Switch(config-if)# ip dhcp snooping limit rate 150 Switch(config)#</pre> <p>This example shows how to disable the DHCP message rate limiting:</p> <pre>Switch(config-if)# no ip dhcp snooping limit rate Switch(config)#</pre>				
<b>Related Commands</b>	<a href="#">ip dhcp snooping</a> <a href="#">ip dhcp snooping information option</a> <a href="#">ip dhcp snooping trust</a> <a href="#">ip dhcp snooping vlan</a> <a href="#">show ip dhcp snooping</a> <a href="#">show ip dhcp snooping binding</a>				

# ip dhcp snooping trust

To configure an interface as trusted for DHCP snooping purposes, use the **ip dhcp snooping trust** command. To configure an interface as untrusted, use the **no** form of this command.

**ip dhcp snooping trust**

**no ip dhcp snooping trust**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	DHCP snooping trust is disabled.
-----------------	----------------------------------

<b>Command Modes</b>	Interface configuration
----------------------	-------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to enable DHCP snooping trust on an interface:
-----------------	---

```
Switch(config-if)# ip dhcp snooping trust
Switch(config)#
```

This example shows how to disable DHCP snooping trust on an interface:
--

```
Switch(config-if)# no ip dhcp snooping trust
Switch(config)#
```

<b>Related Commands</b>	<a href="#">ip dhcp snooping</a>
	<a href="#">ip dhcp snooping information option</a>
	<a href="#">ip dhcp snooping limit rate</a>
	<a href="#">ip dhcp snooping vlan</a>
	<a href="#">show ip dhcp snooping</a>
	<a href="#">show ip dhcp snooping binding</a>

# ip dhcp snooping vlan

Use the **ip dhcp snooping vlan** command to enable DHCP snooping on a VLAN. To disable DHCP snooping on a VLAN, use the **no** form of this command.

**ip dhcp snooping** [*vlan number*]

**no ip dhcp snooping** [*vlan number*]

Syntax Description	<i>vlan number</i>	(Optional) Single VLAN number or a range of VLANs; valid values are from 1 to 4094.
--------------------	--------------------	---

Defaults	DHCP snooping is disabled.
----------	----------------------------

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	DHCP snooping is enabled on a VLAN only if both the global snooping and the VLAN snooping are enabled.
------------------	--

**Examples** This example shows how to enable DHCP snooping on a VLAN:

```
Switch(config)# ip dhcp snooping vlan 10
Switch(config)#
```

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

```
Switch(config)# no ip dhcp snooping vlan 10
Switch(config)#
```

This example shows how to enable DHCP snooping on a group of VLANs:

```
Switch(config)# ip dhcp snooping vlan 10 55
Switch(config)#
```

This example shows how to disable DHCP snooping on a group of VLANs:

```
Switch(config)# no ip dhcp snooping vlan 10 55
Switch(config)#
```

---

Related Commands

[ip dhcp snooping](#)  
[ip dhcp snooping information option](#)  
[ip dhcp snooping limit rate](#)  
[ip dhcp snooping trust](#)  
[show ip dhcp snooping](#)  
[show ip dhcp snooping binding](#)



# ip igmp filter

To control whether all hosts on a Layer 2 interface can join one or more IP multicast groups by applying an IGMP profile to the interface, use the **ip igmp filter** command. To remove a profile from the interface, use the **no** form of this command.

**ip igmp filter** *profile number*

**no ip igmp filter**

Syntax Description	<i>profile number</i> IGMP profile number to be applied; valid values are from 1 to 429496795.	
Defaults	Profiles are not applied.	
Command Modes	Interface configuration	
Command History	Release	Modification
	12.1(11b)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	<p>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.</p> <p>An IGMP profile can be applied to one or more switch port interfaces, but one port can have only one profile applied to it.</p>	
Examples	<p>This example shows how to apply IGMP profile 22 to an interface.</p> <pre>Switch(config)# interface gigabitethernet1/1 Switch(config-if)# ip igmp filter 22 Switch(config-if)#</pre>	
Related Commands	<a href="#">ip igmp profile</a> <a href="#">show ip igmp profile</a>	

# ip igmp max-groups

To set the maximum number of IGMP groups that a Layer 2 interface can join, use the **ip igmp max-groups** command. To set the maximum back to the default, use the **no** form of this command.

**ip igmp max-groups** *number*

**no ip igmp max-groups**

Syntax Description	<i>number</i> Maximum number of IGMP groups that an interface can join; valid values are from 0 to 4294967294.	
Defaults	No maximum limit.	
Command Modes	Interface configuration	
Command History	Release	Modification
	12.1(11b)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	You can use the <b>ip igmp max-groups</b> command only on Layer 2 physical interfaces; you cannot set the IGMP maximum groups for the routed ports, the switch virtual interfaces (SVIs), or the ports that belong to an EtherChannel group.	
Examples	<p>This example shows how to limit the number of IGMP groups that an interface can join to 25:</p> <pre>Switch(config)# interface gigabitethernet1/1 Switch(config-if)# ip igmp max-groups 25 Switch(config-if)</pre>	

# ip igmp profile

To create an IGMP profile, use the **ip igmp profile** command. To delete the IGMP profile, use the **no** form of this command.

**ip igmp profile** *profile number*

**no ip igmp profile** *profile number*

Syntax Description	<i>profile number</i> IGMP profile number being configured; valid values are from 1 to 4294967295.	
Defaults	No profile created.	
Command Modes	Global configuration IGMP profile configuration	
Command History	Release	Modification
	12.1(11b)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	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 # <b>config terminal</b> Switch(config)# <b>ip igmp profile 40</b> Switch(config-igmp-profile)# <b>permit</b> Switch(config-igmp-profile)# <b>range 233.1.1.1 233.255.255.255</b> Switch(config-igmp-profile)#	
Related Commands	<a href="#">ip igmp filter</a> <a href="#">show ip igmp profile</a>	

# ip igmp query-interval

To configure the frequency that the switch sends the IGMP host-query messages, use the **ip igmp query-interval** command. To return to the default frequency, use the **no** form of this command.

**ip igmp query-interval** *seconds*

**no ip igmp query-interval**

<b>Syntax Description</b>	<i>seconds</i>	Frequency, in seconds, at which the IGMP host-query messages are transmitted; valid values depend on the IGMP snooping mode. See the “Usage Guidelines” section for more information.
---------------------------	----------------	---

<b>Defaults</b>	The query interval is set to 60 seconds.
-----------------	--

<b>Command Modes</b>	Interface configuration
----------------------	-------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	If you use the default IGMP snooping configuration, the valid query interval values are from 1 to 65535 seconds. If you have changed the default configuration to support CGMP as the IGMP snooping learning method, the valid query interval values are from 1 to 300 seconds.
-------------------------	---

The designated switch for a LAN is the only switch that sends the IGMP host-query messages. For IGMP version 1, the designated switch is elected according to the multicast routing protocol that runs on the LAN. For IGMP version 2, the designated querier is the lowest IP-addressed multicast switch on the subnet.

If no queries are heard for the timeout period (controlled by the **ip igmp query-timeout** command), the switch becomes the querier.



## Note

Changing the timeout period may severely impact multicast forwarding.

<b>Examples</b>	This example shows how to change the frequency at which the designated switch sends the IGMP host-query messages:
-----------------	---

```
Switch(config-if)# ip igmp query-interval 120
Switch(config-if)#
```

---

**Related Commands**

**ip igmp query-timeout** (refer to Cisco IOS documentation)  
**ip pim query-interval** (refer to Cisco IOS documentation)  
**show ip igmp groups** (refer to Cisco IOS documentation)

# ip igmp snooping

To enable IGMP snooping, use the **ip igmp snooping** command. To disable IGMP snooping, use the **no** form of this command.

**ip igmp snooping** [**tcn** {**flood query count** *count* | **query solicit**}]

**no ip igmp snooping** [**tcn** {**flood query count** *count* | **query solicit**}]

## Syntax Description

<b>tcn</b>	(Optional) Specifies the topology change configurations.
<b>flood</b>	(Optional) Specifies to flood the spanning-tree table to the network when a topology change occurs.
<b>query</b>	(Optional) Specifies the TCN query configurations.
<b>count</b> <i>count</i>	(Optional) Specifies how often the spanning-tree table is flooded; valid values are from 1 to 10.
<b>solicit</b>	(Optional) Specifies an IGMP general query.

## Defaults

IGMP snooping is enabled.

## Command Modes

Global configuration  
Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(11)EW	Support for flooding the spanning-tree table was added.

## Usage Guidelines

The **tcn flood** option applies only to Layer 2 switch ports and EtherChannels; it does not apply to routed ports, VLAN interfaces, or Layer 3 channels.

The **ip igmp snooping command** is disabled by default on multicast routers.



### Note

You can use the **tcn flood** option in interface configuration mode.

## Examples

This example shows how to enable IGMP snooping:

```
Switch(config)# ip igmp snooping
Switch(config)#
```

This example shows how to disable IGMP snooping:

```
Switch(config)# no ip igmp snooping
Switch(config)#
```

This example shows how to enable the flooding of the spanning-tree table to the network after nine topology changes have occurred:

```
Switch(config)# ip igmp snooping tcn flood query count 9
Switch(config)#
```

This example shows how to disable the flooding of the spanning-tree table to the network:

```
Switch(config)# no ip igmp snooping tcn flood
Switch(config)#
```

This example shows how to enable an IGMP general query:

```
Switch(config)# ip igmp snooping tcn query solicit
Switch(config)#
```

This example shows how to disable an IGMP general query:

```
Switch(config)# no ip igmp snooping tcn query solicit
Switch(config)#
```

---

**Related Commands**

[ip igmp snooping vlan immediate-leave](#)  
[ip igmp snooping vlan mrouter](#)  
[ip igmp snooping vlan static](#)

# ip igmp snooping report-suppression

To enable report suppression, use the **ip igmp snooping report-suppression** command. To disable report suppression and forward the reports to the multicast devices, use the **no** form of this command.

**ip igmp snooping report-suppression**

**no igmp snooping report-suppression**

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

**Defaults** IGMP snooping report-suppression is enabled.

**Command Modes** Global configuration

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** If the **ip igmp snooping report-suppression** command is disabled, all the IGMP reports are forwarded to the multicast devices.

If the command is enabled, report suppression is done by IGMP snooping.

**Examples** This example shows how to enable report suppression:

```
Switch(config)# ip igmp snooping report-suppression
Switch(config)#
```

This example shows how to disable report suppression:

```
Switch(config)# no ip igmp snooping report-suppression
Switch(config)#
```

This example shows how to display the system status for report suppression:

```
Switch# show ip igmp snoop
vlan 1
-----
IGMP snooping is globally enabled
IGMP snooping TCN solicit query is globally disabled
IGMP snooping global TCN flood query count is 2
IGMP snooping is enabled on this Vlan
IGMP snooping immediate-leave is disabled on this Vlan
IGMP snooping mrouter learn mode is pim-dvmrp on this Vlan
IGMP snooping is running in IGMP_ONLY mode on this Vlan
IGMP snooping report suppression is enabled on this Vlan
Switch#
```



---

Related Commands

[ip igmp snooping vlan immediate-leave](#)  
[ip igmp snooping vlan mrouter](#)  
[ip igmp snooping vlan static](#)

# ip igmp snooping vlan

To enable IGMP snooping for a VLAN, use the **ip igmp snooping vlan** command. To disable IGMP snooping, use the **no** form of this command.

**ip igmp snooping vlan** *vlan-id*

**no ip igmp snooping vlan** *vlan-id*

Syntax Description	<i>vlan-id</i> Number of the VLAN; valid values are from 1 to 1001 and from 1006 to 4094.
--------------------	---

Defaults	IGMP snooping is disabled.
----------	----------------------------

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended addressing was added.

Usage Guidelines	Before you can enable IGMP snooping on the Catalyst 4006 switches, you must configure the VLAN interface for multicast routing.
------------------	---

This command is entered in VLAN interface configuration mode only.

The **ip igmp snooping vlan** command is disabled by default on multicast routers.

Examples	This example shows how to enable IGMP snooping on a VLAN:
----------	---

```
Switch(config)# ip igmp snooping vlan 200
Switch(config)#
```

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

```
Switch(config)# no ip igmp snooping vlan 200
Switch(config)#
```

Related Commands	<b>ip igmp snooping vlan immediate-leave</b>
	<b>ip igmp snooping vlan mrouter</b>
	<b>ip igmp snooping vlan static</b>

# ip igmp snooping vlan explicit-tracking

To enable per-VLAN explicit host tracking, use the **ip igmp snooping vlan explicit-tracking** command. To disable explicit host tracking, use the **no** form of this command.

**ip igmp snooping vlan *vlan-id* explicit-tracking**

**no ip igmp snooping vlan *vlan-id* explicit-tracking**

Syntax Description	<i>vlan_id</i> (Optional) Specifies a VLAN; valid values are from 1 to 1001 and from 1006 to 4094.				
Defaults	Explicit host tracking is enabled.				
Command Modes	Configuration				
Command History	<table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>12.1(20)EW</td><td>Support for this command was introduced on the Catalyst 4500 series switch.</td></tr> </table>	Release	Modification	12.1(20)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Release	Modification				
12.1(20)EW	Support for this command was introduced on the Catalyst 4500 series switch.				

**Examples** This example shows how to disable IGMP explicit host tracking on interface VLAN 200 and how to verify the configuration:

```
Switch(config)# no ip igmp snooping vlan 200 explicit-tracking
Switch(config)# end
Switch# show ip igmp snooping vlan 200 | include explicit tracking
Global IGMP Snooping configuration:
-----
IGMP snooping           : Enabled
IGMPv3 snooping         : Enabled
Report suppression      : Enabled
TCN solicit query       : Disabled
TCN flood query count    : 2

Vlan 2:
-----
IGMP snooping           : Enabled
IGMPv2 immediate leave  : Disabled
Explicit host tracking   : Disabled
Multicast router learning mode : pim-dvmrp
CGMP interoperability mode : IGMP_ONLY
Explicit host tracking   : Disabled
Switch#
```

**Related Commands**

- [show ip igmp snooping membership](#)
- clear ip igmp snooping statistics vlan** (refer to Cisco IOS documentation)
- show ip igmp snooping statistics vlan** (refer to Cisco IOS documentation)

# ip igmp snooping vlan immediate-leave

To enable IGMP immediate-leave processing, use the **ip igmp snooping vlan immediate-leave** command. To disable immediate-leave processing, use the **no** form of this command.

**ip igmp snooping vlan *vlan\_num* immediate-leave**

**no ip igmp snooping vlan *vlan\_num* immediate-leave**

## Syntax Description

<i>vlan_num</i>	Number of the VLAN; valid values are from 1 to 4094.
<b>immediate-leave</b>	Enables immediate leave processing.

## Defaults

Immediate leave processing is disabled.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(12c)EW	Support for extended addressing was added.

## Usage Guidelines

You enter this command in global configuration mode only.

Use the immediate-leave feature only when there is a single receiver for the MAC group for a specific VLAN.

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 4:

```
Switch(config)# ip igmp snooping vlan 4 immediate-leave
Switch(config)#
```

This example shows how to disable IGMP immediate-leave processing on VLAN 4:

```
Switch(config)# no ip igmp snooping vlan 4 immediate-leave
Switch(config)#
```

## Related Commands

[ip igmp snooping](#)  
[ip igmp snooping vlan mrouter](#)  
[ip igmp snooping vlan static](#)  
[show ip igmp interface](#) (refer to Cisco IOS documentation)  
[show mac-address-table multicast](#)

# ip igmp snooping vlan mrouter

To statically configure an Layer 2 interface as a multicast router interface for a VLAN, use the **ip igmp snooping vlan mrouter** command. To remove the configuration, use the **no** form of this command.

```
ip igmp snooping vlan vlan-id mrouter {interface {{fastethernet slot/port} | {gigabitethernet slot/port} | {tengigabitethernet slot/port} | {port-channel number}} | {learn {cgmp | pim-dvmrp}}
```

```
no ip igmp snooping vlan vlan-id mrouter {interface {{fastethernet slot/port} | {gigabitethernet slot/port} | {tengigabitethernet slot/port} | {port-channel number}} | {learn {cgmp | pim-dvmrp}}
```

## Syntax Description

<b>vlan</b> <i>vlan-id</i>	Specifies the VLAN ID number to use in the command; valid values are from 1 to 4094.
<b>interface</b>	Specifies the next-hop interface to a multicast switch.
<b>fastethernet</b> <i>slot/port</i>	Specifies the Fast Ethernet interface; number of the slot and port.
<b>gigabitethernet</b> <i>slot/port</i>	Specifies the Gigabit Ethernet interface; number of the slot and port.
<b>tengigabitethernet</b> <i>slot/port</i>	Specifies the 10-Gigabit Ethernet interface; number of the slot and port.
<b>port-channel</b> <i>number</i>	Port-channel number; valid values are from 1 to 64.
<b>learn</b>	Specifies the multicast switch learning method.
<b>cgmp</b>	Specifies the multicast switch snooping CGMP packets.
<b>pim-dvmrp</b>	Specifies the multicast switch snooping PIM-DVMRP packets.

## Defaults

Multicast switch snooping PIM-DVMRP packets are specified.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(12c)EW	Support for extended addressing was added.
12.2(25)EW	Support for the 10-Gigabit Ethernet interface was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

You enter this command in VLAN interface configuration mode only.

The interface to the switch must be in the VLAN where you are entering the command. It must be both administratively up and line protocol up.

The CGMP learning method can decrease control traffic.

The learning method that you configure is saved in NVRAM.

The static connections to multicast interfaces are supported only on switch interfaces.

---

### Examples

This example shows how to specify the next-hop interface to a multicast switch:

```
Switch(config-if)# ip igmp snooping 400 mrouter interface fastethernet 5/6  
Switch(config-if)#
```

This example shows how to specify the multicast switch learning method:

```
Switch(config-if)# ip igmp snooping 400 mrouter learn cgmp  
Switch(config-if)#
```

---

### Related Commands

**ip igmp snooping**  
**ip igmp snooping vlan immediate-leave**  
**ip igmp snooping vlan static**  
**show ip igmp snooping**  
**show ip igmp snooping mrouter**

# ip igmp snooping vlan static

To configure a Layer 2 interface as a member of a group, use the **ip igmp snooping vlan static** command. To remove the configuration, use the **no** form of this command.

**ip igmp snooping vlan** *vlan\_num* **static** *mac-address* **{interface {fastethernet slot/port} | {gigabitethernet slot/port} | {tengigabitethernet slot/port} | {port-channel number}}**

**no ip igmp snooping vlan** *vlan\_num* **static** *mac-address* **{interface {fastethernet slot/port} | {gigabitethernet slot/port} | {tengigabitethernet mod/interface-number} | {port-channel number}}**

Syntax Description	<b>vlan</b> <i>vlan_num</i>	Number of the VLAN.
	<b>static</b> <i>mac-address</i>	Group MAC address.
	<b>interface</b>	Specifies the next-hop interface to multicast switch.
	<b>fastethernet</b> <i>slot/port</i>	Specifies the Fast Ethernet interface; number of the slot and port.
	<b>gigabitethernet</b> <i>slot/port</i>	Specifies the Gigabit Ethernet interface; number of the slot and port.
	<b>tengigabitethernet</b> <i>slot/port</i>	Specifies the 10-Gigabit Ethernet interface; number of the slot and port.
	<b>port-channel</b> <i>number</i>	Port-channel number; valid values are from 1 through 64.

**Defaults** This command has no default settings.

**Command Modes** Global configuration

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EW	Support for the 10-Gigabit Ethernet interface was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to configure a host statically on an interface:

```
Switch(config)# ip igmp snooping vlan 4 static 0100.5e02.0203 interface fastethernet 5/11
Configuring port FastEthernet5/11 on group 0100.5e02.0203 vlan 4
Switch(config)#
```

**Related Commands**

- [ip igmp snooping](#)
- [ip igmp snooping vlan immediate-leave](#)
- [ip igmp snooping vlan mrouter](#)
- [show mac-address-table multicast](#)

# ip local-proxy-arp

To enable the local proxy ARP feature, use the **ip local-proxy-arp** command. To disable the local proxy ARP feature, use the **no** form of this command.

**ip local-proxy-arp**

**no ip local-proxy-arp**

---

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

---

**Defaults** Local proxy ARP is disabled.

---

**Command Modes** Interface configuration

---

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---



---

**Usage Guidelines** Use this feature only on subnets where hosts are intentionally prevented from communicating directly to the switch on which they are connected.

ICMP redirect is disabled on interfaces where the local proxy ARP feature is enabled.

---

**Examples** This example shows how to enable the local proxy ARP feature:

```
Switch(config-if) # ip local-proxy-arp
Switch(config-if) #
```



# ip mfib fastdrop

To enable MFIB fast drop, use the **ip mfib fastdrop** command. To disable MFIB fast drop, use the **no** form of this command.

**ip mfib fastdrop**

**no ip mfib fastdrop**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	MFIB fast drop is enabled.
-----------------	----------------------------

<b>Command Modes</b>	EXEC
----------------------	------

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	<p>This example shows how to enable MFIB fast drops:</p> <pre>Switch# ip mfib fastdrop Switch#</pre>
-----------------	--

<b>Related Commands</b>	<p><a href="#">clear ip mfib fastdrop</a></p> <p><a href="#">show ip mfib fastdrop</a></p>
-------------------------	--

# ip route-cache flow

To enable NetFlow statistics for IP routing, use the **ip route-cache flow** command. To disable NetFlow statistics, use the **no** form of this command.

**ip route-cache flow [infer-fields]**

**no ip route-cache flow [infer-fields]**

<b>Syntax Description</b>	<b>infer-fields</b> (Optional) Includes the NetFlow fields as inferred by the software: Input identifier, Output identifier, and Routing information.
---------------------------	---

<b>Defaults</b>	NetFlow statistics is disabled. Inferred information is excluded.
-----------------	--

<b>Command Modes</b>	Configuration
----------------------	---------------

<b>Command History</b>	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switches.
	12.1(19)EW	Command enhanced to support infer fields.

<b>Usage Guidelines</b>	To use these commands, you need to install the Supervisor Engine IV and the NetFlow Service Card.
	The NetFlow statistics feature captures a set of traffic statistics. These traffic statistics include the source IP address, destination IP address, Layer 4 port information, protocol, input and output identifiers, and other routing information that can be used for network analysis, planning, accounting, billing and identifying DoS attacks.

NetFlow switching is supported on IP and IP-encapsulated traffic over all interface types.

If you enter the **ip route-cache flow infer-fields** command after the **ip route-cache flow** command, you will purge the existing cache, and vice versa. This action is done to avoid having flows with and without inferred fields in the cache simultaneously.

For additional information on NetFlow switching, refer to the *Catalyst 4500 Series Switch Cisco IOS Software Configuration Guide*.



## Note

NetFlow consumes additional memory and CPU resources compared to other switching modes. You need to know the resources required on your switch before enabling NetFlow.

---

**Examples**

This example shows how to enable NetFlow switching on the switch:

```
Switch# config terminal  
Switch(config)# ip route-cache flow  
Switch(config)# exit  
Switch#
```

**Note**

---

This command does not work on a per-interface basis.

---

# ip source binding

To add or delete a static IP source binding entry, use the **ip source binding** command. To delete the corresponding IP source binding entry, use the **no** form of this command.

**ip source binding** *ip-address mac-address* **vlan** *vlan-id* **interface** *interface-name*

**no ip source binding** *ip-address mac-address* **vlan** *vlan-id* **interface** *interface-name*

## Syntax Description

<i>ip-address</i>	Binding IP address.
<i>mac-address</i>	Binding MAC address.
<b>vlan</b> <i>vlan-id</i>	VLAN number.
<b>interface</b> <i>interface-name</i>	Binding interface.

## Defaults

This command has no default settings.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The **ip source binding** command is used to add a static IP source binding entry only.

The **no** form of this command deletes the corresponding IP source binding entry. For the deletion to succeed, all required parameters must match.

Each static IP binding entry is keyed by a MAC address and VLAN number. If the CLI contains an existing MAC and VLAN, the existing binding entry will be updated with the new parameters; a separate binding entry will not be created.

## Examples

This example shows how to configure the static IP source binding:

```
Switch# config terminal
Switch(config)# ip source binding 11.0.0.1 0000.000A.000B vlan 10 interface
fastethernet6/10
Switch(config)#
```

## Related Commands

[show ip source binding](#)

# ip sticky-arp

To enable sticky ARP, use the **ip sticky-arp** command. Use the **no** form of this command to disable sticky ARP.

**ip sticky-arp**

**no ip sticky-arp**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Enabled
-----------------	---------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>This command is supported on PVLANS only.</p> <p>ARP entries that are learned on Layer3 PVLAN interfaces are sticky ARP entries. (You should display and verify ARP entries on the PVLAN interface using the <b>show arp</b> command).</p> <p>For security reasons, sticky ARP entries on the PVLAN interface do not age out. Connecting new equipment with the same IP address generates a message and the ARP entry is not created.</p> <p>Because the ARP entries on the PVLAN interface do not age out, you must manually remove ARP entries on the PVLAN interface if a MAC address changes.</p> <p>Unlike static entries, sticky-ARP entries are not stored and restored when you enter the <b>reboot</b> and <b>restart</b> commands.</p>
-------------------------	---

<b>Examples</b>	<p>This example shows how to enable sticky ARP:</p> <pre>Switch# configure terminal Enter configuration commands, one per line. End with CNTL/Z. Switch(config) ip sticky-arp Switch(config)# end Switch#</pre>
-----------------	---

	<p>This example shows how to disable sticky ARP:</p> <pre>Switch# configure terminal Enter configuration commands, one per line. End with CNTL/Z. Switch(config) no ip sticky-arp Switch(config)# end Switch#</pre>
--	---

---

**Related Commands****arp** (refer to Cisco IOS documentation)**show arp** (refer to Cisco IOS documentation)

# ip verify header vlan all

To enable IP header validation for Layer 2-switched IPv4 packets, use the **ip verify header vlan all** command. To disable the IP header validation, use the **no** form of this command.

**ip verify header vlan all**

**no ip verify header vlan all**

## Syntax Description

This command has no default settings.

## Defaults

The IP header is validated for bridged and routed IPv4 packets.

## Command Modes

Configuration

## Command History

Release	Modification
12.1(20)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

This command does not apply to Layer 3-switched (routed) packets.

The Catalyst 4500 series switch checks the validity of the following fields in the IPv4 header for all switched IPv4 packets:

- The version must be 4.
- The header length must be greater than or equal to 20 bytes.
- The total length must be greater than or equal to four times the header length and greater than the Layer 2 packet size minus the Layer 2 encapsulation size.

If an IPv4 packet fails the IP header validation, the packet is dropped. If you disable the header validation, the packets with the invalid IP headers are bridged but are not routed even if routing was intended. The IPv4 access lists also are not applied to the IP headers.

## Examples

This example shows how to disable the IP header validation for the Layer 2-switched IPv4 packets:

```
Switch# config terminal
Switch(config)# no ip verify header vlan all
Switch(config)# end
Switch#
```

# ip verify source vlan dhcp-snooping

To enable IP source guard on DHCP snooping on untrusted Layer 2 interfaces, use the **ip verify source vlan dhcp-snooping** command. To disable IP source guard on DHCP snooping on untrusted Layer 2 interfaces, use the **no** form of this command.

**ip verify source vlan dhcp-snooping [port-security]**

**no ip verify source vlan dhcp-snooping [port-security]**

Syntax Description	<b>port-security</b> (Optional) Filters both source IP and MAC addresses using the port security feature.	
Defaults	IP source guard is disabled.	
Command Modes	Global configuration	
Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	Interface configuration	
Examples	<p>This example shows how to enable DHCP snooping security on VLANs 10 through 20:</p> <pre>Switch# config terminal Enter configuration commands, one per line. End with CNTL/Z. Switch(config)# ip dhcp snooping vlan 10 20 Switch(config)# interface fastethernet6/1  Switch(config-if)# switchport trunk encapsulation dot1q Switch(config-if)# switchport mode trunk Switch(config-if)# switchport access vlan 10 Switch(config-if)# no ip dhcp snooping trust Switch(config-if)# ip verify source vlan dhcp-snooping Switch(config)# end</pre>	
Related Commands	<p><b>debug ip verify source packet</b> (refer to Cisco IOS documentation)</p> <p><b>ip dhcp snooping</b></p> <p><b>ip dhcp snooping limit rate</b></p> <p><b>ip dhcp snooping information option</b></p> <p><b>ip dhcp snooping trust</b></p> <p><b>ip source binding</b> (refer to Cisco IOS documentation)</p> <p><b>show ip dhcp snooping</b></p> <p><b>show ip dhcp snooping binding</b></p> <p><b>show ip verify source</b> (refer to Cisco IOS documentation)</p> <p><b>show ip source binding</b> (refer to Cisco IOS documentation)</p>	



# l2protocol-tunnel

To enable protocol tunneling on an interface, use the **l2protocol-tunnel** command. You can enable tunneling for the Cisco Discovery Protocol (CDP), Spanning Tree Protocol (STP), or VLAN Trunking Protocol (VTP) packets. To disable tunneling on the interface, use the **no** form of this command.

**l2protocol-tunnel** [**cdp** | **stp** | **vtp**]

**no l2protocol-tunnel** [**cdp** | **stp** | **vtp**]

Syntax Description	<b>cdp</b>	(Optional) Enables tunneling of CDP.
	<b>stp</b>	(Optional) Enables tunneling of STP.
	<b>vtp</b>	(Optional) Enables tunneling of VTP.

**Defaults** The default is no Layer 2 protocol packets are tunneled.

**Command Modes** Interface configuration

Command History	Release	Modification
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** You must enter this command, with or without protocol types, to tunnel Layer 2 packets.

Layer 2 protocol tunneling across a service-provider network ensures that Layer 2 information is propagated across the network to all customer locations. When protocol tunneling is enabled, protocol packets are encapsulated with a well known Cisco multicast address for transmission across the network. When the packets reach their destination, the well-known MAC address is replaced by the Layer 2 protocol MAC address.

You can enable Layer 2 protocol tunneling for CDP, STP, and VTP individually or for all three protocols.

**Examples** This example shows how to enable protocol tunneling for the CDP packets:

```
Switch(config-if)# l2protocol-tunnel cdp
Switch(config-if)#
```

**Related Commands**

- [l2protocol-tunnel cos](#)
- [l2protocol-tunnel drop-threshold](#)
- [l2protocol-tunnel shutdown-threshold](#)

# l2protocol-tunnel cos

To configure the class of service (CoS) value for all tunneled Layer 2 protocol packets, use the **l2protocol-tunnel cos** command. To return to the default value of zero, use the **no** form of this command.

**l2protocol-tunnel cos** *value*

**no l2protocol-tunnel cos**

<b>Syntax Description</b>	<i>value</i> Specifies the CoS priority value for tunneled Layer 2 protocol packets. The range is 0 to 7, with 7 being the highest priority.
---------------------------	--

<b>Defaults</b>	The default is to use the CoS value that is configured for data on the interface. If no CoS value is configured, the default is 5 for all tunneled Layer 2 protocol packets.
-----------------	--

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	This command was first introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	When enabled, the tunneled Layer 2 protocol packets use this CoS value. The value is saved in NVRAM.
-------------------------	---

<b>Examples</b>	This example shows how to configure a Layer-2 protocol tunnel CoS value of 7:  Switch(config)# <b>l2protocol-tunnel cos 7</b> Switch(config)#
-----------------	--

<b>Related Commands</b>	<a href="#">l2protocol-tunnel</a> <a href="#">l2protocol-tunnel drop-threshold</a> <a href="#">l2protocol-tunnel shutdown-threshold</a>
-------------------------	---

# l2protocol-tunnel drop-threshold

To set a drop threshold for the maximum rate of Layer 2 protocol packets per second to be received before an interface drops packets, use the **l2protocol-tunnel drop-threshold** command. You can set the drop threshold for the Cisco Discovery Protocol (CDP), Spanning Tree Protocol (STP), or VLAN Trunking Protocol (VTP) packets. To disable the drop threshold on the interface, use the **no** form of this command.

**l2protocol-tunnel drop-threshold** [**cdp** | **stp** | **vtp**] *value*

**no l2protocol-tunnel drop-threshold** [**cdp** | **stp** | **vtp**] *value*

Syntax Description	<b>cdp</b>	(Optional) Specifies a drop threshold for CDP.
	<b>stp</b>	(Optional) Specifies a drop threshold for STP.
	<b>vtp</b>	(Optional) Specifies a drop threshold for VTP.
	<i>value</i>	Specifies a threshold in packets per second to be received for encapsulation before the interface shuts down, or specifies the threshold before the interface drops packets. The range is 1 to 4096. The default is no threshold.

Defaults	The default is no drop threshold for the number of the Layer 2 protocol packets.
----------	--

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

Command History	Release	Modification
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>The <b>l2protocol-tunnel drop-threshold</b> command controls the number of protocol packets per second that are received on an interface before it drops packets. When no protocol option is specified with a keyword, the threshold is applied to each of the tunneled Layer 2 protocol types. If you also set a shutdown threshold on the interface, the drop-threshold value must be less than or equal to the shutdown-threshold value.</p>
------------------	--

When the drop threshold is reached, the interface drops the Layer 2 protocol packets until the rate at which they are received is below the drop threshold.

Examples	This example shows how to configure the drop threshold rate:
----------	--

```
Switch(config-if)# l2protocol-tunnel drop-threshold cdp 50
Switch(config-if)#
```

■ `l2protocol-tunnel drop-threshold`

---

**Related Commands**

[l2protocol-tunnel](#)

[l2protocol-tunnel cos](#)

[l2protocol-tunnel shutdown-threshold](#)

# l2protocol-tunnel shutdown-threshold

To configure the protocol tunneling encapsulation rate, use the **l2protocol-tunnel shutdown-threshold** command. You can set the encapsulation rate for the Cisco Discovery Protocol (CDP), Spanning Tree Protocol (STP), or VLAN Trunking Protocol (VTP) packets. To disable the encapsulation rate on the interface, use the **no** form of this command.

**l2protocol-tunnel shutdown-threshold** [cdp | stp | vtp] *value*

**no l2protocol-tunnel shutdown-threshold** [cdp | stp | vtp] *value*

Syntax Description	<b>cdp</b>	(Optional) Specifies a shutdown threshold for CDP.
	<b>stp</b>	(Optional) Specifies a shutdown threshold for STP.
	<b>vtp</b>	(Optional) Specifies a shutdown threshold for VTP.
	<i>value</i>	Specifies a threshold in packets per second to be received for encapsulation before the interface shuts down. The range is 1 to 4096. The default is no threshold.

Defaults	The default is no shutdown threshold for the number of Layer 2 protocol packets.
----------	--

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

Command History	Release	Modification
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>The <b>l2-protocol-tunnel shutdown-threshold</b> command controls the number of protocol packets per second that are received on an interface before it shuts down. When no protocol option is specified with the keyword, the threshold is applied to each of the tunneled Layer 2 protocol types. If you also set a drop threshold on the interface, the shutdown-threshold value must be greater than or equal to the drop-threshold value.</p>
------------------	---

When the shutdown threshold is reached, the interface is error disabled. If you enable error recovery by entering the **errdisable recovery cause l2ptguard** command, the interface is brought out of the error-disabled state and allowed to retry the operation again when all the causes have timed out. If the error recovery feature generation is not enabled for **l2ptguard**, the interface stays in the error-disabled state until you enter the **shutdown** and **no shutdown** commands.

Examples	This example shows how to configure the maximum rate:
----------	---

```
Switch(config-if)# l2protocol-tunnel shutdown-threshold cdp 50
Switch(config-if)#
```

■ l2protocol-tunnel shutdown-threshold

---

**Related Commands**

[l2protocol-tunnel](#)  
[l2protocol-tunnel cos](#)  
[l2protocol-tunnel shutdown-threshold](#)

# lacp port-priority

To set the LACP priority for the physical interfaces, use the **lacp port-priority** command.

**lacp port-priority** *priority*

Syntax Description	<i>priority</i> Priority for the physical interfaces; valid values are from 1 to 65535.
--------------------	---

Defaults	Priority is set to 32768.
----------	---------------------------

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

Command History	Release	Modification
	12.1(13)EW	This command was introduced on the Catalyst 4500 series switches.

Usage Guidelines	This command is not supported on the systems that are configured with a Supervisor Engine I.
	You must assign each port in the switch a port priority that can be specified automatically or by entering the <b>lacp port-priority</b> command. The port priority is used with the port number to form the port identifier. The port priority is used to decide which ports should be put in standby mode when there is a hardware limitation that prevents all compatible ports from aggregating.
	Although this command is a global configuration command, the <i>priority</i> value is supported only on port channels with LACP-enabled physical interfaces. This command is supported on LACP-enabled interfaces.
	When setting the priority, the higher numbers indicate lower priorities.

Examples	This example shows how to set the priority for the interface:
----------	---

```
Switch(config-if)# lacp port-priority 23748
Switch(config-if)#
```

Related Commands	<a href="#">channel-group</a> <a href="#">channel-protocol</a> <a href="#">lacp system-priority</a> <a href="#">show lacp</a>
------------------	--

# lacp system-priority

To set the priority of the system for LACP, use the **lacp system-priority** command.

**lacp system-priority** *priority*

Syntax Description	<i>priority</i> Priority of the system; valid values are from 1 to 65535.
--------------------	---

Defaults	Priority is set to 32768.
----------	---------------------------

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

Command History	Release	Modification
	12.1(13)EW	This command was introduced on the Catalyst 4500 series switches.

Usage Guidelines	This command is not supported on systems that are configured with a Supervisor Engine I.
	You must assign each switch that is running LACP a system priority that can be specified automatically or by entering the <b>lacp system-priority</b> command. The system priority is used with the switch MAC address to form the system ID and is also used during negotiation with other systems.
	Although this command is a global configuration command, the <i>priority</i> value is supported on port channels with LACP-enabled physical interfaces.
	When setting the priority, the higher numbers indicate lower priorities.
	You can also enter the <b>lacp system-priority</b> command in interface configuration mode. After you enter the command, the system defaults to global configuration mode.

Examples	This example shows how to set the system priority:
	Switch(config)# <b>lacp system-priority 23748</b>
	Switch(config)#

Related Commands	<a href="#">channel-group</a> <a href="#">channel-protocol</a> <a href="#">lacp port-priority</a> <a href="#">show lacp</a>
------------------	--



# logging event link-status global (global configuration)

To change the default switch-wide global link-status event messaging settings, use the **logging event link-status global** command. Use the **no** form of this command to disable the link-status event messaging.

**logging event link-status global**

**no logging event link-status global**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	The global link-status messaging is disabled.
-----------------	---

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(25)SG	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	If link-status logging event is not configured at the interface level, this global link-status setting takes effect for each interface.
-------------------------	---

<b>Examples</b>	This example shows how to globally enable link status message on each interface:
-----------------	--

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# logging event link-status global
Switch(config)# end
Switch#
```

<b>Related Commands</b>	<a href="#">logging event link-status global (global configuration)</a>
-------------------------	---

# logging event link-status (interface configuration)

To enable the link-status event messaging on an interface, use the **logging event link-status** command. Use the **no** form of this command to disable link-status event messaging. Use the **logging event link-status use-global** command to apply the global link-status setting.

**logging event link-status**

**no logging event link-status**

**logging event link-status use-global**

## Defaults

Global link-status messaging is enabled.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.2(25)SG	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

To enable system logging of interface state-change events on a specific interface, enter the **logging event link-status** command in interface configuration mode.

To enable system logging of interface state-change events on all interfaces in the system, enter the **logging event link-status global** command in global configuration mode. All interfaces without the state change event configuration use the global setting.

## Examples

This example shows how to enable logging event state-change events on interface g11/1:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface g11/1
Switch(config-if)# logging event link-status
Switch(config-if)# end
Switch#
```

This example shows how to turn off logging event link status regardless of the global setting:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface g11/1
Switch(config-if)# no logging event link-status
Switch(config-if)# end
Switch#
```

This example shows how to enable the global event link-status setting on interface g11/1:

```
Switch# config terminal  
Enter configuration commands, one per line.  End with CNTL/Z.  
Switch(config)# interface g11/1  
Switch(config-if)# logging event link-status use-global  
Switch(config-if)# end  
Switch#
```

---

**Related Commands**

**logging event link-status global (global configuration)**

# logging event trunk-status global (global configuration)

To enable the trunk-status event messaging globally, use the **logging event trunk-status global** command. Use the **no** form of this command to disable trunk-status event messaging.

**logging event trunk-status global**

**no logging event trunk-status global**

---

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

---

**Defaults** Global trunk-status messaging is disabled.

---

**Command Modes** Global configuration

---

Release	Modification
12.2(25)SG	Support for this command was introduced on the Catalyst 4500 series switch.

---



---

**Usage Guidelines** If trunk-status logging event is not configured at the interface level, the global trunk-status setting takes effect for each interface.

---

**Examples** This example shows how to globally enable link status messaging on each interface:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# logging event trunk-status global
Switch(config)# end
Switch#
```

---

**Related Commands** [logging event trunk-status global \(global configuration\)](#)

# logging event trunk-status (interface configuration)

To enable the trunk-status event messaging on an interface, use the **logging event trunk-status** command. Use the **no** form of this command to disable the trunk-status event messaging. Use the **logging event trunk-status use-global** command to apply the global trunk-status setting.

**logging event trunk-status**

**no logging event trunk-status**

**logging event trunk-status use-global**

## Defaults

Global trunk-status messaging is enabled.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.2(25)SG	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

To enable system logging of interface state-change events on a specific interface, enter the **logging event trunk-status** command in interface configuration mode.

To enable system logging of interface state-change events on all interfaces in the system, enter the **logging event trunk-status use-global** command in global configuration mode. All interfaces without the state change event configuration use the global setting.

## Examples

This example shows how to enable logging event state-change events on interface gi11/1:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gi11/1
Switch(config-if)# logging event trunk-status
Switch(config-if)# end
Switch#
```

This example shows how to turn off logging event trunk status regardless of the global setting:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gi11/1
Switch(config-if)# no logging event trunk-status
Switch(config-if)# end
Switch#
```

**logging event trunk-status (interface configuration)**

This example shows how to enable the global event trunk-status setting on interface g11/1:

```
Switch# config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)# interface g11/1  
Switch(config-if)# logging event trunk-status use-global  
Switch(config-if)# end  
Switch#
```

**Related Commands**

**logging event trunk-status global (global configuration)**

# mac access-list extended

To define the extended MAC access lists, use the **mac access-list extended** command. To remove the MAC access lists, use the **no** form of this command.

**mac access-list extended** *name*

**no mac access-list extended** *name*

Syntax Description	<i>name</i> ACL to which the entry belongs.				
Defaults	MAC access lists are not defined.				
Command Modes	Global configuration				
Command History	<table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>12.1(12c)EW</td><td>Support for this command was introduced on the Catalyst 4500 series switch.</td></tr> </table>	Release	Modification	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Release	Modification				
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.				

Usage Guidelines	<p>When you enter the ACL name, follow these naming conventions:</p> <ul style="list-style-type: none"> <li>• Maximum of 31 characters long and can include a-z, A-Z, 0-9, the dash character (-), the underscore character (_), and the period character (.)</li> <li>• Must start with an alpha character and must be unique across all ACLs of all types</li> <li>• Case sensitive</li> <li>• Cannot be a number</li> <li>• Must not be a keyword; keywords to avoid are all, default-action, map, help, and editbuffer</li> </ul>
------------------	---

When you enter the **mac access-list extended** *name* command, you use the **[no] {permit | deny} [{src-mac mask | any} [dest-mac mask]] [protocol-family {appletalk | arp-non-ipv4 | decnet | ipx | ipv6 | rarp-ipv4 | rarp-non-ipv4 | vines | xns}]** subset to create or delete entries in a MAC layer access list.

[Table 2-8](#) describes the syntax of the **mac access-list extended** subcommands.

**Table 2-8** *mac access-list extended Subcommands*

Subcommand	Description
<b>deny</b>	Prevents access if the conditions are matched.
<b>no</b>	(Optional) Deletes a statement from an access list.
<b>permit</b>	Allows access if the conditions are matched.
<i>src-mac mask</i>	Source MAC address in the form: <i>source-mac-address source-mac-address-mask.</i>
<b>any</b>	Specifies any protocol type.

**Table 2-8** *mac access-list extended Subcommands (continued)*

Subcommand	Description
<i>dest-mac mask</i>	(Optional) Destination MAC address in the form: <i>dest-mac-address dest-mac-address-mask</i> .
<i>protocol-family</i>	(Optional) Name of the protocol family. <a href="#">Table 2-9</a> lists which packets are mapped to a particular protocol family.

[Table 2-9](#) describes mapping an Ethernet packet to a protocol family.

**Table 2-9** *Mapping an Ethernet Packet to a Protocol Family*

Protocol Family	Ethertype in Packet Header
Appletalk	0x809B, 0x80F3
Arp-Non-Ipv4	0x0806 and protocol header of Arp is a non-Ip protocol family
Decnet	0x6000-0x6009, 0x8038-0x8042
Ipx	0x8137-0x8138
Ipv6	0x86DD
Rarp-Ipv4	0x8035 and protocol header of Rarp is Ipv4
Rarp-Non-Ipv4	0x8035 and protocol header of Rarp is a non-Ipv4 protocol family
Vines	0x0BAD, 0x0BAE, 0x0BAF
Xns	0x0600, 0x0807

When you enter the *src-mac mask* or *dest-mac mask* value, follow these guidelines:

- Enter the MAC addresses as three 4-byte values in dotted hexadecimal format such as 0030.9629.9f84.
- Enter the MAC address masks as three 4-byte values in dotted hexadecimal format. Use 1 bit as a wildcard. For example, to match an address exactly, use 0000.0000.0000 (can be entered as 0.0.0).
- For the optional *protocol* parameter, you can enter either the EtherType or the keyword.
- Entries without a *protocol* parameter match any protocol.
- The access list entries are scanned in the order that you enter them. The first matching entry is used. To improve performance, place the most commonly used entries near the beginning of the access list.
- An implicit **deny any any** entry exists at the end of an access list unless you include an explicit **permit any any** entry at the end of the list.
- All new entries to an existing list are placed at the end of the list. You cannot add entries to the middle of a list.



---

**Examples**

This example shows how to create a MAC layer access list named `mac_layer` that denies traffic from 0000.4700.0001, which is going to 0000.4700.0009, and permits all other traffic:

```
Switch(config)# mac access-list extended mac_layer
Switch(config-ext-macl)# deny 0000.4700.0001 0.0.0 0000.4700.0009 0.0.0 protocol-family appletalk
Switch(config-ext-macl)# permit any any
Switch(config-ext-macl)# end
Switch#
```

---

**Related Commands**

[show vlan access-map](#)

# mac-address-table aging-time

To configure the aging time for the entries in the Layer 2 table, use the **mac-address-table aging-time** command. To reset the *seconds* value to the default setting, use the **no** form of this command.

**mac-address-table aging-time** *seconds* [**vlan** *vlan\_id*]

**no mac-address-table aging-time** *seconds* [**vlan** *vlan\_id*]

Syntax Description	<i>seconds</i>	Aging time in seconds; valid values are 0 and from 10 to 1000000 seconds.
	<b>vlan</b> <i>vlan_id</i>	(Optional) Single VLAN number or a range of VLANs; valid values are from 1 to 4094.

**Defaults** Aging time is set to 300 seconds.

**Command Modes** Global configuration

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended addressing was added.

**Usage Guidelines** If you do not enter a VLAN, the change is applied to all routed-port VLANs.  
Enter 0 seconds to disable aging.

**Examples** This example shows how to configure the aging time to 400 seconds:

```
Switch(config)# mac-address-table aging-time 400
Switch(config)#
```

This example shows how to disable aging:

```
Switch(config)# mac-address-table aging-time 0
Switch(config)
```

**Related Commands** [show mac-address-table aging-time](#)

# mac-address-table dynamic group protocols

To enable the learning of MAC addresses in both the “ip” and “other” protocol buckets, even though the incoming packet may belong to only one of the protocol buckets, use the **mac-address-table dynamic group protocols** command. To disable grouped learning, use the **no** form of this command.

**mac-address-table dynamic group protocols {ip | other} {ip | other}**

**[no] mac-address-table dynamic group protocols {ip | other} {ip | other}**

Syntax Description	<b>ip</b>	Specifies the “ip” protocol bucket.
	<b>other</b>	Specifies the “other” protocol bucket.

**Defaults** The group learning feature is disabled.

**Command Modes** global configuration

Command History	Release	Modification
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The entries within the “ip” and “other” protocol buckets are created according to the protocol of the incoming traffic.

When you use the **mac-address-table dynamic group protocols** command, an incoming MAC address that might belong to either the “ip” or the “other” protocol bucket, is learned on both protocol buckets. Therefore, any traffic destined to this MAC address and belonging to any of the protocol buckets is unicasted to that MAC address, rather than flooded. This reduces the unicast Layer 2 flooding that might be caused if the incoming traffic from a host belongs to a different protocol bucket than the traffic that is destined to the sending host.

**Examples** This example shows that the MAC addresses are initially assigned to either the “ip” or the “other” protocol bucket:

```
Switch# show mac-address-table dynamic
Unicast Entries
  vlan  mac address      type      protocols      port
-----+-----+-----+-----+-----
    1   0000.0000.5000   dynamic  other          GigabitEthernet1/1
    1   0001.0234.6616   dynamic  ip              GigabitEthernet3/1
    1   0003.3178.ec0a   dynamic  assigned       GigabitEthernet3/1
    1   0003.4700.24c3   dynamic  ip              GigabitEthernet3/1
    1   0003.4716.f475   dynamic  ip              GigabitEthernet3/1
    1   0003.4748.75c5   dynamic  ip              GigabitEthernet3/1
    1   0003.47f0.d6a3   dynamic  ip              GigabitEthernet3/1
    1   0003.47f6.a91a   dynamic  ip              GigabitEthernet3/1
```

```

1      0003.ba06.4538      dynamic ip      GigabitEthernet3/1
1      0003.fd63.3eb4      dynamic ip      GigabitEthernet3/1
1      0004.2326.18a1      dynamic ip      GigabitEthernet3/1
1      0004.5a5d.de53      dynamic ip      GigabitEthernet3/1
1      0004.5a5e.6ecc      dynamic ip      GigabitEthernet3/1
1      0004.5a5e.f60e      dynamic ip      GigabitEthernet3/1
1      0004.5a5f.06f7      dynamic ip      GigabitEthernet3/1
1      0004.5a5f.072f      dynamic ip      GigabitEthernet3/1
1      0004.5a5f.08f6      dynamic ip      GigabitEthernet3/1
1      0004.5a5f.090b      dynamic ip      GigabitEthernet3/1
1      0004.5a88.b075      dynamic ip      GigabitEthernet3/1
1      0004.c1bd.1b40      dynamic ip      GigabitEthernet3/1
1      0004.c1d8.b3c0      dynamic ip      GigabitEthernet3/1
1      0004.c1d8.bd00      dynamic ip      GigabitEthernet3/1
1      0007.e997.74dd      dynamic ip      GigabitEthernet3/1
1      0007.e997.7e8f      dynamic ip      GigabitEthernet3/1
1      0007.e9ad.5e24      dynamic ip      GigabitEthernet3/1
1      000b.5f0a.f1d8      dynamic ip      GigabitEthernet3/1
1      000b.fdf3.c498      dynamic ip      GigabitEthernet3/1
1      0010.7be8.3794      dynamic assigned GigabitEthernet3/1
1      0012.436f.c07f      dynamic ip      GigabitEthernet3/1
1      0050.0407.5fe1      dynamic ip      GigabitEthernet3/1
1      0050.6901.65af      dynamic ip      GigabitEthernet3/1
1      0050.da6c.81cb      dynamic ip      GigabitEthernet3/1
1      0050.dad0.af07      dynamic ip      GigabitEthernet3/1
1      00a0.ccd7.20ac      dynamic ip      GigabitEthernet3/1
1      00b0.64fd.1c23      dynamic ip      GigabitEthernet3/1
1      00b0.64fd.2d8f      dynamic assigned GigabitEthernet3/1
1      00d0.b775.c8bc      dynamic ip      GigabitEthernet3/1
1      00d0.b79e.de1d      dynamic ip      GigabitEthernet3/1
1      00e0.4c79.1939      dynamic ip      GigabitEthernet3/1
1      00e0.4c7b.d765      dynamic ip      GigabitEthernet3/1
1      00e0.4c82.66b7      dynamic ip      GigabitEthernet3/1
1      00e0.4c8b.f83e      dynamic ip      GigabitEthernet3/1
1      00e0.4cbc.a04f      dynamic ip      GigabitEthernet3/1
1      0800.20cf.8977      dynamic ip      GigabitEthernet3/1
1      0800.20f2.82e5      dynamic ip      GigabitEthernet3/1
Switch#

```

This example shows how to assign MAC addresses that belong to either the “ip” or the “other” bucket to both buckets:

```

Switch(config)# mac-address-table dynamic group protocols ip other
Switch(config)# exit
Switch# show mac address-table dynamic
Unicast Entries

```

vlan	mac address	type	protocols	port
1	0000.0000.5000	dynamic	ip, other	GigabitEthernet1/1
1	0001.0234.6616	dynamic	ip, other	GigabitEthernet3/1
1	0003.4700.24c3	dynamic	ip, other	GigabitEthernet3/1
1	0003.4716.f475	dynamic	ip, other	GigabitEthernet3/1
1	0003.4748.75c5	dynamic	ip, other	GigabitEthernet3/1
1	0003.47c4.06c1	dynamic	ip, other	GigabitEthernet3/1
1	0003.47f0.d6a3	dynamic	ip, other	GigabitEthernet3/1
1	0003.47f6.a91a	dynamic	ip, other	GigabitEthernet3/1
1	0003.ba0e.24a1	dynamic	ip, other	GigabitEthernet3/1
1	0003.fd63.3eb4	dynamic	ip, other	GigabitEthernet3/1
1	0004.2326.18a1	dynamic	ip, other	GigabitEthernet3/1
1	0004.5a5d.de53	dynamic	ip, other	GigabitEthernet3/1
1	0004.5a5d.de55	dynamic	ip, other	GigabitEthernet3/1
1	0004.5a5e.6ecc	dynamic	ip, other	GigabitEthernet3/1
1	0004.5a5e.f60e	dynamic	ip, other	GigabitEthernet3/1
1	0004.5a5f.08f6	dynamic	ip, other	GigabitEthernet3/1

```

1      0004.5a5f.090b    dynamic ip,other      GigabitEthernet3/1
1      0004.5a64.f813    dynamic ip,other      GigabitEthernet3/1
1      0004.5a66.1a77    dynamic ip,other      GigabitEthernet3/1
1      0004.5a6b.56b2    dynamic ip,other      GigabitEthernet3/1
1      0004.5a6c.6a07    dynamic ip,other      GigabitEthernet3/1
1      0004.5a88.b075    dynamic ip,other      GigabitEthernet3/1
1      0004.c1bd.1b40    dynamic ip,other      GigabitEthernet3/1
1      0004.c1d8.b3c0    dynamic ip,other      GigabitEthernet3/1
1      0004.c1d8.bd00    dynamic ip,other      GigabitEthernet3/1
1      0005.dce0.7c0a    dynamic assigned      GigabitEthernet3/1
1      0007.e997.74dd    dynamic ip,other      GigabitEthernet3/1
1      0007.e997.7e8f    dynamic ip,other      GigabitEthernet3/1
1      0007.e9ad.5e24    dynamic ip,other      GigabitEthernet3/1
1      0007.e9c9.0bc9    dynamic ip,other      GigabitEthernet3/1
1      000b.5f0a.f1d8    dynamic ip,other      GigabitEthernet3/1
1      000b.fdf3.c498    dynamic ip,other      GigabitEthernet3/1
1      0012.436f.c07f    dynamic ip,other      GigabitEthernet3/1
1      0050.0407.5fe1    dynamic ip,other      GigabitEthernet3/1
1      0050.6901.65af    dynamic ip,other      GigabitEthernet3/1
1      0050.da6c.81cb    dynamic ip,other      GigabitEthernet3/1
1      0050.dad0.af07    dynamic ip,other      GigabitEthernet3/1
1      00a0.ccd7.20ac    dynamic ip,other      GigabitEthernet3/1
1      00b0.64fd.1b84    dynamic assigned      GigabitEthernet3/1
1      00d0.b775.c8bc    dynamic ip,other      GigabitEthernet3/1
1      00d0.b775.c8ee    dynamic ip,other      GigabitEthernet3/1
1      00d0.b79e.de1d    dynamic ip,other      GigabitEthernet3/1
1      00e0.4c79.1939    dynamic ip,other      GigabitEthernet3/1
1      00e0.4c7b.d765    dynamic ip,other      GigabitEthernet3/1
1      00e0.4c82.66b7    dynamic ip,other      GigabitEthernet3/1
1      00e0.4c8b.f83e    dynamic ip,other      GigabitEthernet3/1
1      00e0.4c8c.0861    dynamic ip,other      GigabitEthernet3/1
1      0800.20d1.bf09    dynamic ip,other      GigabitEthernet3/1
Switch#

```

**Related Commands**     **mac-address-table dynamic** (refer to Cisco IOS documentation)

# mac-address-table notification

To enable MAC address notification on a switch, use the **mac-address-table notification** command. To return to the default setting, use the **no** form of this command

**mac-address-table notification** { **change** [**history-size** *hs\_value*] | [**interval** *intv\_value*]} | [**mac-move**] | [**threshold** [**limit** *percentage*] | [**interval** *time*]}

**no mac-address-table notification** { **change** [**history-size** *hs\_value*] | [**interval** *intv\_value*]} | [**mac-move**] | [**threshold** [**limit** *percentage*] | [**interval** *time*]}

<b>Syntax Description</b>	<b>change</b>	(Optional) Specifies enabling MAC change notification.
	<b>history-size</b> <i>hs_value</i>	(Optional) Maximum number of entries in the MAC change notification history table. The range is 0 to 500 entries.
	<b>interval</b> <i>intv_value</i>	(Optional) Notification trap interval, set interval time between two consecutive traps. The range is 0 to 2,147,483,647 seconds.
	<b>mac-move</b>	(Optional) Specifies enabling MAC move notification.
	<b>threshold</b>	(Optional) Specifies enabling MAC threshold notification.
	<b>limit</b> <i>percentage</i>	(Optional) Specifies the percentage of MAT utilization threshold; valid values are from 1 to 100 percent.
	<b>interval</b> <i>time</i>	(Optional) Specifies the time between MAC threshold notifications; valid values are greater than or equal to 120 seconds.

## Defaults

MAC address notification feature is disabled.

The default MAC change trap interval value is 1 second.

The default number of entries in the history table is 1.

MAC move notification is disabled.

MAC threshold monitoring feature is disabled.

The default limit is 50 percent.

The default time is 120 seconds.

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch

---

**Usage Guidelines**

We can enable the MAC change notification feature by using the **mac address-table notification change** command. We must also enable MAC notification traps on an interface by using the **snmp trap mac-notification change interface** configuration command and configure the switch to send MAC change traps to the NMS by using the **snmp-server enable traps mac-notification** global configuration command.

When the *history-size* option is configured, the existing MAC change history table is deleted, and a new table is created.

---

**Examples**

This example shows how to set the MAC address notification history table size to 300 entries:

```
Switch(config)# mac-address-table notification change history-size 300
Switch(config)#
```

This example shows how to set the MAC address notification interval time to 1250 seconds:

```
Switch(config)# mac-address-table notification change interval 1250
Switch(config)#
```

---

**Related Commands**

[clear mac-address-table](#)  
[show mac-address-table notification](#)  
[snmp-server enable traps](#)  
[snmp trap mac-notification change](#)

# mac-address-table static

To configure the static MAC addresses for a VLAN interface or drop unicast traffic for a MAC address for a VLAN interface, use the **mac-address-table static** command. To remove the static MAC address configurations, use the **no** form of this command.

**mac-address-table static** *mac-addr* {**vlan** *vlan-id*} {**interface** *type* | **drop**}

**no mac-address-table static** *mac-addr* {**vlan** *vlan-id*} {**interface** *type*} {**drop**}

Syntax Description	<i>mac-addr</i>	MAC address; optional when using the <b>no</b> form of this command.
	<b>vlan</b> <i>vlan-id</i>	VLAN and valid VLAN number; valid values are from 1 to 4094.
	<b>interface</b> <i>type</i>	Interface type and number; valid options are <b>FastEthernet</b> and <b>GigabitEthernet</b> .
	<b>drop</b>	Drops all traffic received from and going to the configured MAC address in the specified VLAN.

**Defaults** This command has no default settings.

**Command Modes** Global configuration

Command History	<b>Release</b>	<b>Modification</b>
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switches.

**Usage Guidelines**

- When a static MAC address is installed, it is associated with a port.
- The output interface specified must be a Layer 2 interface and not an SVI.
- If you do not enter a protocol type, an entry is automatically created for each of the four protocol types.
- Entering the **no** form of this command does not remove the system MAC addresses.
- When removing a MAC address, entering **interface** *int* is optional. For unicast entries, the entry is removed automatically. For multicast entries, if you do not specify an interface, the entire entry is removed. You can specify the selected ports to be removed by specifying the interface.

**Examples** This example shows how to add the static entries to the MAC address table:

```
Switch(config)# mac-address-table static 0050.3e8d.6400 vlan 100 interface fastethernet5/7
Switch(config)#
```

**Related Commands** [show mac-address-table static](#)



# macro apply cisco-desktop

To enable the Cisco-recommended features and settings that are suitable for connecting a switch port to a standard desktop, use the **macro apply cisco-desktop** command.

**macro apply cisco-desktop \$AVID access\_vlanid**

<b>Syntax Description</b>	<b>\$AVID access_vlanid</b> Specifies an access VLAN ID.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Interface configuration
----------------------	-------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>This command can only be viewed and applied; it cannot be modified.</p> <p>Ensure that the existing configuration on the interface does not conflict with the intended macro configuration. Before you apply the macro, clear the configuration on the interface with the <b>default interface</b> command.</p>
-------------------------	--

<b>Examples</b>	This example shows how to enable the Cisco-recommended features and settings on port fa2/1:
-----------------	---

```
Switch(config)# interface FastEthernet2/1
Switch(config-if)# macro apply cisco-desktop $AVID 50
Switch(config-if)#
```

The contents of this macro are as follows:

```
# Basic interface - Enable data VLAN only
# Recommended value for access vlan (AVID) should not be 1
switchport access vlan $AVID [access_vlanid]
switchport mode access
# Enable port security limiting port to a single
# MAC address -- that of desktop
switchport port-security
# Ensure port-security age is greater than one minute
# and use inactivity timer
# "Port-security maximum 1" is the default and will not
# Show up in the config
switchport port-security violation restrict
switchport port-security aging time 2
switchport port-security aging type inactivity
# Configure port as an edge network port
spanning-tree portfast
spanning-tree bpduguard enable
```

■ `macro apply cisco-desktop`

---

**Related Commands**

[macro apply cisco-phone](#)  
[macro apply cisco-router](#)  
[macro apply cisco-switch](#)

# macro apply cisco-phone

To enable the Cisco-recommended features and settings that are suitable for connecting a switch port to a standard desktop and a Cisco IP phone, use the **macro apply cisco-phone** command.

**macro apply cisco-phone \$AVID access\_vlanid \$VVID voice\_vlanid**

Syntax Description	<b>\$AVID access_vlanid</b>	Specifies an access VLAN ID.
	<b>\$VVID voice_vlanid</b>	Specifies a voice VLAN ID.

**Defaults** This command has no default settings.

**Command Modes** Interface configuration

Command History	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** This command can only be viewed and applied; it cannot be modified.

Ensure that the existing configuration on the interface does not conflict with the intended macro configuration. Before you apply the macro, clear the configuration on the interface with the **default interface** command.

**Examples** This example shows how to enable the Cisco-recommended features and settings on port fa2/1:

```
Switch(config)# interface FastEthernet2/1
Switch(config-if)# macro apply cisco-phone $AVID 10 $VVID 50
Switch(config-if)#
```

The contents of this macro are as follows:

```
# VoIP enabled interface - Enable data VLAN
# and voice VLAN (VVID)
# Recommended value for access vlan (AVID) should not be 1\
switchport access vlan $AVID [access_vlan_id]
switchport mode access
# Update the Voice VLAN (VVID) value which should be
# different from data VLAN
# Recommended value for voice vlan (VVID) should not be 1
switchport voice vlan $VVID [voice_vlan_id]
# Enable port security limiting port to a 3 MAC
# addressees -- One for desktop and two for phone
switchport port-security
switchport port-security maximum 3
# Ensure port-security age is greater than one minute
# and use inactivity timer
switchport port-security violation restrict
switchport port-security aging time 2
```

**macro apply cisco-phone**

```
switchport port-security aging type inactivity
# Enable auto-qos to extend trust to attached Cisco phone
auto qos voip cisco-phone
# Configure port as an edge network port
spanning-tree portfast
spanning-tree bpduguard enable@
```

**Related Commands**

**macro apply cisco-desktop**  
**macro apply cisco-router**  
**macro apply cisco-switch**

# macro apply cisco-router

To enable the Cisco-recommended features and settings that are suitable for connecting a switch port to a router, use the **macro apply cisco-router** command.

**macro apply cisco-router \$NVID native\_vlanid**

Syntax Description	<b>\$NVID native_vlanid</b> Specifies a native VLAN ID.
--------------------	---

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

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

Command History	Release	Modification
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>This command can only be viewed and applied; it cannot be modified.</p> <p>Ensure that the existing configuration on the interface does not conflict with the intended macro configuration. Before you apply the <b>macro apply cisco-router</b> command, clear the configuration on the interface with the <b>default interface</b> command.</p>
------------------	--

Examples	This example shows how to enable the Cisco-recommended features and settings on port fa2/1:
----------	---

```
Switch(config)# interface FastEthernet2/1
Switch(config-if)# macro apply cisco-router $NVID 80
Switch(config-if)#
```

The contents of this macro are as follows:

```
# Access Uplink to Distribution
switchport trunk encapsulation dot1q
# Define unique Native VLAN on trunk ports
# Recommended value for native vlan (NVID) should not be 1
switchport trunk native vlan $NVID [native_vlan_id]
# Update the allowed VLAN range (VRANGE) such that it
# includes data, voice and native VLANs
# switchport trunk allowed vlan $VRANGE [vlan_range]
# Hardcode trunk and disable negotiation to
# speed up convergence
# Hardcode speed and duplex to router
switchport mode trunk
switchport nonegotiate
speed 100
duplex full
# Configure qos to trust this interface
auto qos voip trust
qos trust dscp
```

**macro apply cisco-router**

```
# Ensure fast access to the network when enabling the interface.  
# Ensure that switch devices cannot become active on the interface.  
spanning-tree portfast  
spanning-tree bpduguard enable
```

**Related Commands**

**macro apply cisco-desktop**  
**macro apply cisco-phone**  
**macro apply cisco-switch**

# macro apply cisco-switch

To enable the Cisco-recommended features and settings that are suitable for connecting a switch port to another switch, use the **macro apply cisco-switch** command.

**macro apply cisco-switch \$NVID native\_vlanid**

<b>Syntax Description</b>	<b>\$NVID native_vlanid</b> Specifies a native VLAN ID.
---------------------------	---

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Interface configuration
----------------------	-------------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	This command can only be viewed and applied; it cannot be modified.
	Ensure that the existing configuration on the interface does not conflict with the intended macro configuration. Before you apply this macro, clear the configuration on the interface with the <b>default interface</b> command.

<b>Examples</b>	This example shows how to enable the Cisco-recommended features and settings on port fa2/1:
-----------------	---

```
Switch(config)# interface FastEthernet2/1
Switch(config-if)# macro apply cisco-switch $NVID 45
Switch(config-if)#
```

The contents of this macro are as follows:

```
# Access Uplink to Distribution
switchport trunk encapsulation dot1q
# Define unique Native VLAN on trunk ports
# Recommended value for native vlan (NVID) should not be 1
switchport trunk native vlan $NVID [native_vlan_id]
# Update the allowed VLAN range (VRANGE) such that it
# includes data, voice and native VLANs
# switchport trunk allowed vlan $VRANGE
# Hardcode trunk and disable negotiation to
# speed up convergence
switchport mode trunk
switchport nonegotiate
# Configure qos to trust this interface
auto qos voip trust
# 802.1w defines the link as pt-pt for rapid convergence
spanning-tree link-type point-to-point
```

■ macro apply cisco-switch

---

Related Commands    [macro apply cisco-desktop](#)  
                          [macro apply cisco-phone](#)  
                          [macro apply cisco-router](#)



# macro global apply cisco-global

To apply the system-defined default template to the switch, use the **macro global apply cisco-global** global configuration command on the switch stack or on a standalone switch.

## macro global apply cisco-global

<b>Syntax Description</b>	This command has no keywords or variables.
---------------------------	--

<b>Defaults</b>	This command has no default setting.
-----------------	--------------------------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch

<b>Examples</b>	<p>These examples show how to apply the system-defined default to the switch:</p> <pre>Switch(config)#<b>macro global apply cisco-global</b> Changing VTP domain name from gsg-vtp to [smartports] Device mode already VTP TRANSPARENT. Switch(config)#</pre>
-----------------	---

# macro global apply system-cpp

To apply the control plane policing default template to the switch, use the **macro global apply system-cpp** global configuration command on the switch stack or on a standalone switch.

## macro global apply system-cpp

**Syntax Description** This command has no keywords or variables.

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

**Command Modes** Global configuration

Command History	Release	Modification
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch
	12.2(25)SE1	This command was introduced.
	12.2(25)FX	This command was introduced.

**Usage Guidelines**

**Examples** These examples show how to apply the system-defined default to the switch:

```
Switch (config)# macro global apply system-cpp
Switch (config)#
```

**Related Commands** [macro global apply cisco-global](#)  
[macro global description](#)

# macro global description

To enter a description about the macros that are applied to the switch, use the **macro global description** global configuration command on the switch stack or on a standalone switch. Use the no form of this command to remove the description.

**macro global description** *text*

**no macro global description** *text*

## Syntax Description

**description** *text* Enter a description about the macros that are applied to the switch.

## Defaults

This command has no default setting.

## Command Modes

Global configuration

## Command History

Release	Modification
12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch
12.2(25)SE1	This command was introduced.
12.2(25)FX	This command was introduced.

## Usage Guidelines

Use the **description** keyword to associate comment text, or the macro name, with a switch. When multiple macros are applied on a switch, the description text will be from the last applied macro.

This example shows how to add a description to a switch:

```
Switch(config)# macro global description uddl aggressive mode enabled
```

You can verify your settings by entering the **show parser macro description** privileged EXEC command.

## Related Commands

[macro global apply cisco-global](#)

# main-cpu

To enter the main CPU submode and manually synchronize the configurations on the two supervisor engines, use the **main-cpu** command.

## main-cpu

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

**Defaults** This command has no default settings.

**Command Modes** Redundancy

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch (Catalyst 4507R only).

**Usage Guidelines** The main CPU submode is used to manually synchronize the configurations on the two supervisor engines.

From the main CPU submode, use the **auto-sync** command to enable automatic synchronization of the configuration files in NVRAM.



### Note

After you enter the main CPU submode, you can use the **auto-sync** command to automatically synchronize the configuration between the primary and secondary route processors based on the primary configuration. In addition, you can use all of the redundancy commands that are applicable to the main CPU.

**Examples** This example shows how to reenable the default automatic synchronization feature using the auto-sync standard command to synchronize the startup-config and config-register configuration of the active supervisor engine with the standby supervisor engine. The updates for the boot variables are automatic and cannot be disabled.

```
Switch(config)# redundancy
Switch(config-red)# main-cpu
Switch(config-r-mc)# auto-sync standard
Switch(config-r-mc)# end
Switch# copy running-config startup-config
Switch#
```

**Related Commands** [auto-sync](#)

# match

To specify a match clause by selecting one or more ACLs for a VLAN access-map sequence, use the **match** subcommand. To remove the match clause, use the **no** form of this command.

**match** {**ip address** {*acl-number* | *acl-name*}} | {**mac address** *acl-name*}

**no match** {**ip address** {*acl-number* | *acl-name*}} | {**mac address** *acl-name*}



## Note

If a match clause is not specified, the action for the VLAN access-map sequence is applied to all packets. All packets are matched against that sequence in the access map.

## Syntax Description

<b>ip address</b> <i>acl-number</i>	Selects one or more IP ACLs for a VLAN access-map sequence; valid values are from 1 to 199 and from 1300 to 2699.
<b>ip address</b> <i>acl-name</i>	Selects an IP ACL by name.
<b>mac address</b> <i>acl-name</i>	Selects one or more MAC ACLs for a VLAN access-map sequence.

## Defaults

This command has no default settings.

## Command Modes

VLAN access-map

## Command History

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The match clause specifies the IP or MAC ACL for traffic filtering.

The MAC sequence is not effective for IP packets. IP packets should be access controlled by IP match clauses.

Refer to the *Catalyst 4500 Series Switch Cisco IOS Software Configuration Guide* for additional configuration guidelines and restrictions.

Refer to the *Cisco IOS Command Reference* publication for additional **match** command information.

## Examples

This example shows how to define a match clause for a VLAN access map:

```
Switch(config)# vlan access-map ganymede 10
Switch(config-access-map)# match ip address 13
Switch(config-access-map)#
```

## Related Commands

[show vlan access-map](#)  
[vlan access-map](#)

# match flow ip

To specify match criteria to treat flows with a unique source or destination address as new flows, use the **match flow ip** command. To disable this function, use the **no** form of this command.

**match flow ip** {source-address [ip destination-address ip protocol L4 source-address L4 destination-address] | destination-address}

**no match flow ip** {source-address [ip destination-address ip protocol L4 source-address L4 destination-address] | destination-address}

Syntax Description	<b>source-address</b>	Establishes a new flow from a flow with a unique IP source address.
	<b>ip destination-address ip protocol L4 source-address L4 destination-address</b>	Comprises the full flow keyword; treats each flow with unique IP source, destination, protocol, and Layer 4 source and destination address as a new flow.
	<b>destination-address</b>	Establishes a new flow from a flow with a unique IP destination address.

Defaults None.

Command Modes class-map configuration submode

Command History	Release	Modification
	12.2(25)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)SG	Support for the full flow option was added.

**Usage Guidelines**

When you specify the source-address keyword, each flow with a unique source address is treated as a new flow.

When you specify the destination-address keyword, each flow with a unique destination address is treated as a new flow.

A policy map is called a *flow-based* policy map when you configure the flow keywords on the class map that it uses. To attach a flow-based policy map as a child to an aggregate policy map, use the **service-policy** command.



## Note

The **match flow** command is available on the Catalyst 4500 series switch only when Supervisor Engine VI (WS-X4516-10GE) is present.

**Examples** This example shows how to create a flow-based class map associated with a source address:

```
Switch(config)# class-map match-all c1
Switch(config-cmap)# match flow ip source-address
```

```
Switch(config-cmap)# end
Switch#
Switch# show class-map c1
Class Map match-all c1 (id 2)
  Match flow ip source-address
Switch#
```

This example shows how to create a flow-based class map associated with a destination address:

```
Switch(config)# class-map match-all c1
Switch(config-cmap)# match flow ip destination-address
Switch(config-cmap)# end
Switch#

Switch# show class-map c1
  Class Map match-all c1 (id 2)
    Match flow ip destination-address
Switch#
```

Assume there are two active flows on the Fast Ethernet interface 6/1 with source addresses 192.168.10.20 and 192.168.10.21. The following example shows how to maintain each flow to 1 Mbps with an allowed burst value of 9000 bytes:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# class-map c1
Switch(config-cmap)# match flow ip source-address
Switch(config-cmap)# exit
Switch(config)# policy-map p1
Switch(config-pmap)# class c1
Switch(config-pmap-c)# police 1000000 9000
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface fastethernet6/1
Switch(config-if)# service-policy input p1
Switch(config-if)# end
Switch# write memory
```

```
Switch# show policy-map interface
FastEthernet6/1

Service-policy input: p1

Class-map: c1 (match-all)
  15432182 packets
  Match: flow ip source-address
  police: Per-interface
    Conform: 64995654 bytes Exceed: 2376965424 bytes

Class-map: class-default (match-any)
  0 packets
  Match: any
    0 packets
Switch#
```

This example shows two active flows on the Fast Ethernet interface 6/1 with destination addresses of 192.168.20.20 and 192.168.20.21. The following example shows how to maintain each flow to 1 Mbps with an allowed burst value of 9000 bytes:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# class-map c1
Switch(config-cmap)# match flow ip destination-address
Switch(config-cmap)# exit
```

```

Switch(config)# policy-map p1
Switch(config-pmap)# class c1
Switch(config-pmap-c)# police 1000000 9000
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface fastethernet6/1
Switch(config-if)# service-policy input p1
Switch(config-if)# end
Switch# write memory

Switch# show policy-map interface
FastEthernet6/1

Service-policy input: p1

Class-map: c1 (match-all)
  2965072 packets
  Match: flow ip destination-address
  police: Per-interface
    Conform: 6105636 bytes Exceed: 476652528 bytes

Class-map: class-default (match-any)
  0 packets
  Match: any
    0 packets
Switch#

```

Assume there are two active flows as shown below on the Fast Ethernet interface 6/1:

SrcIp	DstIp	IpProt	SrcL4Port	DstL4Port
192.168.10.10	192.168.20.20	20	6789	81
192.168.10.10	192.168.20.20	20	6789	21

With the following configuration, each flow is policed to a 1000000 bps with an allowed 9000-byte burst value.



#### Note

If you use the **match flow ip source-address|destination-address** command, these two flows are consolidated into one flow because they have the same source and destination address.

```

Switch# conf terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# class-map c1
Switch(config-cmap)# match flow ip source-address ip destination-address ip protocol 14
source-port 14 destination-port
Switch(config-cmap)# exit
Switch(config)# policy-map p1
Switch(config-pmap)# class c1
Switch(config-pmap-c)# police 1000000 9000
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface fastEthernet 6/1
Switch(config-if)# service-policy input p1
Switch(config-if)# end
Switch# write memory
Switch# show policy-map interface
FastEthernet6/1

class-map c1
  match flow ip source-address ip destination-address ip protocol 14 source-port 14
  destination-port

```



```
!
policy-map p1
  class c1
    police 1000000 bps 9000 byte conform-action transmit exceed-action drop
!
interface FastEthernet 6/1
  service-policy input p1

Switch# show class-map c1
Class Map match-all c1 (id 2)
  Match flow ip source-address ip destination-address ip protocol 14 source-port 14
  destination-port

Switch# show policy-map p1
Policy Map p1
  Class c1
    police 1000000 bps 9000 byte conform-action transmit exceed-action drop

Switch# show policy-map interface
FastEthernet6/1

  Service-policy input: p1

    Class-map: c1 (match-all)
      15432182 packets
      Match: flow ip source-address ip destination-address ip protocol 14 source-port 14
      destination-port
      police: Per-interface
        Conform: 64995654 bytes Exceed: 2376965424 bytes

    Class-map: class-default (match-any)
      0 packets
      Match: any
        0 packets
Switch#
```

---

**Related Commands**

[service-policy](#)  
[show class-map](#)  
[show policy-map](#)  
[show policy-map interfaces](#) (refer to Cisco IOS documentation)

# media-type

To select the connector for a dual-mode capable port, use the **media-type** command.

**media-type { rj45 | sfp }**

Syntax Description	<b>rj45</b>	Uses the RJ-45 connector.
	<b>sfp</b>	Uses the SFP connector.

Defaults	<b>sfp</b>
----------	------------

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

Command History	Release	Modification
	12.2(20)EWA	Support for this command was introduced for the WS-X4306-GB-T module and the WS-X4948 chassis.

Usage Guidelines	This command is supported on all ports on the WS-X4306-GB-T module and ports 1/45-48 on the WS-X4948 chassis.
	Entering the <b>show interface capabilities</b> command provides the Multiple Media Types field, which displays the value <b>no</b> if a port is not dual-mode capable and lists the media types ( <b>sfp</b> and <b>rj45</b> ) for dual-mode capable ports.

Examples	This example shows how to configure port 5/45 on a WS-X4948 chassis to use the RJ-45 connector:
	<pre>Switch(config)# interface gigabitethernet 5/45 Switch(config-if)# media-type rj45</pre>

# mode

To set the redundancy mode, use the **mode** command.

**mode { rpr | sso }**

Syntax Description	<b>rpr</b>	Specifies RPR mode.
	<b>sso</b>	Specifies SSO mode.

## Defaults

For Catalyst 4500 series switches that are configured with Supervisor Engine II+, Supervisor Engine IV, and Supervisor Engine V, the defaults are as follows:

- SSO, if the supervisor engine is using Cisco IOS Release 12.2(20)EWA.
- RPR, if the supervisor engine is using Cisco IOS Release 12.1(12c)EW through Release 12.2(18)EW, as well as Release 12.1(xx)E.



**Note** If you are upgrading the current supervisor engine from Release 12.2(18)EW or an earlier release to Release 12.2(20)EWA, and the RPR mode has been saved to the startup configuration, both supervisor engines will continue to operate in RPR mode after the software upgrade. To use SSO mode, you must manually change the redundancy mode to SSO.

## Command Modes

Redundancy configuration

## Command History

Release	Modification
12.2(20)EWA	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

RPR and SSO mode are not supported on Catalyst 4500 series switches that are configured with Supervisor Engine II.

The **mode** command can be entered only from within redundancy configuration mode.

Follow these guidelines when configuring your system to RPR or SSO mode:

- You must use identical Cisco IOS images and supervisor engines to support RPR and SSO mode. Redundancy may not work due to differences between the Cisco IOS release and supervisor engine capabilities.
- Any modules that are not online at the time of a switchover are reset and reloaded on a switchover.
- If you perform an OIR of the module within 60 seconds before a stateful switchover, the module resets during the stateful switchover and the port states are restarted.
- The FIB tables are cleared on a switchover. Routed traffic is interrupted until route tables reconverge.

The redundant supervisor engine reloads on any mode change and begins to work in the current mode.

---

**Examples**

This example shows how to set the redundancy mode to SSO:

```
Switch(config)# redundancy  
Switch(config-red)# mode sso  
Switch(config-red)#
```

---

**Related Commands**

[redundancy](#)  
[redundancy force-switchover](#)  
[show redundancy](#)  
[show running-config](#)

# monitor session

To enable the SPAN sessions on interfaces or VLANs, use the **monitor session** command. To remove one or more source or destination interfaces from a SPAN session, or a source VLAN from a SPAN session, use the **no** form of this command.

```
monitor session session { destination interface { FastEthernet interface-number |
GigabitEthernet interface-number } [ encapsulation { isl | dot1q } ] [ ingress [ vlan vlan_id ]
[ learning ] ] } | { remote vlan vlan_id } | { source { interface { FastEthernet interface-number |
GigabitEthernet interface-number | Port-channel interface-number } } | [ vlan vlan_id ]
| { remote vlan vlan_id } | { cpu [ queue queue_id ] } [ , | - rx | tx | both ] } | { filter { ip
access-group [ name | id ] } { vlan vlan_id [ , | - ] } | { packet-type { good | bad } } | { address-type
{ unicast | multicast | broadcast } [ rx | tx | both ] }
```

```
no monitor session session { destination interface { FastEthernet interface-number |
GigabitEthernet interface-number } [ encapsulation { isl | dot1q } ] [ ingress [ vlan vlan_id ]
[ learning ] ] } | { remote vlan vlan_id } | { source { interface { FastEthernet interface-number |
GigabitEthernet interface-number | Port-channel interface-number } } | [ vlan vlan_id ]
| { remote vlan vlan_id } | { cpu [ queue queue_id ] } [ , | - rx | tx | both ] } | { filter { ip
access-group [ name | id ] } { vlan vlan_id [ , | - ] } | { packet-type { good | bad } } | { address-type
{ unicast | multicast | broadcast } [ rx | tx | both ] }
```

Syntax Description		
<i>session</i>		Number of a SPAN session; valid values are from 1 to 6.
<b>destination</b>		Specifies a SPAN destination.
<b>interface</b>		Specifies an interface.
<b>FastEthernet</b> <i>interface-number</i>		Specifies a Fast Ethernet module and port number; valid values are from 1 to 6.
<b>GigabitEthernet</b> <i>interface-number</i>		Specifies a Gigabit Ethernet module and port number; valid values are from 1 to 6.
<b>encapsulation</b>		(Optional) Specifies the encapsulation type of the destination port.
<b>isl</b>		(Optional) Specifies ISL encapsulation.
<b>dot1q</b>		(Optional) Specifies dot1q encapsulation.
<b>ingress</b>		(Optional) Indicates whether the ingress option is enabled.
<b>vlan</b> <i>vlan_id</i>		(Optional) Specifies the VLAN; valid values are from 1 to 4094.
<b>learning</b>		(Optional) Enables host learning on ingress-enabled destination ports.
<b>remote vlan</b> <i>vlan_id</i>		Specifies an RSPAN source or destination session on a switch.
<b>source</b>		Specifies a SPAN source.
<b>Port-channel</b> <i>interface-number</i>		Specifies a port-channel interface; valid values are from 1 to 64.
<b>cpu</b>		Causes traffic received or sent from the CPU to be copied to the destination of the session.

<b>queue</b> <i>queue_id</i>	(Optional) Specifies that only traffic received on the specific CPU subqueue should be copied to the destination of the session. Valid values are from 1 to 32, or by the following names: all, control-packet, rpf-failure, adj-same-if, nfl, mtu-exceeded, unknown-sa, span, acl input, acl input log, acl input error, acl input forward, acl input punt, acl output, acl output log, acl output error, acl output forward, acl output punt, bridged, bridged 1, bridged 2, bridged 3, bridged 4, routed received, routed received 1, routed received 2, routed received 3, routed received 4, routed forward, routed forward 1, routed forward 2, routed forward 3, and routed forward 4.
<b>,</b>	(Optional) Symbol to specify another range of SPAN VLANs; valid values are from 1 to 4094.
<b>-</b>	(Optional) Symbol to specify a range of SPAN VLANs.
<b>both</b>	(Optional) Monitors and filters received and transmitted traffic.
<b>rx</b>	(Optional) Monitors and filters received traffic only.
<b>tx</b>	(Optional) Monitors and filters transmitted traffic only.
<b>filter</b>	Limits SPAN source traffic to specific VLANs.
<b>ip access-group</b>	(Optional) Specifies an IP access group filter, either a name or a number.
<b>name</b>	(Optional) Specifies an IP access list name.
<b>id</b>	(Optional) Specifies an IP access list number. Valid values are 1 to 199 for an IP access list and 1300 to 2699 for an IP expanded access list.
<b>vlan</b> <i>vlan_id</i>	(Optional) Specifies the VLAN to be filtered. The number is entered as a single value or a range; valid values are from 1 to 4094.
<b>packet-type</b>	Limits SPAN source traffic to packets of a specified type.
<b>good</b>	Specifies a good packet type
<b>bad</b>	Specifies a bad packet type.
<b>address-type unicast   multicast   broadcast</b>	Limits SPAN source traffic to packets of a specified address type. Valid types are unicast, multicast, and broadcast.

## Defaults

Received and transmitted traffic, as well as all VLANs, packet types, and address types are monitored on a trunking interface.

Packets are transmitted untagged out the destination port; ingress and learning are disabled.

All packets are permitted and forwarded “as is” on the destination port.

## Command Modes

Global configuration

**Command History**

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(11b)EW	Support for differing directions within a single-user session and extended VLAN addressing was added.
12.1(19)EW	Support for ingress packets, encapsulation specification, packet and address type filtering, and CPU source sniffing enhancements was added.
12.1(20)EW	Support for remote SPAN and host learning on ingress-enabled destination ports was added.
12.2(20)EW	Support for an IP access group filter was added.

**Usage Guidelines**

Only one SPAN destination for a SPAN session is supported. If you attempt to add another destination interface to a session that already has a destination interface that is configured, you will get an error. You must first remove a SPAN destination interface before changing the SPAN destination to a different interface.

Beginning in Cisco IOS Release 12.1(12c)EW, you can configure sources from different directions within a single user session.



**Note** Beginning in Cisco IOS Release 12.1(12c)EW, SPAN is limited to two sessions containing ingress sources and four sessions containing egress sources. Bidirectional sources support both ingress and egress sources.

A particular SPAN session can either monitor VLANs or monitor individual interfaces: you cannot have a SPAN session that monitors both specific interfaces and specific VLANs. If you first configure a SPAN session with a source interface, and then try to add a source VLAN to the same SPAN session, you will receive an error. You will also receive an error message if you configure a SPAN session with a source VLAN, and then try to add a source interface to that session. You must first clear any sources for a SPAN session before switching to another type of source. CPU sources may be combined with source interfaces and source VLANs.

When configuring the **ingress** option on a destination port, you must specify an ingress VLAN if the configured encapsulation type is untagged (the default) or is 802.1Q. If the encapsulation type is ISL, then no ingress VLAN specification is necessary.

By default, when you enable ingress, no host learning is performed on destination ports. When you enter the **learning** keyword, host learning is performed on the destination port, and traffic to learned hosts is forwarded out the destination port.

If you enter the **filter** keyword on a monitored trunking interface, only traffic on the set of specified VLANs is monitored. Port-channel interfaces are displayed in the list of **interface** options if you have them configured. VLAN interfaces are not supported. However, you can span a particular VLAN by entering the **monitor session session source vlan vlan-id** command.

The packet-type filters are supported only in the Rx direction. You can specify both Rx- and Tx-type filters and multiple-type filters at the same time (for example, you can use **good** and **unicast** to only sniff nonerror unicast frames). As with VLAN filters, if you do not specify the type, the session will sniff all packet types.

The **queue** identifier allows sniffing for only traffic that is sent or received on the specified CPU queues. The queues may be identified either by number or by name. The queue names may contain multiple numbered queues for convenience.

---

**Examples**

This example shows how to configure IP access group 100 on a SPAN session:

```
Switch(config)# monitor session 1 filter ip access-group 100
Switch(config)#
```

This example shows how to add a source interface to a SPAN session:

```
Switch(config)# monitor session 1 source interface fa2/3
Switch(config)#
```

This example shows how to configure the sources with different directions within a SPAN session:

```
Switch(config)# monitor session 1 source interface fa2/3 rx
Switch(config)# monitor session 1 source interface fa2/2 tx
Switch(config)#
```

This example shows how to remove a source interface from a SPAN session:

```
Switch(config)# no monitor session 1 source interface fa2/3
Switch(config)#
```

This example shows how to limit SPAN traffic to VLANs 100 through 304:

```
Switch(config)# monitor session 1 filter vlan 100 - 304
Switch(config)#
```

This example shows how to configure RSPAN VLAN 20 as the destination:

```
Switch(config)# monitor session 2 destination remote vlan 20
Switch(config)#
```

---

**Related Commands**

[show monitor](#)



# mtu

To enable jumbo frames on an interface by adjusting the maximum size of a packet or maximum transmission unit (MTU), use the **mtu** command. To return to the default setting, use the **no** form of this command.

**mtu** *bytes*

**no mtu**

## Syntax Description

<i>bytes</i>	Byte size; valid values are from 1500 to 9198.
--------------	--

## Defaults

The default settings are as follows:

- Jumbo frames are disabled
- 1500 bytes for all ports

## Command Modes

Interface configuration mode

## Command History

Release	Modification
12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switches.

## Usage Guidelines

Jumbo frames are supported on nonblocking Gigabit Ethernet ports, switch virtual interfaces (SVI), and EtherChannels. Jumbo frames are not available for stub-based ports.

The baby giants feature uses the global **system mtu size** command to set the global baby giant MTU. It allows all stub-based port interfaces to support an Ethernet payload size of up to 1552 bytes.

Both the **system mtu** command and the per-interface **mtu** command work on interfaces that can support jumbo frames, but the per-interface **mtu** command takes precedence.

## Examples

This example shows how to specify an MTU of 1800 bytes:

```
Switch(config)# interface GigabitEthernet 1/1
Switch(config-if)# mtu 1800
```

## Related Commands

[system mtu](#)

# name

To set the MST region name, use the **name** command. To return to the default name, use the **no** form of this command.

**name** *name*

**no name** *name*

<b>Syntax Description</b>	<i>name</i>	Specifies the name of the MST region. The name can be any string with a maximum length of 32 characters.
---------------------------	-------------	--

<b>Defaults</b>	The MST region name is not set.
-----------------	---------------------------------

<b>Command Modes</b>	MST configuration
----------------------	-------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	Two or more Catalyst 4500 series switches with the same VLAN mapping and configuration version number are considered to be in different MST regions if the region names are different.
-------------------------	--

<b>Examples</b>	This example shows how to name a region:
-----------------	--

```
Switch(config-mst)# name Cisco
Switch(config-mst)#
```

<b>Related Commands</b>	<a href="#">instance</a> <a href="#">revision</a> <a href="#">show spanning-tree mst</a> <a href="#">spanning-tree mst configuration</a>
-------------------------	---

# pagp learn-method

To learn the input interface of the incoming packets, use the **pagp learn-method** command. To return to the default value, use the **no** form of this command.

**pagp learn-method { aggregation-port | physical-port }**

**no pagp learn-method**

Syntax Description	<b>aggregation-port</b>	Specifies learning the address on the port channel.
	<b>physical-port</b>	Specifies learning the address on the physical port within the bundle.

Defaults	Aggregation port is enabled.
----------	------------------------------

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Examples	This example shows how to enable physical port address learning within the bundle:  Switch(config-if)# <b>pagp learn-method physical-port</b> Switch(config-if)#
	This example shows how to enable aggregation port address learning within the bundle:  Switch(config-if)# <b>pagp learn-method aggregation-port</b> Switch(config-if)#

Related Commands	<a href="#">pagp learn-method</a> <a href="#">show pagp</a>
------------------	--

# pagp port-priority

To select a port in hot standby mode, use the **pagp port-priority** command. To return to the default value, use the **no** form of this command.

**pagp port-priority** *priority*

**no pagp port-priority**

Syntax Description	<i>priority</i> Port priority number; valid values are from 1 to 255.	
Defaults	Port priority is set to 128.	
Command Modes	Interface configuration	
Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	The higher the priority, the better the chances are that the port will be selected in the hot standby mode.	
Examples	<p>This example shows how to set the port priority:</p> <pre>Switch(config-if)# <b>pagp port-priority 45</b> Switch(config-if)#</pre>	
Related Commands	<a href="#">pagp learn-method</a> <a href="#">show pagp</a>	

# passive-interface

To disable sending routing updates on an interface, use the **passive-interface** command. To reenable the sending of routing updates, use the **no** form of this command.

**passive-interface** [[**default**] {*interface-type interface-number*}] | {**range** *interface-type interface-number-interface-type interface-number*}

**no passive-interface** [[**default**] {*interface-type interface-number*}] | {**range** *interface-type interface-number-interface-type interface-number*}

Syntax Description	<b>default</b>	(Optional) All interfaces become passive.
	<i>interface-type</i>	Specifies the interface type.
	<i>interface-number</i>	Specifies the interface number.
	<b>range</b> <i>range</i>	Specifies the range of subinterfaces being configured; see the “Usage Guidelines” section.

**Defaults** Routing updates are sent on the interface.

**Command Modes** Router configuration

Command History	<b>Release</b>	<b>Modification</b>
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch

**Usage Guidelines** You can use the **passive-interface range** command on the following interfaces: FastEthernet, GigabitEthernet, VLAN, Loopback, Port-channel, 10-GigabitEthernet, and Tunnel. When you use the **passive-interface range** command on a VLAN interface, the interface should be the existing VLAN SVIs. To display the VLAN SVIs, enter the **show running config** command. The VLANs that are not displayed cannot be used in the **passive-interface range** command.

The values that are entered with the **passive-interface range** command are applied to all the existing VLAN SVIs.

Before you can use a macro, you must define a range using the **define interface-range** command.

All configuration changes that are made to a port range through the **passive-interface range** command are retained in the running-configuration as individual passive-interface commands.

You can enter the **range** in two ways:

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

You can either specify the interfaces or the name of an interface-range macro. An interface range must consist of the same interface type, and the interfaces within a range cannot span across the modules.

You can define up to five interface ranges on a single command; separate each range with a comma:

```
interface range gigabitethernet 5/1-20, gigabitethernet4/5-20.
```

Use this format when entering the *port-range*:

- *interface-type {mod}/{first-port} - {last-port}*

You cannot specify both a macro and an interface range in the same command. After creating a macro, you can enter additional ranges. If you have already entered an interface range, the CLI does not allow you to enter a macro.

You can specify a single interface in the **range** *range* value. This makes the command similar to the **passive-interface** *interface-number* command.



#### Note

The **range** keyword is only supported in OSPF, EIGRP, RIP, and ISIS router mode.

If you disable the sending of routing updates on an interface, the particular subnet will continue to be advertised to other interfaces, and updates from other routers on that interface continue to be received and processed.

The **default** keyword sets all interfaces as passive by default. You can then configure individual interfaces where adjacencies are desired using the **no passive-interface** command. The **default** keyword is useful in Internet service provider (ISP) and large enterprise networks where many of the distribution routers have more than 200 interfaces.

For the Open Shortest Path First (OSPF) protocol, OSPF routing information is neither sent nor received through the specified router interface. The specified interface address appears as a stub network in the OSPF domain.

For the Intermediate System-to-Intermediate System (IS-IS) protocol, this command instructs IS-IS to advertise the IP addresses for the specified interface without actually running IS-IS on that interface. The **no** form of this command for IS-IS disables advertising IP addresses for the specified address.



#### Note

For IS-IS you must keep at least one active interface and configure the interface with the **ip router isis** command.

Enhanced Interior Gateway Routing Protocol (EIGRP) is disabled on an interface that is configured as passive although it advertises the route.

## Examples

The following example sends EIGRP updates to all interfaces on network 10.108.0.0 except Gigabit Ethernet interface 1/1:

```
Switch(config)# interface gigabitethernet 1/1
Switch(config-if)# router eigrp 109
Switch(config-router)# network 10.108.0.0
Switch(config-router)# passive-interface gigabitethernet 1/1
Switch(config-router)#
```

The following configuration enables IS-IS on Ethernet interface 1 and serial interface 0 and advertises the IP addresses of Ethernet interface 0 in its link-state protocol data units (PDUs):

```
Switch(config-if)# router isis Finance
Switch(config-router)# passive-interface Ethernet 0
Switch(config-router)# interface Ethernet 1
Switch(config-router)# ip router isis Finance
Switch(config-router)# interface serial 0
Switch(config-router)# ip router isis Finance
Switch(config-router)#
```

The following example sets all interfaces as passive, then activates Ethernet interface 0:

```
Switch(config-if)# router ospf 100
Switch(config-router)# passive-interface default
Switch(config-router)# no passive-interface ethernet0
Switch(config-router)# network 10.108.0.1 0.0.0.255 area 0
Switch(config-router)#
```

The following configuration sets the Ethernet ports 3 through 4 on module 0 and GigabitEthernet ports 4 through 7 on module 1 as passive:

```
Switch(config-if)# router ospf 100
Switch(config-router)# passive-interface range ethernet0/3-4,gigabitethernet1/4-7
Switch(config-router)#
```

# permit

To permit an ARP packet based on matches against the DHCP bindings, use the **permit** command. To remove a specified ACE from an access list, use the **no** form of this command

**permit** {[**request**] **ip** {**any** | **host** *sender-ip* | *sender-ip sender-ip-mask*} **mac** {**any** | **host** *sender-mac* | *sender-mac sender-mac-mask*} | **response ip** {**any** | **host** *sender-ip* | *sender-ip sender-ip-mask*} [{**any** | **host** *target-ip* | *target-ip target-ip-mask*}] **mac** {**any** | **host** *sender-mac* | *sender-mac sender-mac-mask*} [{**any** | **host** *target-mac* | *target-mac target-mac-mask*}}] [**log**]

**no permit** {[**request**] **ip** {**any** | **host** *sender-ip* | *sender-ip sender-ip-mask*} **mac** {**any** | **host** *sender-mac* | *sender-mac sender-mac-mask*} | **response ip** {**any** | **host** *sender-ip* | *sender-ip sender-ip-mask*} [{**any** | **host** *target-ip* | *target-ip target-ip-mask*}] **mac** {**any** | **host** *sender-mac* | *sender-mac sender-mac-mask*} [{**any** | **host** *target-mac* | *target-mac target-mac-mask*}}] [**log**]

## Syntax Description

<b>request</b>	(Optional) Requests a match for the ARP request. When <b>request</b> is not specified, matching is performed against all ARP packets.
<b>ip</b>	Specifies the sender IP address.
<b>any</b>	Specifies that any IP or MAC address will be accepted.
<b>host</b> <i>sender-ip</i>	Specifies that only a specific sender IP address will be accepted.
<i>sender-ip</i> <i>sender-ip-mask</i>	Specifies that a specific range of sender IP addresses will be accepted.
<b>mac</b>	Specifies the sender MAC address.
<b>host</b> <i>sender-mac</i>	Specifies that only a specific sender MAC address will be accepted.
<i>sender-mac</i> <i>sender-mac-mask</i>	Specifies that a specific range of sender MAC addresses will be accepted.
<b>response</b>	Specifies a match for the ARP responses.
<b>ip</b>	Specifies the IP address values for the ARP responses.
<b>host</b> <i>target-ip</i>	(Optional) Specifies that only a specific target IP address will be accepted.
<i>target-ip target-ip-mask</i>	(Optional) Specifies that a specific range of target IP addresses will be accepted.
<b>mac</b>	Specifies the MAC address values for the ARP responses.
<b>host</b> <i>target-mac</i>	(Optional) Specifies that only a specific target MAC address will be accepted.
<i>target-mac</i> <i>target-mac-mask</i>	(Optional) Specifies that a specific range of target MAC addresses will be accepted.
<b>log</b>	(Optional) Logs a packet when it matches the access control entry (ACE).

## Defaults

This command has no default settings.

## Command Modes

arp-nacl configuration



Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** Permit clauses can be added to forward or drop ARP packets based on some matching criteria.

**Examples** This example shows a host with a MAC address of 0000.0000.abcd and an IP address of 1.1.1.1. This example shows how to permit both requests and responses from this host:

```
Switch(config)# arp access-list static-hosts
Switch(config-arp-nacl)# permit ip host 1.1.1.1 mac host 0000.0000.abcd
Switch(config-arp-nacl)# end
Switch# show arp access-list

ARP access list static-hosts
    permit ip host 1.1.1.1 mac host 0000.0000.abcd
Switch#
```

**Related Commands**

- [arp access-list](#)
- [deny](#)
- [ip arp inspection filter vlan](#)

# policy-map

To access the QoS policy map configuration mode to configure the QoS policy map, use the **policy-map** command. To delete a policy map, use the **no** form of this command.

**policy-map** *policy-map-name*

**no policy-map** *policy-map-name*

## Syntax Description

*policy-map-name* Specifies the name of the policy map.

## Defaults

This command has no default settings.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

In QoS policy-map configuration mode, these configuration commands are available:

- **exit** exits QoS class map configuration mode.
- **no** removes an existing defined policy map.
- **class** *class-map-name* accesses the QoS class map configuration mode to specify a previously created class map to be included in the policy map or to create a class map. (See the [class-map](#) command for additional information.)
- **police** [*aggregate name*] *rate burst* [**conform-action** {**drop** | **transmit**}] [{**exceed-action** {**drop** | **policed-dscp-transmit** | **transmit**}}] defines a microflow or aggregate policer.
- **trust** {**cos** | **dscp**} sets the specified class trust values. Trust values that are set in this command supersede trust values that are set on specific interfaces.

## Examples

This example shows how to create a policy map named **ipp5-policy** that uses the class-map named **ipp5** and is configured to rewrite the packet precedence to 6 and to aggregate police the traffic that matches the IP precedence value of 5:

```
Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# policy-map ipp5-policy
Switch(config-pmap)# class ipp5
Switch(config-pmap-c)# set ip precedence 6
Switch(config-pmap-c)# police 2000000000 2000000 conform-action transmit exceed-action
policed-dscp-transmit
Switch(config-pmap-c)# end
```

---

Related Commands

[class-map](#)  
[service-policy](#)  
[show class-map](#)  
[show policy-map](#)  
[show policy-map interface](#)

# port-channel load-balance

To set the load-distribution method among the ports in the bundle, use the **port-channel load-balance** command. To reset the load distribution to the default, use the **no** form of this command.

**port-channel load-balance** *method*

**no port-channel load-balance**

Syntax Description	<i>method</i>	Specifies the load distribution method. See the “Usage Guidelines” section for more information.
Defaults	Load distribution on the source XOR destination IP address is enabled.	
Command Modes	Global configuration	
Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>The following values are valid for the load-distribution method:</p> <ul style="list-style-type: none"> <li>• <b>dst-ip</b>—Load distribution on the destination IP address</li> <li>• <b>dst-mac</b>—Load distribution on the destination MAC address</li> <li>• <b>dst-port</b>—Load distribution on the destination TCP/UDP port</li> <li>• <b>src-dst-ip</b>—Load distribution on the source XOR destination IP address</li> <li>• <b>src-dst-mac</b>—Load distribution on the source XOR destination MAC address</li> <li>• <b>src-dst-port</b>—Load distribution on the source XOR destination TCP/UDP port</li> <li>• <b>src-ip</b>—Load distribution on the source IP address</li> <li>• <b>src-mac</b>—Load distribution on the source MAC address</li> <li>• <b>src-port</b>—Load distribution on the source port</li> </ul>	
------------------	---	--

Examples	<p>This example shows how to set the load-distribution method to the destination IP address:</p> <pre>Switch(config)# port-channel load-balance dst-ip Switch(config)#</pre> <p>This example shows how to set the load-distribution method to the source XOR destination IP address:</p> <pre>Switch(config)# port-channel load-balance src-dst-port Switch(config)#</pre>	
----------	--	--

---

Related Commands

[interface port-channel](#)  
[show etherchannel](#)

# power dc input

To configure the power DC input parameters on the switch, use the **power dc input** command. To return to the default power settings, use the **no** form of this command.

**power dc input** *watts*

**no power dc input**

Syntax Description	<b>dc input</b>	Specifies the external DC source for both power supply slots.
	<i>watts</i>	Sets the total capacity of the external DC source in watts; valid values are from 300 to 8500.

Defaults	DC power input is 2500 W.
----------	---------------------------

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

Command History	Release	Modification
	12.1(11)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(13)EW	Support for <b>dc input</b> was added.

Usage Guidelines	<p>If your interface is not capable of supporting Power over Ethernet, you will receive this message:</p> <pre>Power over Ethernet not supported on interface Admin</pre>
------------------	---

Examples	<p>This example shows how to set the total capacity of the external DC power source to 5000 W:</p> <pre>Switch(config)# power dc input 5000 Switch(config)#</pre>
----------	---

Related Commands	<a href="#">show power</a>
------------------	----------------------------

# power inline

To set the inline-power state for the inline-power-capable interfaces, use the **power inline** command. To return to the default values, use the **no** form of this command.

**power inline** { **auto** [**max** *milliwatt*] | **never** | **static** [**max** *milliwatt*] | **consumption** *milliwatt* }

**no power inline**

Syntax Description		
<b>auto</b>		Sets the Power over Ethernet state to auto mode for inline-power-capable interfaces.
<b>max</b> <i>milliwatt</i>		(Optional) Maximum power that the equipment can consume; valid range is from 2000 to 15400 mW.
<b>never</b>		Disables both the detection and power for the inline-power capable interfaces.
<b>static</b>		Allocates power statically.
<b>consumption</b> <i>milliwatt</i>		Sets power allocation per interface; valid range is from 4000 to 15400. Any non-default value disables automatic adjustment of power allocation.

## Defaults

The default settings are as follows:

- Auto mode for Power over Ethernet is set.
- Maximum mW mode is set to 15400.
- Default allocation is set to 15400.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(11)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(19)EW	Support added for static power allocation.
12.1(20)EW	Support added for Power over Ethernet.

## Usage Guidelines

If your interface is not capable of supporting Power over Ethernet, you will receive this message:

```
Power over Ethernet not supported on interface Admin
```

## Examples

This example shows how to set the inline-power detection and power for the inline-power-capable interfaces:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet 4/1
Switch(config-if)# power inline auto
```

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

This example shows how to disable the inline-power detection and power for the inline-power-capable interfaces:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet 4/1
Switch(config-if)# power inline never
Switch(config-if)# end
Switch#
```

This example shows how to set the permanent Power over Ethernet allocation to 8000 mW for Fast Ethernet interface 4/1 regardless what is mandated either by the 802.3af class of the discovered device or by any CDP packet that is received from the powered device:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet 4/1
Switch(config-if)# power inline consumption 8000
Switch(config-if)# end
Switch#
```

#### Related Commands

[power inline consumption](#)  
[show power](#)



# power inline consumption

To set the default power that is allocated to an interface for all the inline-power-capable interfaces on the switch, use the **power inline consumption** command. To return to the default values, use the **no** form of this command.

**power inline consumption default** *milliwatts*

**no power inline consumption default**

Syntax Description	default	Specifies the switch to use the default allocation.
	<i>milliwatts</i>	Sets the default power allocation in milliwatts; the valid range is from 4000 to 15400. Any non-default value disables automatic adjustment of power allocation.

Defaults	Milliwatt mode is set to 15400.
----------	---------------------------------

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

Command History	Release	Modification
	12.1(11)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(20)EW	Support added for Power over Ethernet.

Usage Guidelines	<p>If your interface is not capable of supporting Power over Ethernet, you will receive this message:</p> <pre>Power over Ethernet not supported on interface Admin</pre>
------------------	---

Examples	<p>This example shows how to set the Power over Ethernet allocation to use 8000 mW, regardless of any CDP packet that is received from the powered device:</p>
----------	--

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# power inline consumption default 8000
Switch(config)# end
Switch#
```

Related Commands	<p><a href="#">power inline</a></p> <p><a href="#">show power</a></p>
------------------	---

# power redundancy-mode

To configure the power settings for the chassis, use the **power redundancy-mode** command. To return to the default setting, use the **default** form of this command.

**power redundancy-mode { redundant | combined }**

**default power redundancy-mode**

## Syntax Description

<b>redundant</b>	Configures the switch to redundant power management mode.
<b>combined</b>	Configures the switch to combined power management mode.

## Defaults

Redundant power management mode

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch (Catalyst 4500 series switches only: 4503, 4506, and 4507).

## Usage Guidelines

The two power supplies must be the same type and wattage.



### Caution

If you have power supplies with different types or wattages installed in your switch, the switch will not recognize one of the power supplies. A switch set to redundant mode will not have power redundancy. A switch set to combined mode will use only one power supply.

In redundant mode, the power from a single power supply must provide enough power to support the switch configuration.

[Table 2-10](#) lists the maximum available power for chassis and Power over Ethernet for each power supply.

**Table 2-10 Available Power**

Power Supply	Redundant Mode (W)	Combined Mode (W)
1000 W AC	System <sup>1</sup> = 1000 Inline = 0	System = 1667 Inline = 0
2800 W AC	System = 1360 Inline = 1400	System = 2473 Inline = 2333

1. The system power includes power for the supervisor engines, all modules, and the fan tray.

---

**Examples**

This example shows how to set the power management mode to combined:

```
Switch(config)# power redundancy-mode combined  
Switch(config)#
```

---

**Related Commands**

[show power](#)

# port-security mac-address

To configure a secure address on an interface for a specific VLAN or VLAN range, use the **port-security mac-address** command.

**port-security mac-address** *mac\_address*

Syntax Description	<i>mac_address</i>	The MAC-address that needs to be secured.
Command Modes	VLAN-range interface submenu	
Command History	Release	Modification
	12.2(25)EWA	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	Layer 2 interfaces can be part of multiple VLANs (for example, a typical trunk port). In conjunction with the <b>vlan</b> command, you can use the <b>port-security mac-address</b> command to specify different addresses on different VLANs.	
Examples	<p>This example shows how to configure the secure address 1.1.1 on interface Gigabit Ethernet 1/1 for VLANs 2-3:</p> <pre>Switch# configure terminal Enter configuration commands, one per line. End with CNTL/Z. Switch(config)# interface gigabitethernet1/1 Switch(config-if)# switchport trunk encapsulation dot1q Switch(config-if)# switchport mode trunk Switch(config-if)# vlan 2-3 Switch(config-if-vlan-range)# port-security mac-address 1.1.1 Switch(config-if-vlan-range)# end Switch#</pre>	
Related Commands	<a href="#">port-security mac-address sticky</a> <a href="#">port-security maximum</a>	

# port-security mac-address sticky

To configure a sticky address on an interface for a specific VLAN or VLAN range, use the **port-security mac-address sticky** command.

**port-security mac-address sticky** *mac\_address*

Syntax Description	<i>mac_address</i>	The MAC-address that needs to be secured.
--------------------	--------------------	---

Command Modes	VLAN-range interface submode
---------------	------------------------------

Command History	Release	Modification
	12.2(25)EWA	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	The Sticky feature must be enabled on an interface before you can configure the <b>port-security mac-address sticky</b> command.
------------------	--

Usage Guidelines	<p>Layer 2 interfaces can be part of multiple VLANs (for example, a typical trunk port). In conjunction with the <b>vlan</b> command, you can use the <b>port-security mac-address sticky</b> command to specify different sticky addresses on different VLANs.</p> <p>The Sticky feature must be enabled on an interface before you can configure the <b>port-security mac-address sticky</b> command.</p>
------------------	---

Examples	This example shows how to configure the sticky address 1.1.1 on interface Gigabit Ethernet 1/1 for VLANs 2-3:
----------	---

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitethernet1/1
Switch(config-if)# switchport trunk encapsulation dot1q
Switch(config-if)# switchport mode trunk
Switch(config-if)# vlan 2-3
Switch(config-if-vlan-range)# port-security mac-address sticky 1.1.1
Switch(config-if-vlan-range)# end
Switch#
```

Related Commands	<a href="#">port-security mac-address</a> <a href="#">port-security maximum</a>
------------------	--

# port-security maximum

To configure the maximum number of addresses on an interface for a specific VLAN or VLAN range, use the **port-security maximum** command.

**port-security maximum** *max\_value*

Syntax Description	<i>max_value</i>	The maximum number of MAC-addresses.
--------------------	------------------	--------------------------------------

Command Modes	VLAN-range interface submode
---------------	------------------------------

Command History	Release	Modification
	12.2(25)EWA	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** Layer 2 interfaces can be part of multiple VLANs (for example, a typical trunk port). In conjunction with the **vlan** command, you can use the **port-security maximum** command to specify the maximum number of secure addresses on different VLANs.

If a specific VLAN on a port is not configured with a maximum value, the maximum configured for the port is used for that VLAN. In this situation, the maximum number of addresses that can be secured on this VLAN is limited to the maximum value configured on the port.

Each VLAN can be configured with a maximum count that is greater than the value configured on the port. Also, the sum total of the maximum configured values for all the VLANs can exceed the maximum configured for the port. In either of these situations, the number of MAC addresses secured on each VLAN is limited to the lesser of the VLAN configuration maximum and the port configuration maximum.

**Examples** This example shows how to configure a maximum number of addresses (5) on interface Gigabit Ethernet 1/1 for VLANs 2-3:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface g1/1
Switch(config-if)# switchport trunk encapsulation dot1q
Switch(config-if)# switchport mode trunk
Switch(config-if)# vlan 2-3
Switch(config-if-vlan-range)# port-security maximum 5
Switch(config-if-vlan-range)# exit
Switch#
```

**Related Commands** [port-security mac-address](#)  
[port-security mac-address sticky](#)

# power supplies required

To configure the power redundancy mode for the Catalyst 4006 (only), use the **power supplies required** command. To return to the default power redundancy mode, use the **default** form of this command or the **power supplies required 2** command.

**power supplies required { 1 | 2 }**

**default power supplies required**

Syntax Description	1	Configures the chassis for 1+1 redundancy mode.
	2	Configures the switch to 2+1 redundancy mode.

Defaults	2+1 redundancy mode
----------	---------------------

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

Command History	Release	Modification
	12.1(11)EW	Support for this command was introduced on the Catalyst 4500 series switch (Catalyst 4006 only).

Usage Guidelines	This command is not supported on a Catalyst 4500 series switch.
------------------	---

Examples	This example shows how to set the power supplies that are required for the chassis to 1:
	<pre>Switch(config)# power supplies required 1 Switch(config)#</pre>

Related Commands	<a href="#">show power</a>
------------------	----------------------------

# private-vlan

To configure private VLANs and the association between a private VLAN and a secondary VLAN, use the **private-vlan** command. To return to the default value, use the **no** form of this command.

**private-vlan** { **isolated** | **community** | **primary** }

**private-vlan association** *secondary-vlan-list* [{ **add** *secondary-vlan-list* } | { **remove** *secondary-vlan-list* }]

**no private-vlan** { **isolated** | **community** | **primary** }

**no private-vlan association**

Syntax Description	<b>isolated</b>	Designates the VLAN as an isolated private VLAN.
	<b>community</b>	Designates the VLAN as the community private VLAN.
	<b>primary</b>	Designates the VLAN as the primary private VLAN.
	<b>association</b>	Creates an association between a secondary VLAN and a primary VLAN.
	<i>secondary-vlan-list</i>	Specifies the number of the secondary VLAN.
	<b>add</b>	(Optional) Associates a secondary VLAN to a primary VLAN.
	<b>remove</b>	(Optional) Clears the association between a secondary VLAN and a primary VLAN.

**Defaults** Private VLANs are not configured.

**Command Modes** VLAN configuration

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended addressing was added.
	12.2(20)EW	Support for community VLAN was added.

**Usage Guidelines**

You cannot configure VLAN 1 or VLANs 1001 to 1005 as private VLANs.

VTP does not support private VLANs. You must configure private VLANs on each device where you want private VLAN ports.

The *secondary\_vlan\_list* parameter cannot contain spaces; it can contain multiple comma-separated items. Each item can be a single private VLAN ID or a range of private VLAN IDs separated by hyphens.

The *secondary\_vlan\_list* parameter can contain multiple community VLAN IDs.



The *secondary\_vlan\_list* parameter can contain only one isolated VLAN ID. A private VLAN is defined as a set of private ports characterized by a common set of VLAN number pairs: each pair is made up of at least two special unidirectional VLANs and is used by isolated ports or by a community of ports to communicate with the switches.

An isolated VLAN is a VLAN that is used by the isolated ports to communicate with the promiscuous ports. The isolated VLAN traffic is blocked on all other private ports in the same VLAN and can be received only by the standard trunking ports and the promiscuous ports that are assigned to the corresponding primary VLAN.

A community VLAN is the VLAN that carries the traffic among the community ports and from the community ports to the promiscuous ports on the corresponding primary VLAN. A community VLAN is not allowed on a private VLAN trunk.

A promiscuous port is a private port that is assigned to a primary VLAN.

A primary VLAN is a VLAN that is used to convey the traffic from the switches to the customer end stations on the private ports.

You can specify only one isolated *vlan-id* value, while multiple community VLANs are allowed. You can only associate isolated and community VLANs to one VLAN. The associated VLAN list may not contain primary VLANs. Similarly, a VLAN that is already associated to a primary VLAN cannot be configured as a primary VLAN.

The **private-vlan** commands do not take effect until you exit the config-VLAN submode.

If you delete either the primary or secondary VLAN, the ports that are associated with the VLAN become inactive.

Refer to the *Catalyst 4500 Series Switch Cisco IOS Software Configuration Guide* for additional configuration guidelines.

## Examples

This example shows how to configure VLAN 202 as a primary VLAN and verify the configuration:

```
Switch# configure terminal
Switch(config)# vlan 202
Switch(config-vlan)# private-vlan primary
Switch(config-vlan)# end
Switch# show vlan private-vlan
```

Primary	Secondary	Type	Interfaces
202		primary	

This example shows how to configure VLAN 303 as a community VLAN and verify the configuration:

```
Switch# configure terminal
Switch(config)# vlan 303
Switch(config-vlan)# private-vlan community
Switch(config-vlan)# end
Switch# show vlan private-vlan
```

Primary	Secondary	Type	Interfaces
202		primary	
	303	community	

This example shows how to configure VLAN 440 as an isolated VLAN and verify the configuration:

```
Switch# configure terminal
Switch(config)# vlan 440
Switch(config-vlan)# private-vlan isolated
Switch(config-vlan)# end
Switch# show vlan private-vlan
```

Primary	Secondary	Type	Interfaces
202		primary	
	303	community	
	440	isolated	

This example shows how to create a private VLAN relationship among the primary VLAN 14, the isolated VLAN 19, and community VLANs 20 and 21:

```
Switch(config)# vlan 19
Switch(config-vlan) # private-vlan isolated
Switch(config)# vlan 14
Switch(config-vlan) # private-vlan primary
Switch(config-vlan) # private-vlan association 19
```

This example shows how to remove a private VLAN relationship and delete the primary VLAN. The associated secondary VLANs are not deleted.

```
Switch(config-vlan) # no private-vlan 14
Switch(config-vlan) #
```

This example shows how to associate community VLANs 303 through 307 and 309 and isolated VLAN 440 with primary VLAN 202 and verify the configuration:

```
Switch# configure terminal
Switch(config)# vlan 202
Switch(config-vlan) # private-vlan association 303-307,309,440
Switch(config-vlan) # end
Switch# show vlan private-vlan
```

Primary	Secondary	Type	Interfaces
202	303	community	
202	304	community	
202	305	community	
202	306	community	
202	307	community	
202	309	community	
202	440	isolated	
	308	community	



#### Note

The secondary VLAN 308 has no associated primary VLAN.

This example shows how to remove an isolated VLAN from the private VLAN association:

```
Switch(config)# vlan 14
Switch(config-vlan) # private-vlan association remove 18
Switch(config-vlan) #
```

This example shows how to configure interface FastEthernet 5/1 as a PVLAN host port and verify the configuration:

```
Switch# configure terminal
Switch(config)# interface fastethernet 5/1
Switch(config-if) # switchport mode private-vlan host
Switch(config-if) # switchport private-vlan host-association 202 440
Switch(config-if) # end
```

```
Switch# show interfaces fastethernet 5/1 switchport
Name: Fa5/1
Switchport: Enabled
Administrative Mode: private-vlan host
Operational Mode: private-vlan host
Administrative Trunking Encapsulation: negotiate
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Appliance trust: none
Administrative Private Vlan
  Host Association: 202 (VLAN0202) 440 (VLAN0440)
  Promiscuous Mapping: none
  Trunk encapsulation : dot1q
  Trunk vlans:
Operational private-vlan(s):
  202 (VLAN0202) 440 (VLAN0440)
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
```

---

**Related Commands**

[show vlan](#)  
[show vlan private-vlan](#)

# private-vlan mapping

To create a mapping between the primary and the secondary VLANs so that both share the same primary VLAN SVI, use the **private-vlan mapping** command. To remove all PVLAN mappings from an SVI, use the **no** form of this command.

```
private-vlan mapping primary-vlan-id {[secondary-vlan-list | add secondary-vlan-list] |
{remove secondary-vlan-list}}
```

```
no private-vlan mapping
```

## Syntax Description

<i>primary-vlan-id</i>	VLAN ID of the primary VLAN of the PVLAN relationship.
<i>secondary-vlan-list</i>	(Optional) VLAN ID of the secondary VLANs to map to the primary VLAN.
<b>add</b>	(Optional) Maps the secondary VLAN to the primary VLAN.
<b>remove</b>	(Optional) Removes the mapping between the secondary VLAN and the primary VLAN.

## Defaults

All PVLAN mappings are removed.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The *secondary\_vlan\_list* parameter cannot contain spaces. It can contain multiple, comma-separated items. Each item can be a single PVLAN ID or a range of PVLAN IDs separated by hyphens.

This command is valid in the interface configuration mode of the primary VLAN.

The SVI of the primary VLAN is created at Layer 3.

The traffic that is received on the secondary VLAN is routed by the SVI of the primary VLAN.

The SVIs of the existing secondary VLANs do not function and are considered down after this command is entered.

A secondary SVI can be mapped to only one primary SVI. If the configured PVLANS association is different from what is specified in this command (if the specified *primary-vlan-id* is configured as a secondary VLAN), all the SVIs that are specified in this command are brought down.

If you configure a mapping between two VLANs that do not have a valid Layer 2 association, the mapping configuration does not take effect.

**Examples**

This example shows how to map the interface of VLAN 20 to the SVI of VLAN 18:

```
Switch(config)# interface vlan 18
Switch(config-if)# private-vlan mapping 18 20
Switch(config-if)#
```

This example shows how to permit the routing of the secondary VLAN ingress traffic from PVLANS 303 through 307, 309, and 440 and how to verify the configuration:

```
Switch# config terminal
Switch(config)# interface vlan 202
Switch(config-if)# private-vlan mapping add 303-307,309,440
Switch(config-if)# end
Switch# show interfaces private-vlan mapping
Interface Secondary VLAN Type
-----
vlan202    303          isolated
vlan202    304          isolated
vlan202    305          isolated
vlan202    306          isolated
vlan202    307          isolated
vlan202    309          isolated
vlan202    440          isolated
Switch#
```

This example shows the displayed message that you will see if the VLAN that you are adding is already mapped to the SVI of VLAN 18. You must delete the mapping from the SVI of VLAN 18 first.

```
Switch(config)# interface vlan 19
Switch(config-if)# private-vlan mapping 19 add 21
      Command rejected: The interface for VLAN 21 is already mapped as s secondary.
Switch(config-if)#
```

This example shows how to remove all PVLAN mappings from the SVI of VLAN 19:

```
Switch(config)# interface vlan 19
Switch(config-if)# no private-vlan mapping
Switch(config-if)#
```

```
Switch# configure terminal
Switch(config)# interface vlan 202
Switch(config-if)# private-vlan mapping add 303-307,309,440
Switch(config-if)# end
Switch# show interfaces private-vlan mapping
Interface Secondary VLAN Type
-----
vlan202    303          community
vlan202    304          community
vlan202    305          community
vlan202    306          community
vlan202    307          community
vlan202    309          community
vlan202    440          isolated
Switch#
```

**Related Commands**

[show interfaces private-vlan mapping](#)  
[show vlan](#)  
[show vlan private-vlan](#)

# private-vlan synchronize

To map the secondary VLANs to the same instance as the primary VLAN, use the **private-vlan synchronize** command.

## private-vlan synchronize

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

**Defaults** This command has no default settings.

**Command Modes** MST configuration

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** If you do not map the VLANs to the same instance as the associated primary VLAN when you exit the MST configuration submode, a warning message displays and lists the secondary VLANs that are not mapped to the same instance as the associated primary VLAN. The **private-vlan synchronize** command automatically maps all secondary VLANs to the same instance as the associated primary VLANs.

**Examples** This example shows how to initialize PVLAN synchronization:

```
Switch(config-mst)# private-vlan synchronize
Switch(config-mst)#
```

This example assumes that a primary VLAN 2 and a secondary VLAN 3 are associated to VLAN 2, and that all VLANs are mapped to the CIST instance 1. This example also shows the output if you try to change the mapping for the primary VLAN 2 only:

```
Switch(config)# spanning-tree mst configuration
Switch(config-mst)# instance 1 vlan 2
Switch(config-mst)# exit
These secondary vlans are not mapped to the same instance as their primary:
->3
Switch(config)#
```

**Related Commands** [show spanning-tree mst](#)

## qos (global configuration mode)

To globally enable QoS functionality on the switch, use the **qos** command. To globally disable QoS functionality, use the **no** form of this command.

**qos**

**no qos**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	QoS functionality is disabled.
-----------------	--------------------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	If QoS functionality is globally enabled, it is enabled on all interfaces, except on the interfaces where QoS has been disabled. If QoS functionality is globally disabled, all traffic is passed in QoS pass-through mode.
-------------------------	---

<b>Examples</b>	This example shows how to enable QoS functionality globally on the switch:
-----------------	--

```
Switch(config)# qos  
Switch(config)#
```

<b>Related Commands</b>	<a href="#">qos (interface configuration mode)</a> <a href="#">show qos</a>
-------------------------	--

## qos (interface configuration mode)

To enable QoS functionality on an interface, use the **qos** command. To disable QoS functionality on an interface, use the **no** form of this command.

**qos**

**no qos**

---

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

---

**Defaults** QoS is enabled.

---

**Command Modes** Interface configuration

---

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---



---

**Usage Guidelines** If QoS functionality is globally disabled, it is also disabled on all interfaces.

---

**Examples** This example shows how to enable QoS functionality on an interface:

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

---

**Related Commands** [show qos](#)  
[qos \(global configuration mode\)](#)




# qos account layer2 encapsulation

To include additional bytes to be accounted by the QoS features, use the **qos account layer2 encapsulation** command. To disable the use of additional bytes, use the **no** form of this command.

**qos account layer2 encapsulation** {arpa | dot1q | isl | length len}

**no qos account layer2 encapsulation** {arpa | dot1q | isl | length len}

<b>Syntax Description</b>	
<b>arpa</b>	Specifies the account length of the Ethernet ARPA-encapsulated packet (18 bytes).
<b>dot1q</b>	Specifies the account length of the 802.1Q-encapsulated packet (22 bytes).
<b>isl</b>	Specifies the account length of the ISL-encapsulated packet (48 bytes).
<b>length len</b>	Specifies the additional packet length to account for; the valid range is from 0 to 64 bytes.
<b>Defaults</b>	By default, only the length that is specified in the IP header for the IP packets and the length that is specified in the Ethernet header for non-IP packets is included.
<b>Command Modes</b>	Global configuration
<b>Command History</b>	
<b>Release</b>	<b>Modification</b>
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.
<b>Usage Guidelines</b>	<p>In the Catalyst 4500 series switch, the <b>qos account layer2 encapsulation</b> command indicates that the policing feature should consider the configured length in addition to the IP length of the packet when policing the IP packets.</p> <p>Sharing and shaping always use the Ethernet ARPA length.</p>
 <b>Note</b>	<p>The given length is included when policing all IP packets irrespective of the encapsulation with which it was received. When <b>qos account layer2 encapsulation isl</b> is configured, a fixed length of 48 bytes is included when policing all IP packets, not only those IP packets that are received with ISL encapsulation.</p>
	Sharing and shaping use the length that is specified in the Layer 2 headers.
<b>Examples</b>	<p>This example shows how to include an additional 18 bytes when policing IP packets:</p> <pre>Switch# config terminal Switch(config)# qos account layer2 encapsulation length 18 Switch (config)# end Switch#</pre>

This example shows how to disable the consistent accounting of the Layer 2 encapsulation by the QoS features:

```
Switch# config terminal
Switch(config)# no qos account layer2 encapsulation
Switch (config)# end
Switch#
```

---

**Related Commands**    [show interfaces](#)  
                          [switchport](#)  
                          [switchport block](#)

# qos aggregate-policer

To define a named aggregate policer, use the **qos aggregate-policer** command. To delete a named aggregate policer, use the **no** form of this command.

```
qos aggregate-policer name rate burst [conform-action { transmit | drop } |  
                                exceed-action { transmit | drop | policed-dscp-transmit }]
```

```
no qos aggregate-policer name
```

## Syntax Description

<i>name</i>	Name of the aggregate policer.
<i>rate</i>	Maximum bits per second; valid values are from 32000 to 32000000000.
<i>burst</i>	Burst bytes; valid values are from 1000 to 512000000.
<b>conform-action</b>	(Optional) Specifies the action to be taken when the rate is not exceeded.
<b>transmit</b>	(Optional) Transmits the package.
<b>drop</b>	(Optional) Drops the packet.
<b>exceed-action</b>	(Optional) Specifies action when the QoS values are exceeded.
<b>policed-dscp-transmit</b>	(Optional) Sends the DSCP per the policed-DSCP map.

## Defaults

The default settings are as follows:

- Conform-action transmits
- Exceed-action drops

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

This policer can be shared by different policy map classes and on different interfaces.

The Catalyst 4006 switch supports up to 1000 aggregate input policers and 1000 output policers.

The **qos aggregate-policer** command allows you to configure an aggregate flow and a policing rule for that aggregate. When you enter your rate and burst parameters, the range for the average rate is 32 Kbps to 32 Gbps, and the range for the burst size is 1 KB to 512 MB.

A rate can be entered in bits-per-second without a suffix. In addition, the suffixes described in [Table 2-11](#) are allowed.

**Table 2-11 Rate Suffix**

Suffix	Description
k	1000 bps
m	1,000,000 bps
g	1,000,000,000 bps

Bursts can be entered in bytes without a suffix. In addition, the suffixes shown in [Table 2-12](#) are allowed.

**Table 2-12 Burst Suffix**

Suffix	Description
k	1000 bytes
m	1,000,000 bytes
g	1,000,000,000 bytes

**Note**

Due to hardware granularity, the rate value is limited, so the burst that you configure might not be the value that is used.

Modifying an existing aggregate rate limit modifies that entry in NVRAM and in the switch if it is currently being used.

When you enter the aggregate policer name, follow these naming conventions:

- Maximum of 31 characters long and may include a-z, A-Z, 0-9, the dash (-), the underscore (\_), and the period (.).
- Must start with an alphabetic character and must be unique across all ACLs of all types.
- Aggregate policer names are case sensitive.
- Cannot be a number.
- Must not be a keyword; keywords to avoid are **all**, **default-action**, **map**, **help**, and **editbuffer**.

An aggregate policer can be applied to one or more interfaces. However, if you apply the same policer to the input direction on one interface and to the output direction on a different interface, then you have created the equivalent of two different aggregate policers in the switching engine. Each policer has the same policing parameters, with one policing the ingress traffic on one interface and the other policing the egress traffic on another interface. If you apply an aggregate policer to multiple interfaces in the same direction, only one instance of the policer is created in the switching engine.

You can apply an aggregate policer to a physical interface or to a VLAN. If you apply the same aggregate policer to a physical interface and to a VLAN, then you have created the equivalent of two different aggregate policers in the switching engine. Each policer has the same policing parameters, with one policing the traffic on the configured physical interface and the other policing the traffic on the configured VLAN. If you apply an aggregate policer to only ports or only VLANs, then only one instance of the policer is created in the switching engine.

If you apply a single aggregate policer to the ports and the VLANs in different directions, then you have created the equivalent of four aggregate policers; one for all ports sharing the policer in the input direction, one for all ports sharing the policer in the output direction, one for all VLANs sharing the policer in the input direction, and one for all VLANs sharing the policer in the output direction.

---

**Examples**

This example shows how to configure a QoS aggregate policer to allow a maximum of 100,000 bits per second with a normal burst size of 10,000 bytes, to transmit when these rates are not exceeded, and to drop packets when these rates are exceeded:

```
Switch(config)# qos aggregate-policer micro-one 100000 10000 conform-action transmit exceed-action drop
Switch(config)#
```

---

**Related Commands**    [show qos aggregate policer](#)

# qos cos

To define the default CoS value for an interface, use the **qos cos** command. To remove a prior entry, use the **no** form of this command.

**qos cos** *cos\_value*

**no qos cos** *cos\_value*

## Syntax Description

<i>cos_value</i>	Default CoS value for the interface; valid values are from 0 to 7.
------------------	--

## Defaults

The default CoS value is 0.



### Note

CoS override is not configured.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

CoS values are configurable on physical LAN ports only.

## Examples

This example shows how to configure the default QoS CoS value as 6:

```
Switch(config-if)# qos cos 6
Switch(config-if)#
```

## Related Commands

[show qos](#)

# qos dbl

To enable Dynamic Buffer Limiting (DBL) globally on the switch, use the **qos dbl** command. To disable DBL, use the **no** form of this command.

```
qos dbl [buffers {aggressive-flow buffers} | credits {aggressive-flow credits |  
          maximum max} | exceed-action {ecn | probability percent} |  
          flow {include [layer4-ports] [vlan]}}]
```

```
no qos dbl [buffers {aggressive-flow buffers} | credits {aggressive-flow credits |  
          maximum max} | exceed-action {ecn | probability percent} |  
          flow {include [layer4-ports] [vlan]}}]
```

Syntax Description	
<b>buffers</b>	(Optional) Specifies the buffer limit for aggressive flows.
<b>aggressive-flow</b>	(Optional) Specifies the aggressive flow.
<i>buffers</i>	(Optional) Number of buffers for aggressive flows; valid values are from 0 to 255.
<b>credits</b>	(Optional) Specifies the credit limit for aggressive flows and all flows.
<i>credits</i>	(Optional) Number of credits for aggressive flows; valid values are from 0 to 15.
<b>maximum</b>	(Optional) Specifies the maximum credit for all flows.
<i>max</i>	(Optional) Number of credits for all flows; valid values are from 0 to 15.
<b>exceed-action</b>	(Optional) Specifies the packet marking when the limits are exceeded.
<b>ecn</b>	(Optional) Specifies the explicit congestion notification.
<b>probability</b>	(Optional) Specifies the probability of packet marking.
<i>percent</i>	(Optional) Probability number; valid values are from 0 to 100.
<b>flow</b>	(Optional) Specifies the flows for limiting.
<b>include</b>	(Optional) Allows the Layer 4 ports and VLANs to be included in the flows.
<b>layer4-ports</b>	(Optional) Includes the Layer 4 ports in flows.
<b>vlan</b>	(Optional) Includes the VLANs in flows.

## Defaults

The default settings are as follows:

- QoS DBL is disabled.
- Aggressive-flow buffers is set to 2.
- Aggressive-flow credits is set to 2.
- Layer 4 ports are included.
- VLANs are included.
- 15 maximum credits are allowed.
- 15% drop probability is set.

## Command Modes

Global configuration

QoS policy-map class configuration

---

**Command History**

Release	Modification
12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---

---

**Examples**

This example shows how to enable DBL globally on the switch:

```
Switch(config)# qos db1
Global DBL enabled
Switch(config)#
```

This example shows how to enable DBL in the QoS policy-map class configuration mode:

```
Switch(config)# class-map c1
Switch(config-cmap)# policy-map p1
Switch(config-pmap)# class c1
Switch(config-pmap-c)# db1
Switch(config-pmap-c)#
```

---

**Related Commands**

[show qos db1](#)



# qos dscp

To define the default CoS value for an interface, use the **qos dscp** command. To remove a prior entry, use the **no** form of this command.

**qos dscp** *dscp\_value*

**no qos dscp** *dscp\_value*

Syntax Description	<i>dscp_value</i>	Default DSCP value for the interface; valid values are from 0 to 63.
--------------------	-------------------	--

Defaults	The default DSCP value is 0.
----------	------------------------------

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Examples	This example shows how to configure the default QoS DSCP value as 6:
----------	--

```
Switch(config-if)# qos dscp 6  
Switch(config-if)#
```

Related Commands	<a href="#">show qos interface</a>
------------------	------------------------------------

# qos map cos

To define the ingress CoS-to-DSCP mapping for the trusted interfaces, use the **qos map cos to dscp** command. To clear the entire mapping table, use the **no** form of this command.



## Note

You cannot remove a single entry from the table.

**qos map cos** *cos\_values* **to dscp** *dscp1*

**no qos map cos to dscp**

## Syntax Description

<i>cos_values</i>	CoS values; list up to eight CoS values separated by spaces.
<b>to dscp</b>	Defines mapping and specifies DSCP value.
<i>dscp1</i>	DSCP value to map to the CoS values; valid values are from 0 to 63.

## Defaults

The default CoS-to-DSCP configuration settings are shown in the following table:

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

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The CoS-to-DSCP map is used to map the packet CoS (on the interfaces that are configured to trust CoS) to the internal DSCP value. This map is a table of eight CoS values (0 through 7) and their corresponding DSCP value. The switch has one map.

## Examples

This example shows how to configure the ingress CoS-to-DSCP mapping for cos 0:

```
Switch(config)# qos map cos 0 to dscp 20
Switch(config)#
```

This example shows how to clear the entire CoS-to-DSCP mapping table:

```
Switch(config)# no qos map cos 0 to dscp 20
Switch(config)#
```

---

Related Commands

[qos map dscp](#)  
[qos map dscp policed](#)  
[show qos](#)

# qos map dscp

To map the DSCP values to selected transmit queues and to map the DSCP-to-CoS value, use the **qos map dscp** command. To return to the default value, use the **no** form of this command.

**qos map dscp** *dscp-values* **to tx-queue** *queue-id*

**no qos map dscp** *dscp-values* **to cos** *cos-value*

## Syntax Description

<i>dscp-values</i>	List of DSCP values to map to the queue ID; valid values are from 0 to 63.
<b>to</b>	Defines mapping.
<b>tx-queue</b>	Specifies a transmit queue.
<i>queue-id</i>	Transmit queue; valid values are from 1 to 4.
<b>cos</b>	Specifies the CoS value.
<i>cos-value</i>	Class of service; valid values are from 1 to 7.

## Defaults

The default DSCP-to-CoS configuration settings are shown in the following table:

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

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

You use the DSCP-to-CoS map to map the final DSCP classification to a final CoS. The CoS map is written into the ISL header or 802.1Q tag of the transmitted packet on trunk interfaces and contains a table of 64 DSCP values and the corresponding CoS values. The switch has one map. You can enter up to eight DSCP values, separated by spaces, for a CoS value.

The DSCP-to-transmit-queue map is used to map the final DSCP classification to a transmit queue. You can enter up to eight DSCP values, separated by spaces, for a transmit queue.

## Examples

This example shows how to configure the egress DSCP-to-CoS mapping:

```
Switch(config)# qos map dscp 20 25 to cos 3
Switch(config)#
```

This example shows how to configure the egress DSCP-to-transmit queue:

```
Switch(config)# qos map dscp 20 25 to tx-queue 1
Switch(config)#
```

---

**Related Commands**

**qos map cos**  
**show qos interface**  
**show qos**  
**tx-queue**

# qos map dscp policed

To set the mapping of the policed DSCP values to the marked-down DSCP values, use the **qos map dscp policed** command. To remove a prior entry, use the **no** form of this command.

**qos map dscp policed** *dscp\_list* **to dscp** *policed\_dscp*

**no qos map dscp policed**

## Syntax Description

<i>dscp_list</i>	DSCP values; valid values are from 0 to 63.
<b>to dscp</b>	Defines mapping.
<i>policed_dscp</i>	Marked-down DSCP values; valid values are from 0 to 63.

## Defaults

Mapping of DSCP values is disabled.

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The DSCP-to-policed-DSCP map determines the marked-down DSCP value that is applied to the out-of-profile flows. The switch has one map.

You can enter up to eight DSCP values, separated by spaces.

You can enter only one policed DSCP value.



### Note

To avoid out-of-sequence packets, configure the DSCP-to-policed-DSCP map so that marked-down packets remain in the same queue as in-profile traffic.

## Examples

This example shows how to map multiple DSCPs to a single policed-DSCP value:

```
Switch(config)# qos map dscp policed 20 25 43 to dscp 4
Switch(config)#
```

## Related Commands

**qos map cos**  
**qos map dscp**  
**show qos**

# qos rewrite ip dscp

To enable DSCP rewrite for IP packets, use the **qos rewrite ip dscp** command. To disable IP DSCP rewrite, use the **no** form of this command.

**qos rewrite ip dscp**

**no qos rewrite ip dscp**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	IP DSCP rewrite is enabled.
-----------------	-----------------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

Command History	Release	Modification
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>If you disable IP DSCP rewrite and enable QoS globally, the following events occur:</p> <ul style="list-style-type: none"><li>• The ToS byte on the IP packet is not modified.</li><li>• Marked and marked-down DSCP values are used for queueing.</li><li>• The internally derived DSCP (as per the trust configuration on the interface or VLAN policy) is used for transmit queue and Layer 2 CoS determination. The DSCP is not rewritten on the IP packet header.</li></ul> <p>If you disable QoS, the CoS and DSCP of the incoming packet are preserved and are not rewritten.</p>
-------------------------	---

<b>Examples</b>	This example shows how to disable IP DSCP rewrite:
-----------------	--

```
Switch(config)# no qos rewrite ip dscp
Switch(config)#
```

<b>Related Commands</b>	<b>qos (global configuration mode)</b> <a href="#">show qos</a>
-------------------------	--

# qos trust

To set the trusted state of an interface (for example, whether the packets arriving at an interface are trusted to carry the correct CoS, ToS, and DSCP classifications), use the **qos trust** command. To set an interface to the untrusted state, use the **no** form of this command.

**qos trust** {**cos** | *device cisco-phone* | **dscp** | **extend** [**cos priority**]}

**no qos trust** {**cos** | *device cisco-phone* | **dscp** | **extend** [**cos priority**]}

## Syntax Description

<b>cos</b>	Specifies that the CoS bits in incoming frames are trusted and derives the internal DSCP value from the CoS bits.
<i>device cisco-phone</i>	Specifies the Cisco IP phone as the trust device for a port.
<b>dscp</b>	Specifies that the ToS bits in the incoming packets contain a DSCP value.
<b>extend</b>	Specifies to extend the trust to Port VLAN ID (PVID) packets coming from the PC.
<b>cos priority</b>	(Optional) Specifies that the CoS priority value is set to PVID packets; valid values are from 0 to 7.

## Defaults

The default settings are as follows:

- If global QoS is enabled, trust is disabled on the port.
- If global QoS is disabled, trust DSCP is enabled on the port.
- The CoS priority level is 0.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(11)EW	Support for extending trust for voice was added.
12.1(19)EW	Support for trust device Cisco IP phone was added.

## Usage Guidelines

You can only configure the trusted state on physical LAN interfaces.

By default, the trust state of an interface when QoS is enabled is untrusted; when QoS is disabled on the interface, the trust state is reset to trust DSCP.

When the interface trust state is **qos trust cos**, the transmit CoS is always the incoming packet CoS (or the default CoS for the interface, if the packet is not tagged).

When the interface trust state is not **qos trust dscp**, the security and QoS ACL classification will always use the interface DSCP and not the incoming packet DSCP.

Trusted boundary should not be configured on the ports that are part of an EtherChannel (that is, a port channel).



---

**Examples**

This example shows how to set the trusted state of an interface to CoS:

```
Switch(config-if)# qos trust cos
Switch(config-if)#
```

This example shows how to set the trusted state of an interface to DSCP:

```
Switch(config-if)# qos trust dscp
Switch(config-if)#
```

This example shows how to set the PVID CoS level to 6:

```
Switch(config-if)# qos trust extend cos 6
Switch(config-if)#
```

This example shows how to set the Cisco phone as the trust device:

```
Switch(config-if)# qos trust device cisco-phone
Switch(config-if)#
```

---

**Related Commands**

[qos cos](#)  
[qos vlan-based](#)  
[show qos interface](#)

# qos vlan-based

To enable per-VLAN QoS for a Layer 2 interface, use the **qos vlan-based** command. To disable per-VLAN QoS for a Layer 2 interface, use the **no** form of this command.

**qos vlan-based**

**no qos vlan-based**

---

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

---

**Defaults** Per-VLAN QoS is disabled.

---

**Command Modes** Interface configuration

---

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---



---

**Usage Guidelines**

In VLAN-based mode, the policy map that is attached to the Layer 2 interface is ignored, and QoS is driven by the policy map that is attached to the corresponding VLAN interface.

Per-VLAN QoS can be configured only on the Layer 2 interfaces.

If no input QoS policy is attached to a Layer 2 interface, then the input QoS policy that is attached to the VLAN (on which the packet is received), if any, is used even if the port is not configured as VLAN based.

If you do not want this default, attach a placeholder input QoS policy to the Layer 2 interface.

Similarly, if no output QoS policy is attached to a Layer 2 interface, then the output QoS policy that is attached to the VLAN (on which the packet is transmitted), if any, is used even if the port is not configured as VLAN based.

If you do not want this default, attach a placeholder output QoS policy to the Layer 2 interface.

Layer 3 interfaces are always in interface-based mode. Layer 3 VLAN interfaces are always in VLAN-based mode.

---

**Examples** This example shows how to enable per-VLAN QoS for a Layer 2 interface:

```
Switch(config-if) # qos vlan-based
Switch(config-if) #
```

---

**Related Commands**

- [qos cos](#)
- [show qos interface](#)

# redundancy

To enter the redundancy configuration mode, use the **redundancy** command in the global configuration mode.

## redundancy

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch (Catalyst 4507R only).

<b>Usage Guidelines</b>	<p>The redundancy configuration mode is used to enter the main CPU submode.</p> <p>To enter the main CPU submode, use the <b>main-cpu</b> command in the redundancy configuration mode.</p> <p>The main CPU submode is used to manually synchronize the configurations on the two supervisor engines.</p> <p>From the main CPU submode, use the <b>auto-sync</b> command to enable automatic synchronization of the configuration files in NVRAM.</p> <p>Use the <b>no</b> command to disable redundancy. If you disable redundancy, then reenabling redundancy, the switch returns to default redundancy settings.</p> <p>Use the <b>exit</b> command to exit the redundancy configuration mode.</p>
-------------------------	---

<b>Examples</b>	This example shows how to enter redundancy mode:
-----------------	--

```
Switch(config)# redundancy
Switch(config-red)#
```

This example shows how to enter the main CPU submode:

```
Switch(config)# redundancy
Switch(config-red)# main-cpu
Switch(config-r-mc)#
```

<b>Related Commands</b>	<b>auto-sync</b> <b>main-cpu</b>
-------------------------	-------------------------------------

# redundancy force-switchover

To force a switchover from the active to the standby supervisor engine, use the **redundancy force-switchover** command.

## redundancy force-switchover

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

**Defaults** This command has no default settings.

**Command Modes** EXEC

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch (Catalyst 4507R only).

**Usage Guidelines** Before using this command, refer to the “Performing a Software Upgrade” section of the *Catalyst 4500 Series Switch Cisco IOS Software Configuration Guide* for additional information.

The **redundancy force-switchover** command conducts a manual switchover to the redundant supervisor engine. The redundant supervisor engine becomes the new active supervisor engine running the Cisco IOS image. The modules are reset.

The old active supervisor engine reboots with the new image and becomes the standby supervisor engine.

**Examples** This example shows how to switch over manually from the active to the standby supervisor engine:

```
Switch# redundancy force-switchover
Switch#
```

**Related Commands** [redundancy](#)  
[show redundancy](#)

# redundancy reload

To force a reload of one or both supervisor engines, use the **redundancy reload** command.

**redundancy reload {peer | shelf}**

Syntax Description	<b>peer</b>	Reloads the peer unit.
	<b>shelf</b>	Reboots both supervisor engines.

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

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch (Catalyst 4507R only).

Usage Guidelines	<p>Before using this command, refer to the “Performing a Software Upgrade” section of the <i>Catalyst 4500 Series Switch Cisco IOS Software Configuration Guide</i> for additional information.</p> <p>The <b>redundancy reload shelf</b> command conducts a reboot of both supervisor engines. The modules are reset.</p>
------------------	--

Examples	<p>This example shows how to manually reload one or both supervisor engines:</p> <pre>Switch# redundancy reload shelf Switch#</pre>
----------	---

Related Commands	<a href="#">redundancy</a> <a href="#">show redundancy</a>
------------------	---

# remote login module

To remotely connect to a specific module, use the **remote login module** configuration command.

**remote login module** *mod*

Syntax Description	<i>mod</i> Target module for the command.
--------------------	---

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

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

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	This command applies only to the Access Gateway Module on Catalyst 4500 series switches.
	The valid values for <i>mod</i> depends on the chassis used. For example, if you have a Catalyst 4006 chassis, valid values for the module are from 2 to 6. If you have a 4507R chassis, valid values are from 3 to 7.
	When you execute the <b>remote login module</b> <i>mod</i> command, the prompt changes to Gateway#
	The <b>remote login module</b> command is identical to the <b>session module</b> <i>mod</i> and the <b>attach module</b> <i>mod</i> commands.

Examples	This example shows how to remotely log in to the Access Gateway Module:
----------	---

```
Switch# remote login module 5
Attaching console to module 5
Type 'exit' at the remote prompt to end the session

Gateway>
```

Related Commands	<a href="#">attach module</a> <a href="#">session module</a>
------------------	---

# remote-span

To convert a VLAN into an RSPAN VLAN, use the **remote-span** command. To convert an RSPAN VLAN to a VLAN, use the **no** form of this command.

**remote-span**

**no remote-span**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	RSPAN is disabled.
-----------------	--------------------

<b>Command Modes</b>	VLAN configuration
----------------------	--------------------

Command History	Release	Modification
	12.1(20)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to convert a VLAN into an RSPAN VLAN:
-----------------	--

```
Switch# config terminal
Switch(config)# vlan 20
Switch(config-vlan)# remote-span
Switch(config-vlan)# end
Switch#
```

<b>Related Commands</b>	<a href="#">monitor session</a>
-------------------------	---------------------------------

# renew ip dhcp snooping database

To renew the DHCP binding database, use the **renew ip dhcp snooping database** command.

**renew ip dhcp snooping database** [**validation none**] [**url**]

Syntax Description	<b>validation none</b>	(Optional) Specifies that the checksum associated with the contents of the file specified by the URL is not verified.
	<b>url</b>	(Optional) Specifies the file from which the read is performed.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** If the URL is not provided, the switch tries to read the file from the configured URL.

**Examples** This example shows how to renew the DHCP binding database while bypassing the CRC checks:

```
Switch# renew ip dhcp snooping database validation none
Switch#
```

**Related Commands**

- [ip dhcp snooping](#)
- [ip dhcp snooping binding](#)
- [ip dhcp snooping information option](#)
- [ip dhcp snooping trust](#)
- [ip dhcp snooping vlan](#)
- [show ip dhcp snooping](#)
- [show ip dhcp snooping binding](#)



# reset

To leave the proposed new VLAN database but remain in VLAN configuration mode and reset the proposed new database to be identical to the VLAN database currently implemented, use the **reset** command.

**reset**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	VLAN configuration
----------------------	--------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to reset the proposed new VLAN database to the current VLAN database:
	Switch(vlan-config)# <b>reset</b>
	RESET completed.
	Switch(vlan-config)#

# revision

To set the MST configuration revision number, use the **revision** command. To return to the default settings, use the **no** form of this command.

**revision** *version*

**no revision**

Syntax Description	<i>version</i> Configuration revision number; valid values are from 0 to 65535.
--------------------	---

Defaults	Revision version is set to 0.
----------	-------------------------------

Command Modes	MST configuration
---------------	-------------------

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	If two Catalyst 4500 series switches have the same configuration but have different configuration revision numbers, they are considered to be part of two different regions.
------------------	--



## Caution

Be careful when using the **revision** command to set the MST configuration revision number because a mistake can put the switch in a different region.

Examples	This example shows how to set the configuration revision number:
----------	--

```
Switch(config-mst)# revision 5
Switch(config-mst)#
```

Related Commands	<a href="#">instance</a> <a href="#">name</a> <a href="#">show spanning-tree mst</a> <a href="#">spanning-tree mst configuration</a>
------------------	---

# service-policy

To attach a policy map to an interface or to apply different QoS policies on VLANs that an interface belongs to, use the **service-policy** command. To remove a policy map from an interface, use the **no** form of this command.

**service-policy** {**input** | **output**} *policy-map name*

**no service-policy** {**input** | **output**} *policy-map name*

## Syntax Description

<b>input</b>	Specifies the input policy maps.
<b>output</b>	Specifies the output policy maps.
<i>policy-map name</i>	Name of a previously configured policy map.

## Defaults

A policy map is not attached to an interface.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.2(25)EWA	Support for applying different QoS policies on VLANs was introduced.

## Usage Guidelines

Layer 2 interfaces can be part of multiple VLANs (for example, a typical trunk port). In conjunction with the **vlan-range** command, you can use the **service-policy** command to specify different QoS policies on different VLANs.



### Note

This capability is restricted to Layer 2 interfaces.

You cannot apply a policy-map under an interface and a VLAN range at the same time.

## Examples

This example shows how to attach a policy map to Fast Ethernet interface 5/20:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fastethernet 5/20
Switch(config-if)# service-policy input pmap1
Switch(config-if)# end
```

This example shows how to apply policy-map p1 for traffic in VLANs 20 and 400, and policy-map p2 for traffic in VLANs 300 through 301:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface gigabitEthernet 6/1
```

```

Switch(config-if)# switchport trunk encapsulation dot1q
Switch(config-if)# switchport mode trunk
Switch(config-if)# vlan-range 20,400
Switch(config-if-vlan-range)# service-policy input p1
Switch(config-if-vlan-range)# exit
Switch(config-if)# vlan-range 300-301
Switch(config-if-vlan-range)# service-policy output p2
Switch(config-if-vlan-range)# end
Switch# show policy-map interface gigabitEthernet 6/1 vlan 20
GigabitEthernet6/1 vlan 20

```

```
Service-policy input: p1
```

```

Class-map: class-default (match-any)
  0 packets
Match: any
  0 packets
police: Per-interface
  Conform: 0 bytes Exceed: 0 bytes

```

```

Switch# show policy-map interface gigabitEthernet 6/1
GigabitEthernet6/1 vlan 20

```

```
Service-policy input: p1
```

```

Class-map: class-default (match-any)
  0 packets
Match: any
  0 packets
police: Per-interface
  Conform: 0 bytes Exceed: 0 bytes

```

```
GigabitEthernet6/1 vlan 300
```

```
Service-policy output: p2
```

```

Class-map: class-default (match-any)
  0 packets
Match: any
  0 packets
police: Per-interface
  Conform: 0 bytes Exceed: 0 bytes

```

```
GigabitEthernet6/1 vlan 301
```

```
Service-policy output: p2
```

```

Class-map: class-default (match-any)
  0 packets
Match: any
  0 packets
police: Per-interface
  Conform: 0 bytes Exceed: 0 bytes

```

```
GigabitEthernet6/1 vlan 400
```

```
Service-policy input: p1
```

```

Class-map: class-default (match-any)
  0 packets
Match: any
  0 packets
police: Per-interface
  Conform: 0 bytes Exceed: 0 bytes

```

---

Related Commands

[class-map](#)  
[policy-map](#)  
[service-policy](#)  
[show policy-map interface vlan](#)

# service-policy input (control-plane)

To attach a policy map to a control plane for aggregate control plane services, use the **service-policy input** command. Use the **no** form of this command to remove a service policy from a control plane.

**service-policy input** *policy-map-name*

Syntax Description	<b>input</b>	Applies the specified service policy to the packets that are entering the control plane.
	<i>policy-map-name</i>	Name of a service policy map (created using the <b>policy-map</b> command) to be attached.

**Defaults** No service policy is specified.

**Command Modes** Control-plane configuration

Command History	Release	Modification
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch

**Usage Guidelines** In this release, the only policy-map accepted on the control-plane is system-cpp-policy. It is already attached to the control-plane at start up. If not (due to some error conditions), it is recommended to use the **global macro system-cpp** command to attach it to the control-plane. The system-cpp-policy created by the system contains system pre-defined classes. For these pre-defined classes, you can change the policing parameters but you should not make any other change to the classes.

You can define your own class-maps and append them to the end of the system-cpp-policy policy-map.

**Examples** This example shows how to configure trusted hosts with source addresses 10.1.1.1 and 10.1.1.2 to forward Telnet packets to the control plane without constraint, while allowing all remaining Telnet packets to be policed at the specified rate:

```
Switch(config)# access-list 140 deny tcp host 10.1.1.1 any eq telnet
! Allow 10.1.1.2 trusted host traffic.
Switch(config)# access-list 140 deny tcp host 10.1.1.2 any eq telnet
! Rate limit all other Telnet traffic.
Switch(config)# access-list 140 permit tcp any any eq telnet
! Define class-map "telnet-class."
Switch(config)# class-map telnet-class
Switch(config-cmap)# match access-group 140
Switch(config-cmap)# exit
Switch(config)# policy-map control-plane-policy
Switch(config-pmap)# class telnet-class
Switch(config-pmap-c)# police 80000 conform transmit exceed drop
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
```

```
! Define aggregate control plane service for the active Route Processor.  
Switch(config)# control-plane  
Switch(config-cp)# service-policy input control-plane-policy  
Switch(config-cp)# exit
```

---

**Related Commands**

**control-plane**  
**macro global apply system-cpp**  
**policy-map**  
**show policy-map control-plane**

# session module



## Note

This command is only supported in SSO mode and does not work in RPR mode.

To login to the standby supervisor engine using a virtual console, use the **session module** configuration command.

**session module** *mod*

## Syntax Description

<i>mod</i>	Target module for the command.
------------	--------------------------------

## Defaults

This command has no default settings.

## Command Modes

Privileged

## Command History

Release	Modification
12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

Catalyst 4500 series switches can be configured with 2 supervisor engines to provide redundancy. When the switch is powered, one of the supervisor engines becomes active and remains active until a switchover occurs. The other supervisor engine remains in standby mode.

Each supervisor engine has its own console port. Access to the standby supervisor engine is possible only through the console port of the standby supervisor engine. Therefore, you must connect to the standby console to access, monitor or debug the standby supervisor.

Virtual Console for Standby Supervisor Engine enables you to access the standby console from the active supervisor engine without requiring a physical connection to the standby console. It uses IPC over EOBC to communicate with the standby supervisor engine and thus emulate the standby console on the active supervisor engine. Only one active standby console session is active at any time.

The Virtual Console for Standby Supervisor Engine allows users who are logged onto the active supervisor engine to remotely execute show commands on the standby supervisor engine and view the results on the active supervisor engine. Virtual Console is available only from the active supervisor engine.

You can access the standby virtual console from the active supervisor engine with the **attach module**, **session module**, or **remote login** commands on the active supervisor engine. You must be in privilege EXEC mode (level 15) to run these commands to access the standby console.



## Note

The **session module** command is identical to the **attach module** *mod* and the **remote login module** *mod* commands.



Once you enter the standby virtual console, the terminal prompt automatically changes to "<hostname>-standby-console#" where hostname is the configured name of the switch. The prompt is restored back to the original prompt when you exit the virtual console.

You exit the virtual console with the **exit** or **quit** commands. When the inactivity period of the terminal on the active supervisor engine where you logged in exceeds the configured idle time, you are automatically logged out of the terminal on the active supervisor engine. In such a case, the virtual console session is also terminated. Virtual console session is also automatically terminated when the standby is rebooted. After the standby boots up, you need to create another virtual console session.

The following limitations apply to the standby virtual console:

All commands on the virtual console run to completion. It does not provide the auto-more feature; it behaves as if the **terminal length 0** command has been executed. It is also non-interactive. Therefore, a running command cannot be interrupted or aborted by any key sequence on the active supervisor engine. Therefore if a command produces considerable output, the virtual console displays it on the supervisor screen.

The virtual console is non-interactive. Because the virtual console does not detect the interactive nature of a command, any command that requires user interaction causes the virtual console to wait until the RPC timer aborts the command.

The virtual console timer is set to 60 seconds. The virtual console returns to its prompt after 60 seconds. During this time, you cannot abort the command from the key board. You must wait for the timer to expire before you continue.

You cannot use virtual console to view debug and syslog messages that are being displayed on the standby supervisor engine. The virtual console only displays the output of commands that are executed from the virtual console. Other information that is displayed on the real standby console does not appear on the virtual console.

---

## Examples

To login to the standby supervisor engine using a virtual console, do the following:

```
Switch# session module 2
Connecting to standby virtual console
Type "exit" or "quit" to end this session

Switch-standby-console# exit
Switch#
```

If the standby console is not enabled, the following message appears.

```
Switch-standby-console#
Standby console disabled.
Valid commands are: exit, logout
```

---

## Related Commands

[attach module](#)  
[remote login module](#)

# shape

To specify traffic shaping on an interface, use the **shape** command. To remove traffic shaping, use the **no** form of this command

**shape [rate] [percent]**

**no shape [rate] [percent]**

Syntax Description	<b>rate</b>	(Optional) Specifies an average rate for traffic shaping; the range is 16000 to 1000000000. Post-fix notation (k, m, and g) is optional and a decimal point is allowed.
	<b>percent</b>	(Optional) Specifies a percent of bandwidth for traffic shaping.

Defaults	Default is no traffic shaping.
----------	--------------------------------

Command Modes	Interface transmit queue configuration mode
---------------	---

Command History	Release	Modification
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines**

Traffic shaping is available on all the ports, and it sets an upper limit on the bandwidth.

When the high shape rates are configured on the Catalyst 4500 Supervisor Engine II-Plus-10GE (WS-X4013+10GE), the Catalyst 4500 Supervisor Engine V (WS-X4516), and the Catalyst 4500 Supervisor Engine V-10GE (WS-X4516-10GE), the shaped traffic rate may not be achieved in situations that involve contention and unusual packet size distributions. On the ports that are multiplexed through a Stub ASIC and connected to the backplane gigaports, the shape rates above 7 Mbps may not be achieved under worst-case conditions. On ports that are connected directly to the backplane gigaports, or the supervisor engine gigaports, the shape rates above 50 Mbps may not be achieved under worst-case conditions.

Some examples of ports that are connected directly to the backplane are as follows:

- Uplink ports on Supervisor Engine II+, II+10GE, III, IV, V, and V-10GE
- Ports on the WS-X4306-GB module
- The two 1000BASE-X ports on the WS-X4232-GB-RJ module
- The first two ports on the WS-X4418-GB module
- The two 1000BASE-X ports on the WS-X4412-2GB-TX module

All ports on the 24-port modules and the 48-port modules are multiplexed through a Stub ASIC. Some examples of ports multiplexed through a Stub ASIC are as follows:

- 10/100 ports on the WS-X4148-RJ45 module
- 10/100/1000 ports on the WS-X4124-GB-RJ45 module
- 10/100/1000 ports on the WS-X4448-GB-RJ45 module

## Examples

This example shows how to configure a maximum bandwidth (70 percent) for the interface fa3/1:

```
Switch(config)# interface fastethernet3/1
Switch(config-if)# tx-queue 3
Switch(config-if-tx-queue)# shape 70m
Switch(config-if-tx-queue)#
```

■ shape

# show access-group mode interface

To display the ACL configuration on a Layer 2 interface, use the **show access-group mode interface** command.

**show access-group mode interface** [*interface interface-number*]

Syntax Description	<i>interface</i>	(Optional) Interface type; valid values are <b>ethernet</b> , <b>fastethernet</b> , <b>gigabitethernet</b> , <b>tengigabitethernet</b> , and <b>port-channel</b> .
	<i>interface-number</i>	(Optional) Interface number.

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

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

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EW	Support for the 10-Gigabit Ethernet interface was introduced on the Catalyst 4500 series switch.

Usage Guidelines	The valid values for the port number depend on the chassis used.
------------------	--

Examples	<p>This example shows how to display the ACL configuration on the Fast Ethernet interface 6/1:</p> <pre>Switch# show access-group mode interface fa6/1 Interface FastEthernet6/1:   Access group mode is: merge Switch#</pre>
----------	---

Related Commands	<a href="#">access-group mode</a>
------------------	-----------------------------------

# show adjacency

To display information about the Layer 3 switching adjacency table, use the **show adjacency** command.

**show adjacency** [{ *interface interface-number* } | { **null** *interface-number* } | { **port-channel** *number* }  
| { **vlan** *vlan-id* } | **detail** | **internal** | **summary**]

<b>Syntax Description</b>	<i>interface</i>	(Optional) Interface type; possible valid values are <b>ethernet</b> , <b>fastethernet</b> , <b>gigabitethernet</b> , <b>tengigabitethernet</b> , <b>pos</b> , <b>ge-wan</b> , and <b>atm</b> .
	<i>interface-number</i>	(Optional) Module and port number; see the “Usage Guidelines” section for valid values.
	<b>null</b> <i>interface-number</i>	(Optional) Specifies the null interface; the valid value is <b>0</b> .
	<b>port-channel</b> <i>number</i>	(Optional) Specifies the channel interface; valid values are a maximum of 64 values ranging from 1 to 256.
	<b>vlan</b> <i>vlan-id</i>	(Optional) Specifies the VLAN; valid values are from 1 to 4094.
	<b>detail</b>	(Optional) Displays the information about the protocol detail and timer.
	<b>internal</b>	(Optional) Displays the information about the internal data structure.
	<b>summary</b>	(Optional) Displays a summary of CEF-adjacency information.

**Defaults** This command has no default settings.

**Command Modes** EXEC

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(25)EW	Extended to include the 10-Gigabit Ethernet interface.

**Usage Guidelines** The *interface-number* argument designates the module and port number. Valid values for *interface-number* depend on the specified interface type and the chassis and module that are used. For example, if you specify a Gigabit Ethernet interface and have a 48-port 10/100BASE-T Ethernet module that is installed in a 13-slot chassis, valid values for the module number are from 1 to 13, and valid values for the port number are from 1 to 48.

Hardware Layer 3 switching adjacency statistics are updated every 60 seconds.

The following information is contained in the **show adjacency** command:

- Protocol interface.
- Type of routing protocol that is configured on the interface.
- Interface address.
- Method of adjacency that was learned.

- MAC address of the adjacent router.
- Time left before the adjacency rolls out of the adjacency table. After it rolls out, a packet must use the same next hop to the destination.

## Examples

This example shows how to display adjacency information:

```
Switch# show adjacency
Protocol Interface Address
IP       FastEthernet2/3 172.20.52.1 (3045)
IP       FastEthernet2/3 172.20.52.22 (11)
Switch#
```

This example shows how to display a summary of adjacency information:

```
Switch# show adjacency summary
Adjacency Table has 2 adjacencies
Interface Adjacency Count
FastEthernet2/3 2
Switch#
```

This example shows how to display protocol detail and timer information:

```
Switch# show adjacency detail
Protocol Interface Address
IP       FastEthernet2/3 172.20.52.1 (3045)
0 packets, 0 bytes
000000000FF920000380000000000000
00000000000000000000000000000000
00605C865B2800D0BB0F980B0800
ARP      03:58:12
IP       FastEthernet2/3 172.20.52.22 (11)
0 packets, 0 bytes
000000000FF920000380000000000000
00000000000000000000000000000000
00801C93804000D0BB0F980B0800
ARP      03:58:06
Switch#
```

This example shows how to display adjacency information for a specific interface:

```
Switch# show adjacency fastethernet2/3
Protocol Interface Address
IP       FastEthernet2/3 172.20.52.1 (3045)
IP       FastEthernet2/3 172.20.52.22 (11)
Switch#
```

## Related Commands

[debug adjacency](#)

# show arp access-list

To display detailed information on an ARP access list, use the **show arp** command.

**show arp access-list**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	EXEC
----------------------	------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to display the ARP ACL information for a switch:
-----------------	---

```
Switch# show arp access-list
ARP access list rose
  permit ip 10.101.1.1 0.0.0.255 mac any
  permit ip 20.3.1.0 0.0.0.255 mac any
```

<b>Related Commands</b>	<a href="#">access-group mode</a> <a href="#">arp access-list</a> <a href="#">ip arp inspection filter vlan</a>
-------------------------	---



# show auto install status

To display the status of an automatic installation, use the **show auto install status** command.

## show auto install status

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(20)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	<p>This example shows how to display the IP address of the TFTP server and to display whether or not the switch is currently acquiring the configuration file on the TFTP server:</p>
-----------------	---

```
Switch# show auto install status

Status           : Downloading config file
DHCP Server      : 20.0.0.1
TFTP Server      : 30.0.0.3
Config File Fetched : Undetermined
```

The first IP address in the display indicates the server that is used for the automatic installation. The second IP address indicates the TFTP server that provided the configuration file.

# show auto qos

To display the automatic quality of service (auto-QoS) configuration that is applied, use the **show auto qos** user EXEC command.

**show auto qos** [**interface** *interface-id*] [{**begin** | **exclude** | **include**} *expression*]

## Syntax Description

<b>interface</b> <i>interface-id</i>	(Optional) Displays auto-QoS information for the specified interface or for all interfaces. Valid interfaces include physical ports.
<b>begin</b>	(Optional) Begins with the line that matches the expression.
<b>exclude</b>	(Optional) Excludes lines that match the expression.
<b>include</b>	(Optional) Includes lines that match the specified expression.
<i>expression</i>	(Optional) Expression in the output to use as a reference point.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The **show auto qos interface** *interface-id* command displays the auto-QoS configuration; it does not display any user changes to the configuration that might be in effect.

To display information about the QoS configuration that might be affected by auto-QoS, use one of these commands:

- **show qos**
- **show qos map**
- **show qos interface** *interface-id*
- **show running-config**

Expressions are case sensitive. For example, if you enter **exclude output**, the lines that contain *output* do not appear, but the lines that contain *Output* appear.

---

**Examples**

This example shows output from the **show auto qos** command when auto-QoS is enabled:

```
Switch# show auto qos
00:00:55:qos
00:00:56:qos map cos 3 to dscp 26
00:00:57:qos map cos 5 to dscp 46
00:00:58:qos map dscp 16 to tx-queue 1
00:00:58:qos map dscp 32 to tx-queue 1
00:00:58:qos dbl
00:00:59:policy-map autoqos-voip-policy
00:00:59:  class class-default
00:00:59:    dbl
00:00:59:interface GigabitEthernet1/1
00:00:59:  qos trust device cisco-phone
00:00:59:  qos trust cos
00:00:59:  tx-queue 3
00:00:59:  priority high
00:00:59:  shape percent 70
00:00:59:  service-policy output autoqos-voip-policyend
```

This example shows output from the **show auto qos interface** command when the **auto qos voip cisco-phone** interface configuration command is entered:

```
Switch# show auto qos interface
Initial configuration applied by AutoQoS:
!
interface GigabitEthernet1/1
qos trust device cisco-phone
qos trust cos
tx-queue 3
priority high
shape percent 70
service-policy output autoqos-voip-policy
!
interface GigabitEthernet1/2
qos trust device cisco-phone
qos trust cos
tx-queue 3
priority high
shape percent 70
service-policy output autoqos-voip-policy
```

This example shows output from the **show auto qos interface gigabitethernet1/1** command when the **auto qos voip cisco-phone** interface configuration command is entered:

```
Switch# show auto qos interface gigabitethernet1/1
Initial configuration applied by AutoQoS:
!
interface GigabitEthernet1/1
qos trust device cisco-phone
qos trust cos
tx-queue 3
priority high
shape percent 70
service-policy output autoqos-voip-policy
```

This example shows output from the **show auto qos** command when auto-QoS is disabled:

```
Switch# show auto qos
AutoQoS is disabled
```

---

**Related Commands**

[auto qos voip](#)

# show bootflash:

To display information about the bootflash: file system, use the **show bootflash:** command.

**show bootflash:** [**all** | **chips** | **filesys**]

Syntax Description	<b>all</b>	(Optional) Displays all possible Flash information.
	<b>chips</b>	(Optional) Displays Flash chip information.
	<b>filesys</b>	(Optional) Displays file system information.

**Defaults** This command has no default settings.

**Command Modes** EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display file system status information:

```
Switch> show bootflash: filesys

----- F I L E   S Y S T E M   S T A T U S -----
  Device Number = 0
DEVICE INFO BLOCK: bootflash
  Magic Number      = 6887635   File System Vers = 10000   (1.0)
  Length            = 1000000   Sector Size      = 40000
  Programming Algorithm = 39     Erased State     = FFFFFFFF
  File System Offset  = 40000    Length = F40000
  MONLIB Offset      = 100      Length = C628
  Bad Sector Map Offset = 3FFF8   Length = 8
  Squeeze Log Offset  = F80000   Length = 40000
  Squeeze Buffer Offset = FC0000  Length = 40000
  Num Spare Sectors   = 0
    Spares:
STATUS INFO:
  Writable
  NO File Open for Write
  Complete Stats
  No Unrecovered Errors
  No Squeeze in progress
USAGE INFO:
  Bytes Used      = 917CE8   Bytes Available = 628318
  Bad Sectors     = 0       Spared Sectors  = 0
  OK Files        = 2       Bytes = 917BE8
  Deleted Files   = 0       Bytes = 0
  Files w/Errors  = 0       Bytes = 0
Switch>
```

This example shows how to display system image information:

```
Switch> show bootflash:
-# - ED --type-- --crc--- -seek-- nlen -length- -----date/time----- name
1  .. image      8C5A393A  237E3C   14  2063804 Aug 23 1999 16:18:45 c4-boot-mz
2  .. image      D86EE0AD  957CE8    9  7470636 Sep 20 1999 13:48:49 rp.halley
Switch>
```

This example shows how to display all bootflash information:

```
Switch> show bootflash: all
-# - ED --type-- --crc--- -seek-- nlen -length- -----date/time----- name
1  .. image      8C5A393A  237E3C   14  2063804 Aug 23 1999 16:18:45 c4-boot-
mz
2  .. image      D86EE0AD  957CE8    9  7470636 Sep 20 1999 13:48:49 rp.halley

6456088 bytes available (9534696 bytes used)

----- F I L E   S Y S T E M   S T A T U S -----
Device Number = 0
DEVICE INFO BLOCK: bootflash
  Magic Number      = 6887635      File System Vers = 10000      (1.0)
  Length            = 1000000      Sector Size      = 40000
  Programming Algorithm = 39      Erased State     = FFFFFFFF
  File System Offset = 40000      Length = F40000
  MONLIB Offset     = 100         Length = C628
  Bad Sector Map Offset = 3FFF8   Length = 8
  Squeeze Log Offset = F80000     Length = 40000
  Squeeze Buffer Offset = FC0000  Length = 40000
  Num Spare Sectors = 0
  Spares:
STATUS INFO:
  Writable
  NO File Open for Write
  Complete Stats
  No Unrecovered Errors
  No Squeeze in progress
USAGE INFO:
  Bytes Used      = 917CE8      Bytes Available = 628318
  Bad Sectors     = 0          Spared Sectors  = 0
  OK Files        = 2          Bytes = 917BE8
  Deleted Files   = 0          Bytes = 0
  Files w/Errors  = 0          Bytes = 0
Switch>
```

# show bootvar

To display BOOT environment variable information, use the **show bootvar** command.

## show bootvar

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to display BOOT environment variable information:
-----------------	--

```
Switch# show bootvar
BOOT variable = sup:1;
CONFIG_FILE variable does not exist
BOOTLDR variable does not exist
Configuration register is 0x0
Switch#
```

# show cable-diagnostics tdr

To display the test results for the TDR cable diagnostics, use the **show cable-diagnostics tdr** command.

**show cable-diagnostics tdr** {**interface** {*interface interface-number*}}



## Note

This command will be deprecated in future Cisco IOS releases. Please use the **diagnostic start** command.

## Syntax Description

**interface** *interface* Interface type; valid values are **fastethernet** and **gigabitethernet**.  
*interface-number* Module and port number.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.2(25)SG	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The TDR test is supported on Catalyst 4500 series switches running Cisco IOS Release 12.2(25)SG for the following line cards only:

- WS-X4548-GB-RJ45
- WS-X4548-GB-RJ45V
- WS-X4524-GB-RJ45V
- WS-X4013+TS
- WS-C4948
- WS-C4948-10GE

The distance to the fault is displayed in meters (m).

## Examples

This example shows how to display information about the TDR test:

```
Switch# show cable-diagnostics tdr interface gi4/13
Interface Speed  Local pair Cable length Remote channel Status
Gi4/13      0Mbps    1-2      102 +-2m    Unknown    Fault
              3-6      100 +-2m    Unknown    Fault
              4-5      102 +-2m    Unknown    Fault
              7-8      102 +-2m    Unknown    Fault
Switch#
```

Table 2-13 describes the fields in the **show cable-diagnostics tdr** command output.

**Table 2-13** *show cable-diagnostics tdr Command Output Fields*

Field	Description
Interface	Interface tested.
Speed	Current line speed.
Pair	Local pair name.
Cable Length	Distance to the fault in meters (m).
Channel	Pair designation (A, B, C, or D).
Status	Pair status displayed is one of the following: <ul style="list-style-type: none"><li>• Terminated—The link is up.</li><li>• Fault—Cable fault (open or short)</li></ul>

**Related Commands**    [test cable-diagnostics tdr](#)



# show cdp neighbors

To display detailed information about the neighboring devices that are discovered through CDP, use the **show cdp neighbors** command.

**show cdp neighbors** [*type number*] [**detail**]

Syntax Description	<i>type</i>	(Optional) Interface type that is connected to the neighbors about which you want information; possible valid values are <b>ethernet</b> , <b>fastethernet</b> , <b>gigabitethernet</b> , <b>tengigabitethernet</b> , <b>port-channel</b> , and <b>vlan</b> .
	<i>number</i>	(Optional) Interface number that is connected to the neighbors about which you want information.
	<b>detail</b>	(Optional) Displays detailed information about a neighbor (or neighbors) including network address, enabled protocols, hold time, and software version.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.2(25)EW	Extended to include the 10-Gigabit Ethernet interface.

**Usage Guidelines** The **vlan** keyword is supported in Catalyst 4500 series switches that are configured with a Supervisor Engine II.

The **port-channel** values are from 0 to 282; values from 257 to 282 are supported on the CSM and the FWSM only.

**Examples** This example shows how to display the information about the CDP neighbors:

```
Switch# show cdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID         Local Intrfce   Holdtme    Capability   Platform   Port ID
lab-7206          Eth 0           157        R            7206VXR    Fas 0/0/0
lab-as5300-1      Eth 0           163        R            AS5300     Fas 0
lab-as5300-2      Eth 0           159        R            AS5300     Eth 0
lab-as5300-3      Eth 0           122        R            AS5300     Eth 0
lab-as5300-4      Eth 0           132        R            AS5300     Fas 0/0
lab-3621          Eth 0           140        R S          3631-telcoFas 0/0
008024 2758E0     Eth 0           132        T            CAT3000    1/2
Switch#
```

Table 2-14 describes the fields that are shown in the example.

**Table 2-14** *show cdp neighbors Field Descriptions*

Field	Definition
Device ID	Configured ID (name), MAC address, or serial number of the neighbor device.
Local Intrfce	(Local Interface) The protocol that is used by the connectivity media.
Holdtme	(Holdtime) Remaining amount of time, in seconds, that the current device holds the CDP advertisement from a transmitting router before discarding it.
Capability	Capability code that is discovered on the device. This device type is listed in the CDP Neighbors table. Possible values are as follows: R—Router T—Transparent bridge B—Source-routing bridge S—Switch H—Host I—IGMP device r—Repeater P—Phone
Platform	Product number of the device.
Port ID	Protocol and port number of the device.

This example shows how to display detailed information about your CDP neighbors:

```
Switch# show cdp neighbors detail
-----
Device ID: lab-7206
Entry address(es):
  IP address: 172.19.169.83
Platform: cisco 7206VXR, Capabilities: Router
Interface: Ethernet0, Port ID (outgoing port): FastEthernet0/0/0
Holdtime : 123 sec

Version :
Cisco Internetwork Operating System Software
IOS (tm) 5800 Software (C5800-P4-M), Version 12.1(2)
Copyright (c) 1986-2002 by Cisco Systems, Inc.

advertisement version: 2
Duplex: half

-----
Device ID: lab-as5300-1
Entry address(es):
  IP address: 172.19.169.87
.
.
.
Switch#
```

Table 2-15 describes the fields that are shown in the example.

**Table 2-15** *show cdp neighbors detail Field Descriptions*

Field	Definition
Device ID	Name of the neighbor device and either the MAC address or the serial number of this device.
Entry address(es)	List of network addresses of neighbor devices.
[network protocol] address	Network address of the neighbor device. The address can be in IP, IPX, AppleTalk, DECnet, or CLNS protocol conventions.
Platform	Product name and number of the neighbor device.
Capabilities	Device type of the neighbor. This device can be a router, a bridge, a transparent bridge, a source-routing bridge, a switch, a host, an IGMP device, or a repeater.
Interface	Protocol and port number of the port on the current device.
Holdtime	Remaining amount of time, in seconds, that the current device holds the CDP advertisement from a transmitting router before discarding it.
Version:	Software version running on the neighbor device.
advertisement version:	Version of CDP that is being used for CDP advertisements.
Duplex:	Duplex state of connection between the current device and the neighbor device.

#### Related Commands

**show cdp** (refer to Cisco IOS documentation)  
**show cdp entry** (refer to Cisco IOS documentation)  
**show cdp interface** (refer to Cisco IOS documentation)  
**show cdp traffic** (refer to Cisco IOS documentation)

# show class-map

To display class map information, use the **show class-map** command.

**show class-map** *class\_name*

Syntax Description	<i>class_name</i> Name of the class map.						
Defaults	This command has no default settings.						
Command Modes	Privileged EXEC						
Command History	<table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>12.1(8a)EW</td><td>Support for this command was introduced on the Catalyst 4500 series switch.</td></tr> <tr> <td>12.2(25)SG</td><td>Displays results from the full flow option.</td></tr> </table>	Release	Modification	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.	12.2(25)SG	Displays results from the full flow option.
Release	Modification						
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.						
12.2(25)SG	Displays results from the full flow option.						

## Examples

This example shows how to display class map information for all class maps:

```
Switch# show class-map
Class Map match-any class-default (id 0)
  Match any
Class Map match-any class-simple (id 2)
  Match any
Class Map match-all ipp5 (id 1)
  Match ip precedence 5
Class Map match-all agg-2 (id 3)
Switch#
```

This example shows how to display class map information for a specific class map:

```
Switch# show class-map ipp5
Class Map match-all ipp5 (id 1)
  Match ip precedence 5
Switch#
```

Assume there are two active flows as shown below on Fast Ethernet interface 6/1:

SrcIp	DstIp	IpProt	SrcL4Port	DstL4Port
192.168.10.10	192.168.20.20	20	6789	81
192.168.10.10	192.168.20.20	20	6789	21

With following configuration, each flow will be policed to a 1000000 bps with an allowed 9000-byte burst value.



### Note

If you use the **match flow ip source-address|destination-address** command, these two flows are consolidated into one flow and they have the same source and destination address.

```
Switch# config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# class-map c1
Switch(config-cmap)# match flow ip source-address ip destination-address ip protocol 14
source-port 14 destination-port
Switch(config-cmap)# exit
Switch(config)# policy-map p1
Switch(config-pmap)# class c1
Switch(config-pmap-c)# police 1000000 9000
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface fastEthernet 6/1
Switch(config-if)# service-policy input p1
Switch(config-if)# end
Switch# write memory
Switch# show policy-map interface
FastEthernet6/1

class-map c1
    match flow  ip source-address ip destination-address ip protocol 14 source-port 14
    destination-port
    !
    policy-map p1
        class c1
            police 1000000 bps 9000 byte conform-action transmit exceed-action drop
        !
    !
interface FastEthernet 6/1
    service-policy input p1

Switch# show class-map c1
Class Map match-all c1 (id 2)
    Match flow  ip source-address ip destination-address ip protocol 14 source-port 14
    destination-port
Switch#
```

**Related Commands**

[class-map](#)  
[show policy-map](#)  
[show policy-map interface](#)

# show diagnostic content

To display test information about the test ID, test attributes, and supported coverage test levels for each test and for all modules, use the **show diagnostic content** command.

**show diagnostic content module {all | num}**

Syntax Description	<b>all</b>	Displays all the modules on the chassis.
	<i>num</i>	Module number.

**Defaults** This command has no default settings.

**Command Modes** EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.2(20)EWA	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display the test suite, monitoring interval, and test attributes for all the modules of the chassis:

```
Switch# show diagnostic content module all
```

```
module 1:
```

```
Diagnostics test suite attributes:
```

```

  B/* - Basic ondemand test / NA
  P/V/* - Per port test / Per device test / NA
  D/N/* - Disruptive test / Non-disruptive test / NA
  S/* - Only applicable to standby unit / NA
  X/* - Not a health monitoring test / NA
  F/* - Fixed monitoring interval test / NA
  E/* - Always enabled monitoring test / NA
  A/I - Monitoring is active / Monitoring is inactive
  m/* - Mandatory bootup test, can't be bypassed / NA
  o/* - Ongoing test, always active / NA
```

ID	Test Name	Attributes	Testing Interval (day hh:mm:ss.ms)
1)	supervisor-bootup	**D***I**	not configured
2)	packet-memory-bootup	**D***I**	not configured
3)	packet-memory-ongoing	**N***I*o	not configured

```

module 6:

Diagnostics test suite attributes:
  B/* - Basic ondemand test / NA
  P/V/* - Per port test / Per device test / NA
  D/N/* - Disruptive test / Non-disruptive test / NA
  S/* - Only applicable to standby unit / NA
  X/* - Not a health monitoring test / NA
  F/* - Fixed monitoring interval test / NA
  E/* - Always enabled monitoring test / NA
  A/I - Monitoring is active / Monitoring is inactive
  m/* - Mandatory bootup test, can't be bypassed / NA
  o/* - Ongoing test, always active / NA

ID      Test Name                                     Attributes      Testing Interval
=====
1) linecard-online-diag -----> **D***I**      not configured

Switch#
    
```

Related Commands

- show diagnostic result module
- show diagnostic result module test 2
- show diagnostic result module test 3

# show diagnostic result module

To display the module-based diagnostic test results, use the **show diagnostic result module** command.

**show diagnostic result module** [*slot-num* / **all**] [**test** [*test-id* / *test-id-range* / **all**]] [**detail**]

## Syntax Description

<i>slot-num</i>	(Optional) Specifies the slot on which diagnostics are displayed.
<b>all</b>	(Optional) Displays the diagnostics for all slots.
<b>test</b>	(Optional) Displays selected tests on the specified module.
<i>test-id</i>	(Optional) Specifies a single test ID.
<i>test-id-range</i>	(Optional) Specifies a range of test IDs.
<b>all</b>	(Optional) Displays the diagnostics for all tests.
<b>detail</b>	(Optional) Displays the complete test results.

## Defaults

A summary of the test results for all modules in the chassis is displayed.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Examples

This example shows how to display the summary results for all modules in the chassis:

```
Switch# show diagnostic result module

Current bootup diagnostic level: minimal

module 1:

  Overall diagnostic result: PASS
  Diagnostic level at card bootup: bypass

  Test results: (. = Pass, F = Fail, U = Untested)

    1) supervisor-bootup -----> U
    2) packet-memory-bootup -----> U
    3) packet-memory-ongoing -----> U

module 4:

  Overall diagnostic result: PASS
  Diagnostic level at card bootup: minimal

  Test results: (. = Pass, F = Fail, U = Untested)

    1) linecard-online-diag -----> .
```



```

module 5:

Overall diagnostic result: PASS
Diagnostic level at card bootup: minimal

Test results: (. = Pass, F = Fail, U = Untested)

1) linecard-online-diag -----> .

```

```

module 6:

Overall diagnostic result: PASS
Diagnostic level at card bootup: minimal

Test results: (. = Pass, F = Fail, U = Untested)

1) linecard-online-diag -----> .

```

This example shows how to display the online diagnostics for module 1:

```
Switch# show diagnostic result module 1 detail
```

```
Current bootup diagnostic level: minimal
```

```
module 1:
```

```

Overall diagnostic result: PASS
Diagnostic level at card bootup: minimal

Test results: (. = Pass, F = Fail, U = Untested)

```

---

```

1) supervisor-bootup -----> .

Error code -----> 0 (DIAG_SUCCESS)
Total run count -----> 0
Last test execution time -----> n/a
First test failure time -----> n/a
Last test failure time -----> n/a
Last test pass time -----> n/a
Total failure count -----> 0
Consecutive failure count -----> 0

```

```
Power-On-Self-Test Results for ACTIVE Supervisor
```

```

Power-on-self-test for Module 1: WS-X4014
Port/Test Status: (. = Pass, F = Fail)
Reset Reason: PowerUp Software/User

```

```

Port Traffic: L2 Serdes Loopback ...
0: . 1: . 2: . 3: . 4: . 5: . 6: . 7: . 8: . 9: . 10: . 11: .
12: . 13: . 14: . 15: . 16: . 17: . 18: . 19: . 20: . 21: . 22: . 23: .
24: . 25: . 26: . 27: . 28: . 29: . 30: . 31: .

```

```
Port Traffic: L2 Asic Loopback ...
0: . 1: . 2: . 3: . 4: . 5: . 6: . 7: . 8: . 9: . 10: . 11: .
12: . 13: . 14: . 15: . 16: . 17: . 18: . 19: . 20: . 21: . 22: . 23: .
24: . 25: . 26: . 27: . 28: . 29: . 30: . 31: .
```

```
Port Traffic: L3 Asic Loopback ...
0: . 1: . 2: . 3: . 4: . 5: . 6: . 7: . 8: . 9: . 10: . 11: .
12: . 13: . 14: . 15: . 16: . 17: . 18: . 19: . 20: . 21: . 22: . 23: .
24: . 25: . 26: . 27: . 28: . 29: . 30: . 31: . au: .
```

```
Switch Subsystem Memory ...
1: . 2: . 3: . 4: . 5: . 6: . 7: . 8: . 9: . 10: . 11: . 12: .
13: . 14: . 15: . 16: . 17: . 18: . 19: . 20: . 21: . 22: . 23: . 24: .
25: . 26: . 27: . 28: . 29: . 30: . 31: . 32: . 33: . 34: . 35: . 36: .
37: . 38: . 39: . 40: . 41: . 42: . 43: . 44: . 45: . 46: . 47: . 48: .
49: . 50: . 51: . 52: . 53: . 54: .
```

Module 1 Passed

---

```
2) packet-memory-bootup -----> .

Error code -----> 0 (DIAG_SUCCESS)
Total run count -----> 0
Last test execution time -----> n/a
First test failure time -----> n/a
Last test failure time -----> n/a
Last test pass time -----> n/a
Total failure count -----> 0
Consecutive failure count -----> 0
packet buffers on free list: 64557 bad: 0 used for ongoing tests: 979

Number of errors found: 0
Cells with hard errors (failed two or more tests): 0
Cells with soft errors (failed one test, includes hard): 0
Suspect bad cells (uses a block that tested bad): 0
total buffers: 65536
bad buffers: 0 (0.0%)
good buffers: 65536 (100.0%)
Bootup test results:1
No errors.
```

---

```
3) packet-memory-ongoing -----> U

Error code -----> 0 (DIAG_SUCCESS)
Total run count -----> 0
Last test execution time -----> n/a
First test failure time -----> n/a
Last test failure time -----> n/a
Last test pass time -----> n/a
Total failure count -----> 0
Consecutive failure count -----> 0
packet buffers on free list: 64557 bad: 0 used for ongoing tests: 979
```

```

Packet memory errors: 0 0
Current alert level: green
Per 5 seconds in the last minute:
  0 0 0 0 0 0 0 0 0 0
  0 0
Per minute in the last hour:
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
Per hour in the last day:
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0
Per day in the last 30 days:
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
Direct memory test failures per minute in the last hour:
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
Potential false positives: 0 0
  Ignored because of rx errors: 0 0
  Ignored because of cdm fifo overrun: 0 0
  Ignored because of oir: 0 0
  Ignored because isl frames received: 0 0
  Ignored during boot: 0 0
  Ignored after writing hw stats: 0 0
  Ignored on high gigaport: 0
Ongoing diag action mode: Normal
Last 1000 Memory Test Failures:
Last 1000 Packet Memory errors:
First 1000 Packet Memory errors:

```

---

Switch#

# show diagnostic result module test

To display the results of the bootup packet memory test, use the **show diagnostic result module test** command. The output indicates whether the test passed, failed, or was not run.

**show diagnostic result module** [*N* / **all**] [**test** *test-id*] [**detail**]

Syntax Description	<i>N</i>	Specifies the module number.
	<b>all</b>	Specifies all modules.
	<b>test</b> <i>test-id</i>	Specifies the number for the tdr test on the platform.
	<b>detail</b>	(Optional) Specifies the display of detailed information for analysis. This option is recommended.

Defaults	Non-detailed results
----------	----------------------

Command Modes	EXEC mode
---------------	-----------

Command History	Release	Modification
	12.2(25)SG	This command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	The <b>detail</b> keyword is intended for use by Cisco support personnel when analyzing failures.
------------------	---

Examples	This example shows how to display the results of the bootup packet memory tests:
----------	--

```
Switch# show diagnostic result module 6 detail
```

```
module 6:
```

```
Overall diagnostic result:PASS
```

```
Test results:(. = Pass, F = Fail, U = Untested)
```

```

1) linecard-online-diag -----> .

Error code -----> 0 (DIAG_SUCCESS)
Total run count -----> 1
Last test execution time -----> Jan 21 2001 19:48:30
First test failure time -----> n/a
Last test failure time -----> n/a
Last test pass time -----> Jan 21 2001 19:48:30
Total failure count -----> 0
Consecutive failure count -----> 0
```

Slot	Ports	Card Type	Diag Status	Diag Details
6	48	10/100/1000BaseT (RJ45)V, Cisco/IEEE	Passed	None

#### Detailed Status

```

-----
. = Pass                U = Unknown
L = Loopback failure    S = Stub failure
I = Ilc failure         P = Port failure
E = SEEPROM failure     G = GBIC integrity check failure

```

Ports	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ports	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ports	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

#### 2) online-diag-tdr:

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	.	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Port	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U

```

Error code -----> 0 (DIAG_SUCCESS)
Total run count -----> 1
Last test execution time -----> Jan 22 2001 03:01:54
First test failure time -----> n/a
Last test failure time -----> n/a
Last test pass time -----> Jan 22 2001 03:01:54
Total failure count -----> 0
Consecutive failure count -----> 0

```

#### Detailed Status

```

-----
TDR test is in progress on interface Gi6/1

```

Switch#

#### Related Commands

[diagnostic start](#)

# show diagnostic result module test 2

To display the results of the bootup packet memory test, use the **show diagnostic result module test 2** command. The output indicates whether the test passed, failed, or was not run.

**show diagnostic result module *N* test 2 [detail]**

Syntax Description	<i>N</i>	Specifies the module number.
	<b>detail</b>	(Optional) Specifies the display of detailed information for analysis.

Defaults	Non-detailed results
----------	----------------------

Command Modes	EXEC mode
---------------	-----------

Command History	Release	Modification
	12.2(18)EW	This command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	The <b>detail</b> keyword is intended for use by Cisco support personnel when analyzing failures.
------------------	---

**Examples** This example shows how to display the results of the bootup packet memory tests:

```
Switch# show diagnostic result module 1 test 2

Test results: (. = Pass, F = Fail, U = Untested)

  2) packet-memory-bootup -----> .
```

This example shows how to display detailed results from the bootup packet memory tests:

```
Switch# show diagnostic result module 2 test 2 detail
```

```
Test results: (. = Pass, F = Fail, U = Untested)
```

```

  2) packet-memory-bootup -----> .

      Error code -----> 0 (DIAG_SUCCESS)
      Total run count -----> 0
      Last test execution time ----> n/a
      First test failure time ----> n/a
      Last test failure time ----> n/a
      Last test pass time -----> n/a
      Total failure count -----> 0
      Consecutive failure count ---> 0
packet buffers on free list: 64557 bad: 0 used for ongoing tests: 979
```

```
Number of errors found: 0
Cells with hard errors (failed two or more tests): 0
Cells with soft errors (failed one test, includes hard): 0
Suspect bad cells (uses a block that tested bad): 0
total buffers: 65536
bad buffers: 0 (0.0%)
good buffers: 65536 (100.0%)
Bootup test results:
No errors.
```

---

**Related Commands**

[\*\*diagnostic monitor action\*\*](#)  
[\*\*show diagnostic result module test 3\*\*](#)

# show diagnostic result module test 3

To display the results from the ongoing packet memory test, use the **show diagnostic result module test 3** command. The output indicates whether the test passed, failed, or was not run.

**show diagnostic result module *N* test 3 [detail]**

Syntax Description	<i>N</i>	Module number.
	<b>detail</b>	(Optional) Specifies the display of detailed information for analysis.

Defaults	Non-detailed results
----------	----------------------

Command Modes	EXEC mode
---------------	-----------

Command History	Release	Modification
	12.2(18)EW	This command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	The <b>detail</b> keyword is intended for use by Cisco support personnel when analyzing failures.
------------------	---

Examples	This example shows how to display the results from the ongoing packet memory tests:
----------	---

```
Switch# show diagnostic result module 1 test 3

Test results: (. = Pass, F = Fail, U = Untested)

    3) packet-memory-ongoing -----> .
```

This example shows how to display the detailed results from the ongoing packet memory tests:

```
Switch# show diagnostic result module 1 test 3 detail
```

```
Test results: (. = Pass, F = Fail, U = Untested)
```

```

    3) packet-memory-ongoing -----> .

        Error code -----> 0 (DIAG_SUCCESS)
        Total run count -----> 0
        Last test execution time ----> n/a
        First test failure time ----> n/a
        Last test failure time -----> n/a
        Last test pass time -----> n/a
        Total failure count -----> 0
        Consecutive failure count ---> 0
packet buffers on free list: 64557 bad: 0 used for ongoing tests: 979
```



```

Packet memory errors: 0 0
Current alert level: green
Per 5 seconds in the last minute:
  0 0 0 0 0 0 0 0 0 0
  0 0
Per minute in the last hour:
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
Per hour in the last day:
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0
Per day in the last 30 days:
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
Direct memory test failures per minute in the last hour:
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
  0 0 0 0 0 0 0 0 0 0
Potential false positives: 0 0
  Ignored because of rx errors: 0 0
  Ignored because of cdm fifo overrun: 0 0
  Ignored because of oir: 0 0
  Ignored because isl frames received: 0 0
  Ignored during boot: 0 0
  Ignored after writing hw stats: 0 0
  Ignored on high gigaport: 0
Ongoing diag action mode: Normal
Last 1000 Memory Test Failures: v
Last 1000 Packet Memory errors:
First 1000 Packet Memory errors:

```

**Related Commands**

[diagnostic monitor action](#)  
[show diagnostic result module test 2](#)

# show dot1x

To display the 802.1X statistics and operational status for the entire switch or for a specified interface, use the **show dot1x** command.

**show dot1x** [**interface** *interface-id*] | [**statistics** [**interface** *interface-id*]] | [**all**]

## Syntax Description

<b>interface</b> <i>interface-id</i>	(Optional) Displays the 802.1X status for the specified port.
<b>statistics</b>	(Optional) Displays 802.1X statistics for the switch or the specified interface.
<b>all</b>	(Optional) Displays per-interface 802.1X configuration information for all interfaces with a non-default 802.1X configuration.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(19)EW	Display enhanced to show the guest-VLAN value.
12.2(25)EW	Support for the 10-Gigabit Ethernet interface was introduced on the Catalyst 4500 series switch.
12.2(25)EWA	Support for currently-assigned reauthentication timer (if the timer is configured to honor the Session-Timeout value) was added.
12.2(31)SG	Support for port direction control and critical recovery was added.

## Usage Guidelines

If you do not specify an interface, the global parameters and a summary are displayed. If you specify an interface, the details for that interface are displayed.

If you specify the **statistics** keyword without the **interface** option, the statistics are displayed for all interfaces. If you specify the **statistics** keyword with the **interface** option, the statistics are displayed for the specified interface.

Expressions are case sensitive. For example, if you enter **exclude output**, the lines that contain *output* are not displayed, but the lines that contain *Output* are displayed.

The **show dot1x** command displays the currently-assigned reauthentication timer and time remaining before reauthentication, if reauthentication is enabled.

## Examples

This example shows how to display the output from the **show dot1x** command:

```
Switch# show dot1x
Sysauthcontrol = Disabled
Dot1x Protocol Version = 2
Dot1x Oper Controlled Directions = Both
```

```
Dot1x Admin Controlled Directions = Both
Critical Recovery Delay = 500
Critical EAP = Enabled
Switch#
```

This example shows how to display the 802.1X statistics for a specific port:

```
Switch# show dot1x interface fastethernet6/1
Dot1x Info for FastEthernet6/1
-----
PAE = AUTHENTICATOR
PortControl = AUTO
ControlDirection = Both
HostMode = SINGLE_HOST
ReAuthentication = Disabled
QuietPeriod = 60
ServerTimeout = 30
SuppTimeout = 30
ReAuthPeriod = 3600 (Locally configured)
ReAuthMax = 2 MaxReq = 2
TxPeriod = 30
RateLimitPeriod = 0
Critical-Auth = Enabled
Critical Recovery Action = Reinitialize
Critical-Auth VLAN = 3

Dot1x Authenticator Client List Empty

Authorized By = Critical-Auth
Vlan Policy = 3
Switch#
```



**Note**

Table 2-16 provides a partial list of the displayed fields. The remaining fields in the display show internal state information. For a detailed description of these state machines and their settings, refer to the 802.1X specification.

**Table 2-16** *show dot1x interface Field Description*

Field	Description
PortStatus	Status of the port (authorized or unauthorized). The status of a port is displayed as authorized if the <b>dot1x port-control</b> interface configuration command is set to <b>auto</b> and has successfully completed authentication.
Port Control	Setting of the <b>dot1x port-control</b> interface configuration command.
MultiHosts	Setting of the <b>dot1x multiple-hosts</b> interface configuration command (allowed or disallowed).

This is an example of output from the **show dot1x statistics interface gigabitethernet1/1** command. Table 2-17 describes the fields in the display.

```
Switch# show dot1x statistics interface gigabitethernet1/1

PortStatistics Parameters for Dot1x
-----
TxReqId = 0      TxReq = 0      TxTotal = 0
RxStart = 0      RxLogoff = 0    RxRespId = 0    RxResp = 0
RxInvalid = 0    RxLenErr = 0    RxTotal = 0
RxVersion = 0    LastRxSrcMac 0000.0000.0000
Switch#
```

**Table 2-17** *show dot1x statistics Field Descriptions*

Field	Description
TxReq/TxReqId	Number of EAP-request/identity frames that have been sent.
TxTotal	Number of EAPOL frames of any type that have been sent.
RxStart	Number of valid EAPOL-start frames that have been received.
RxLogoff	Number of EAPOL-logoff frames that have been received.
RxRespId	Number of EAP-response/identity frames that have been received.
RxResp	Number of valid EAP-response frames (other than response/identity frames) that have been received.
RxInvalid	Number of EAPOL frames that have been received and have an unrecognized frame type.
RxLenError	Number of EAPOL frames that have been received in which the packet body length field is invalid.
RxTotal	Number of valid EAPOL frames of any type that have been received.
RxVersion	Protocol version number carried in the most recently received EAPOL frame.
LastRxSrcMac	Source MAC address carried in the most recently received EAPOL frame.

**Related Commands**[mac-address-table notification](#)[dot1x critical](#)[dot1x critical eapol](#)[dot1x critical recovery delay](#)[dot1x critical vlan](#)[dot1x guest-vlan](#)[dot1x max-reauth-req](#)[dot1x port-control](#)

# show environment

To display the environment alarm, operational status, and current reading for the chassis, use the **show environment** command.

**show environment** [**alarm**] | [**status** [**chassis** | **fantray** | **powersupply** | **supervisor**]] | [**temperature**]

Syntax Description	
<b>alarm</b>	(Optional) Specifies the alarm status of the chassis.
<b>status</b>	(Optional) Specifies the operational status information.
<b>chassis</b>	(Optional) Specifies the operational status of the chassis.
<b>fantray</b>	(Optional) Specifies the status of the fan tray, and shows fan tray power consumption.
<b>powersupply</b>	(Optional) Specifies the status of the power supply.
<b>supervisor</b>	(Optional) Specifies the status of the supervisor engine.
<b>temperature</b>	(Optional) Specifies the current chassis temperature readings.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for the ability to display generic environment information with the <b>show environment</b> command was added.

**Examples** This example shows how to display information about the environment alarms, operational status, and current temperature readings for the chassis:

```
Switch# show environment
no alarm
```

```
Chassis Temperature           = 32 degrees Celsius
Chassis Over Temperature Threshold = 75 degrees Celsius
Chassis Critical Temperature Threshold = 95 degrees Celsius
```

Power Supply	Model No	Type	Fan Status	Sensor
PS1	PWR-C45-1400AC	AC 1400W	good	good
PS2	none	--	--	--

Power Supply (Nos in Watts)	Max Inline	Min Inline	Max System	Min System	Absolute Maximum
PS1	0	0	1360	1360	1400
PS2	--	--	--	--	--

## show environment

Power supplies needed by system : 1

Chassis Type : WS-C4507R

Supervisor Led Color : Green

Fantray : good

Power consumed by Fantray : 50 Watts

This example shows how to display information about the environment alarms:

```
Switch# show environment alarm
no alarm
Switch#
```

This example shows how to display information about the power supplies, chassis type, and fan trays:

```
Switch# show environment status
```

Power Supply	Model No	Type	Status	Fan Sensor
PS1	PWR-C45-1400AC	AC 1400W	good	good
PS2	none	--	--	--

Power Supply (Nos in Watts)	Max Inline	Min Inline	Max System	Min System	Absolute Maximum
PS1	0	0	1360	1360	1400
PS2	--	--	--	--	--

Power supplies needed by system : 1

Chassis Type : WS-C4507R

Supervisor Led Color : Green

Fantray : good

Power consumed by Fantray : 50 Watts

Switch#

This example shows how to display information about the chassis:

```
Switch# show environment status chassis
Chassis Type :WS-C4006
Switch#
```

This example shows how to display information about the fan tray:

```
Switch# show environment status fantray
Fantray : good
Power consumed by Fantray : 50 Watts
Switch#
```

This example shows how to display information about the power supply:

```
Switch# show environment status powersupply
Power
Supply  Model No      Type      Status   Fan
-----  -----
PS1     WS-X4008           AC 400W   good     good
PS2     WS-X4008           AC 400W   good     good
PS3     none                --        --        --
Switch#
```

This example shows how to display information about the supervisor engine:

```
Switch# show environment status supervisor
Supervisor Led Color :Green
Switch#
```

This example shows how to display information about the temperature of the chassis:

```
Switch# show environment temperature
Chassis Temperature           = 32 degrees Celsius
Chassis Over Temperature Threshold = 75 degrees Celsius
Chassis Critical Temperature Threshold = 95 degrees Celsius
Switch#
```

# show errdisable detect

To display the error disable detection status, use the **show errdisable detect** command.

## show errdisable detect

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

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(19)EW	Display includes the status of storm control.

**Examples** This example shows how to display the error disable detection status:

```
Switch# show errdisable detect
ErrDisable Reason    Detection status
-----
udld                  Enabled
bpduguard             Enabled
security-violatio    Enabled
channel-misconfig    Disabled
psecure-violation    Enabled
vmps                  Enabled
pagp-flap             Enabled
dtp-flap              Enabled
link-flap             Enabled
l2ptguard            Enabled
gbic-invalid          Enabled
dhcp-rate-limit      Enabled
unicast-flood         Enabled
storm-control         Enabled
ilpower               Enabled
arp-inspection        Enabled
Switch#
```

**Related Commands**

- [errdisable detect](#)
- [errdisable recovery](#)
- [show interfaces status](#)



# show errdisable recovery

To display error disable recovery timer information, use the **show errdisable recovery** command.

## show errdisable recovery

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

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(19)EW	Display includes the status of storm control.

**Examples** This example shows how to display recovery timer information for error disable:

```
Switch# show errdisable recovery
ErrDisable Reason    Timer Status
-----
udld                  Disabled
bpduguard             Disabled
security-violatio    Disabled
channel-misconfig    Disabled
vmps                  Disabled
pagp-flap            Disabled
dtp-flap              Disabled
link-flap            Disabled
l2ptguard            Disabled
psecure-violation    Disabled
gbic-invalid         Disabled
dhcp-rate-limit      Disabled
unicast-flood        Disabled
storm-control        Disabled
arp-inspection       Disabled

Timer interval:30 seconds

Interfaces that will be enabled at the next timeout:

Interface    Errdisable reason    Time left(sec)
-----
Fa7/32      arp-inspect          13
```

**Related Commands**

- [errdisable detect](#)
- [errdisable recovery](#)
- [show interfaces status](#)

# show etherchannel

To display EtherChannel information for a channel, use the **show etherchannel** command.

**show etherchannel** [*channel-group*] {**port-channel** | **brief** | **detail** | **summary** | **port** | **load-balance** | **protocol**}

Syntax Description	<i>channel-group</i>	(Optional) Number of the channel group; valid values are from 1 to 64.
	<b>port-channel</b>	Displays port-channel information.
	<b>brief</b>	Displays a summary of EtherChannel information.
	<b>detail</b>	Displays detailed EtherChannel information.
	<b>summary</b>	Displays a one-line summary per channel group.
	<b>port</b>	Displays EtherChannel port information.
	<b>load-balance</b>	Displays load-balance information.
	<b>protocol</b>	Displays the enabled protocol.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(13)EW	Support for LACP was added to this command.

**Usage Guidelines** If you do not specify a channel group, all channel groups are displayed.

In the output below, the Passive port list field is displayed for Layer 3 port channels only. This field means that the physical interface, which is still not up, is configured to be in the channel group (and indirectly is in the only port channel in the channel group).

**Examples** This example shows how to display port-channel information for a specific group:

```
Switch# show etherchannel 1 port-channel
      Port-channels in the group:
      -----
Port-channel: Po1
-----
Age of the Port-channel   = 02h:35m:26s
Logical slot/port        = 10/1           Number of ports in agport = 0
GC                       = 0x00000000    HotStandBy port = null
Passive port list        = Fa5/4 Fa5/5
Port state                = Port-channel L3-Ag Ag-Not-Inuse
```

```

Ports in the Port-channel:
Index   Load   Port
-----
Switch#

```

This example shows how to display load-balancing information:

```

Switch# show etherchannel load-balance
Source XOR Destination mac address
Switch#

```

This example shows how to display a summary of information for a specific group:

```

Switch# show etherchannel 1 brief
Group state = L3
Ports: 2   Maxports = 8
port-channels: 1 Max port-channels = 1
Switch#

```

This example shows how to display detailed information for a specific group:

```

Switch# show etherchannel 1 detail
Group state = L3
Ports: 2   Maxports = 8
Port-channels: 1 Max Port-channels = 1
                Ports in the group:
                -----
Port: Fa5/4
-----

Port state      = EC-Enbld Down Not-in-Bndl Ushr-Config
Channel group = 1           Mode = Desirable      Gcchange = 0
Port-channel   = null       GC   = 0x00000000      Psudo-agport = Po1
Port indx      = 0           Load = 0x00

Flags:  S - Device is sending Slow hello.   C - Device is in Consistent state.
        A - Device is in Auto mode.         P - Device learns on physical port.
Timers: H - Hello timer is running.         Q - Quit timer is running.
        S - Switching timer is running.     I - Interface timer is running.

Local information:

Port      Flags State   Timers   Hello    Partner  PAgP      Learning  Group
Fa5/4     d      U1/S1      1s       Interval Count   Priority  Method    Ifindex
Age of the port in the current state: 02h:33m:14s
Port: Fa5/5
-----

Port state      = EC-Enbld Down Not-in-Bndl Ushr-Config
Channel group = 1           Mode = Desirable      Gcchange = 0
Port-channel   = null       GC   = 0x00000000      Psudo-agport = Po1
Port indx      = 0           Load = 0x00

Flags:  S - Device is sending Slow hello.   C - Device is in Consistent state.
        A - Device is in Auto mode.         P - Device learns on physical port.
Timers: H - Hello timer is running.         Q - Quit timer is running.
        S - Switching timer is running.     I - Interface timer is running.

Local information:

Port      Flags State   Timers   Hello    Partner  PAgP      Learning  Group
Fa5/5     d      U1/S1      1s       Interval Count   Priority  Method    Ifindex

```

```

Age of the port in the current state: 02h:33m:17s
Port-channels in the group:
-----

Port-channel: Po1
-----
Age of the Port-channel    = 02h:33m:52s
Logical slot/port         = 10/1           Number of ports in agport = 0
GC                        = 0x00000000     HotStandBy port = null
Passive port list         = Fa5/4 Fa5/5
Port state                 = Port-channel L3-Ag Ag-Not-Inuse

Ports in the Port-channel:

Index   Load   Port
-----
Switch#

```

This example shows how to display a one-line summary per channel group:

```

Switch# show etherchannel summary
U-in use I-in port-channel S-suspended D-down i-stand-alone d-default

Group Port-channel  Ports
-----
1      Po1(U)        Fa5/4(I) Fa5/5(I)
2      Po2(U)        Fa5/6(I) Fa5/7(I)
Switch#

```

This example shows how to display EtherChannel port information for all ports and all groups:

```

Switch# show etherchannel port
Channel-group listing:
-----

Group: 1
-----
Ports in the group:
-----

Port: Fa5/4
-----
Port state      = EC-Enbld Down Not-in-Bndl Usr-Config
Channel group   = 1                Mode = Desirable      Gcchange = 0
Port-channel    = null             GC   = 0x00000000     Pseudo-agport = Po1
Port indx       = 0                Load = 0x00

Flags:  S - Device is sending Slow hello.  C - Device is in Consistent state.
        A - Device is in Auto mode.         P - Device learns on physical port.
Timers: H - Hello timer is running.         Q - Quit timer is running.
        S - Switching timer is running.     I - Interface timer is running.

Local information:

Port      Flags State  Timers  Hello  Partner  PAgP    Learning  Group
Fa5/4     d    U1/S1      1s      0      128     Any     0

Age of the port in the current state: 02h:40m:35s
Port: Fa5/5
-----

Port state      = EC-Enbld Down Not-in-Bndl Usr-Config
Channel group   = 1                Mode = Desirable      Gcchange = 0
Port-channel    = null             GC   = 0x00000000     Pseudo-agport = Po1
Port indx       = 0                Load = 0x00

```

```
Flags: S - Device is sending Slow hello.   C - Device is in Consistent state.
       A - Device is in Auto mode.         P - Device learns on physical port.
Timers: H - Hello timer is running.        Q - Quit timer is running.
       S - Switching timer is running.     I - Interface timer is running.
```

<...output truncated...>

Switch#

This example shows how to display the protocol enabled:

```
Switch# show etherchannel protocol
        Channel-group listing:
        -----
```

```
Group: 12
-----
Protocol: PAgP
```

```
Group: 24
-----
Protocol: - (Mode ON)
Switch#
```

#### Related Commands

[channel-group](#)  
[interface port-channel](#)

# show flowcontrol

To display the per-interface status and statistics related to flow control, use the **show flowcontrol** command.

**show flowcontrol** [**module** *slot* | **interface** *interface*]

## Syntax Description

<b>module</b> <i>slot</i>	(Optional) Limits the display to interfaces on a specific module.
<b>interface</b> <i>interface</i>	(Optional) Displays the status on a specific interface.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.2(25)EW	Support for the 10-Gigabit Ethernet interface was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

Table 2-18 describes the fields in the **show flowcontrol** command output.

**Table 2-18** *show flowcontrol Command Output*

Field	Description
Port	Module and port number.
Send-Flowcontrol-Admin	Flow-control administration. Possible settings: <b>on</b> indicates the local port sends flow control to the far end; <b>off</b> indicates the local port does not send flow control to the far end; <b>desired</b> indicates the local end sends flow control to the far end if the far end supports it.
Send-Flowcontrol-Oper	Flow-control operation. Possible setting: <b>disagree</b> indicates the two ports could not agree on a link protocol.
Receive-Flowcontrol-Admin	Flow-control administration. Possible settings: <b>on</b> indicates the local port requires the far end to send flow control; <b>off</b> indicates the local port does not allow the far end to send flow control; <b>desired</b> indicates the local end allows the far end to send flow control.
Receive-Flowcontrol-Oper	Flow-control operation. Possible setting: <b>disagree</b> indicates the two ports could not agree on a link protocol.
RxPause	Number of pause frames received.
TxPause	Number of pause frames transmitted.

**Examples**

This example shows how to display the flow control status on all the Gigabit Ethernet interfaces:

```
Switch# show flowcontrol
Port      Send FlowControl  Receive FlowControl  RxPause TxPause
         admin    oper      admin    oper
-----
Te1/1     off      off      on      off      0      0
Te1/2     off      off      on      off      0      0
Gi1/3     off      off      desired on      0      0
Gi1/4     off      off      desired on      0      0
Gi1/5     off      off      desired on      0      0
Gi1/6     off      off      desired on      0      0
Gi3/1     off      off      desired off     0      0
Gi3/2     off      off      desired off     0      0
Gi3/3     off      off      desired off     0      0
Gi3/4     off      off      desired off     0      0
Gi3/5     off      off      desired off     0      0
Gi3/6     off      off      desired off     0      0
Switch#
```

This example shows how to display the flow control status on module 1:

```
Switch# show flowcontrol module 1
Port      Send FlowControl  Receive FlowControl  RxPause TxPause
         admin    oper      admin    oper
-----
Gi1/1     desired off      off      off      0      0
Gi1/2     on      disagree on      on      0      0
Switch#
```

This example shows how to display the flow control status on Gigabit Ethernet interface 3/4:

```
Switch# show flowcontrol interface gigabitethernet3/4
Port      Send FlowControl  Receive FlowControl  RxPause TxPause
         admin    oper      admin    oper
-----
Gi3/4     off      off      on      on      0      0
Switch#
```

This example shows how to display the flow control status on 10-Gigabit Ethernet interface 1/1:

```
Switch# show flowcontrol interface tengigabitethernet1/1
Port      Send FlowControl  Receive FlowControl  RxPause TxPause
         admin    oper      admin    oper
-----
Te1/1     off      off      on      off      0      0
Switch#
```

**Related Commands**

[flowcontrol](#)  
[show interfaces status](#)

# show hw-module uplink

To display the current uplink mode, use the **show hw-module uplink** command.

## show hw-module uplink

### Defaults

None

### Command Modes

Privileged EXEC

### Command History

Release	Modification
12.2(25)EW	Support for this command was introduced on the Catalyst 4500 series switch.

### Usage Guidelines

If the active uplink mode is different than configured mode, the output displays the change.  
By default, the current (operational) uplink selection is displayed.

### Examples

This example shows the output displaying the current (active) uplinks:

```
Switch# show hw-module uplink
Active uplink configuration is TenGigabitEthernet
```

This example shows the output for redundant systems in SSO mode if the 10-Gigabit Ethernet uplinks are active, and the Gigabit Ethernet uplinks are selected:

```
Switch# show hw-module uplink
Active uplink configuration is TenGigabitEthernet
(will be GigabitEthernet after next reload)
A 'redundancy reload shelf' or power-cycle of chassis is required to
apply the new configuration
```

This example shows the output for redundant systems in RPR mode if the 10-Gigabit Ethernet uplinks are active, and the Gigabit Ethernet uplinks are selected:

```
Switch# show hw-module uplink
Active uplink configuration is TenGigabitEthernet
(will be GigabitEthernet after next reload)
A reload of active supervisor is required to apply the new configuration.
```

### Related Commands

[hw-module uplink select](#)



# show idprom

To display the IDPROMs for the chassis, supervisor engine, module, power supplies, fan trays, clock module, and multiplexer (mux) buffer, use the **show idprom** command.

**show idprom** { **all** | **chassis** | **module** [*mod*] | **interface** *int\_name* | **supervisor** | **power-supply** *number* | **fan-tray** }

Syntax Description		
<b>all</b>		Displays information for all IDPROMs.
<b>chassis</b>		Displays information for the chassis IDPROMs.
<b>module</b>		Displays information for the module IDPROMs.
<i>mod</i>		(Optional) Specifies the module name.
<b>interface</b> <i>int_name</i>		Displays information for the GBIC or SFP IDPROMs.
<b>supervisor</b>		Displays information for the supervisor engine IDPROMs.
<b>power-supply</b> <i>number</i>		Displays information for the power supply IDPROMs.
<b>fan-tray</b>		Displays information for the fan tray IDPROMs.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for the <b>power-supply</b> , <b>fan-tray</b> , <b>clock-module</b> , and <b>mux-buffer</b> keywords was added.
	12.1(13)EW	Support for <b>interface</b> keyword was added.
	12.2(18)EW	Enhanced the <b>show idprom interface</b> output to include the hexadecimal display of the GBIC/SFP SEEPROM contents.
	12.2(25)EW	Support for the 10-Gigabit Ethernet interface was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** When you enter the **show idprom interface** command, the output lines for Calibration type and Rx (receive) power measurement may not be displayed for all GBICs.

**Examples** This example shows how to display IDPROM information for module 4:

```
Switch# show idprom module 4
Module 4 Idprom:
  Common Block Signature = 0xABAB
  Common Block Version = 1
  Common Block Length = 144
```

```

Common Block Checksum = 4199
Idprom Size = 256
Block Count = 2
FRU Major Type = 0x4201
FRU Minor Type = 303
OEM String = Cisco Systems, Inc.
Product Number = WS-X4306
Serial Number = 00000135
Part Number = <tbid>
Hardware Revision = 0.2
Manufacturing Bits = 0x0000
Engineering Bits = 0x0000
Snmp OID = 0.0.0.0.0.0.0
Power Consumption = 0
RMA Failure Code = 0 0 0 0
Linecard Block Signature = 0x4201
Linecard Block Version = 1
Linecard Block Length = 24
Linecard Block Checksum = 658
Feature Bits = 0x0000000000000000
Card Feature Index = 50
MAC Base = 0010.7bab.9830
MAC Count = 6
Switch#

```

This example shows how to display IDPROM information for the GBICs on the Gigabit Ethernet interface 1/2:

```

Switch# show idprom interface gigabitethernet1/2
GBIC Serial EEPROM Contents:
Common Block:
Identifier           = GBIC [0x1]
Extended Id          = Not specified/compliant with defined MOD_DEF [0x0]
Connector            = SC connector [0x1]
Transceiver
  Speed              = Not available [0x0]
  Media               = Not available [0x0]
  Technology          = Not available [0x0]
  Link Length         = Not available [0x0]
  GE Comp Codes       = Not available [0x0]
  SONET Comp Codes    = Not available [0x0]
Encoding              = 8B10B [0x1]
BR, Nominal           = 1300000000 MHz
Length(9u) in km      = GBIC does not support single mode fibre, or the length
                        must be determined from the transceiver technology.
Length(9u)            = > 25.4 km
Length(50u)           = GBIC does not support 50 micron multi-mode fibre, or the
                        length must be determined from the transceiver technology.
Length(62.5u)         = GBIC does not support 62.5 micron multi-mode fibre, or
                        the length must be determined from transceiver technology.
Length(Copper)        = GBIC does not support copper cables, or the length must
                        be determined from the transceiver technology.
Vendor name           = CISCO-FINISAR
Vendor OUI            = 36965
Vendor Part No.       = FTR-0119-CSC
Vendor Part Rev.      = B
Wavelength            = Not available
CC_BASE               = 0x1A

Extended ID Fields
  Options              = Loss of Signal implemented TX_FAULT signal implemented TX_DISABLE is
                        implemented and disables the serial output [0x1A]
  BR, max              = Unspecified
  BR, min              = Unspecified

```

```

Vendor Serial No. = K1273DH
Date code        = 030409
Diag monitoring   = Implemented
Calibration type  = Internal
Rx pwr measuremnt = Optical Modulation Amplitude (OMA)
Address change    = Required
CC_EXT           = 0xB2

Vendor Specific ID Fields:
20944D30 29 00 02 80 22 33 38 3D C7 67 83 E8 DF 65 6A AF )..."38=Gg^Ch_ej/
20944D40 1A 80 ED 00 00 00 00 00 00 00 00 00 38 23 3C 1B .....8#<.

SEEPROM contents (hex) size 128:
0x0000 01 00 01 00 00 00 00 00 00 00 01 0D 00 00 FF .....
0x0010 00 00 00 00 43 49 53 43 4F 2D 46 49 4E 49 53 41 ....CISCO-FINISA
0x0020 52 20 20 20 00 00 90 65 46 54 52 2D 30 31 31 39 R ..^PeFTR-0119
0x0030 2D 43 53 43 20 20 20 20 42 20 20 20 00 00 00 1A -CSC B ....
0x0040 00 1A 00 00 4B 31 32 37 33 44 48 20 20 20 20 20 ....K1273DH
0x0050 20 20 20 20 30 33 30 34 30 39 20 20 64 00 00 B2 030409 d..2
0x0060 29 00 02 80 22 33 38 3D C7 67 83 E8 DF 65 6A AF )..^@"38=Gg^C_ej.
0x0070 1A 80 ED 00 00 00 00 00 00 00 00 00 38 23 3C 1B .^@m.....8#<.
Switch#

```

This example shows how to display IDPROM information for the 10-Gigabit Ethernet interface 1/1:

```

Switch# show idprom interface tengigabitethernet1/1
X2 Serial EEPROM Contents:
Non-Volatile Register (NVR) Fields
  X2 MSA Version supported      :0xA
  NVR Size in bytes            :0x100
  Number of bytes used         :0xD0
  Basic Field Address           :0xB
  Customer Field Address        :0x77
  Vendor Field Address          :0xA7
  Extended Vendor Field Address :0x100
  Reserved                     :0x0
  Transceiver type              :0x2 =X2
  Optical connector type        :0x1 =SC
  Bit encoding                  :0x1 =NRZ
  Normal BitRate in multiple of 1M b/s :0x2848
  Protocol Type                 :0x1 =10GgE

Standards Compliance Codes :
  10GbE Code Byte 0            :0x2 =10GBASE-LR
  10GbE Code Byte 1            :0x0
  SONET/SDH Code Byte 0        :0x0
  SONET/SDH Code Byte 1        :0x0
  SONET/SDH Code Byte 2        :0x0
  SONET/SDH Code Byte 3        :0x0
  10GFC Code Byte 0            :0x0
  10GFC Code Byte 1            :0x0
  10GFC Code Byte 2            :0x0
  10GFC Code Byte 3            :0x0
  Transmission range in 10m    :0x3E8

Fibre Type :
  Fibre Type Byte 0            :0x40 =NDSF only
  Fibre Type Byte 1            :0x0 =Unspecified

Centre Optical Wavelength in 0.01nm steps - Channel 0 :0x1 0xFF 0xB8
Centre Optical Wavelength in 0.01nm steps - Channel 1 :0x0 0x0 0x0
Centre Optical Wavelength in 0.01nm steps - Channel 2 :0x0 0x0 0x0
Centre Optical Wavelength in 0.01nm steps - Channel 3 :0x0 0x0 0x0
Package Identifier OUI         :0xC09820

```

```

Transceiver Vendor OUI      :0x3400800
Transceiver vendor name    :CISCO-OPNEXT, INC
Part number provided by transceiver vendor      :TRT5021EN-SMC-W
Revision level of part number provided by vendor :00
Vendor serial number       :ONJ08290041
Vendor manufacturing date code :2004072000

```

```

Reserved1 : 00 02 02 20 D1 00 00
Basic Field Checksum :0x10

```

```

Customer Writable Area :
0x00: 58 32 2D 31 30 47 42 2D 4C 52 20 20 20 20 20 20
0x10: 20 20 20 20 20 4F 4E 4A 30 38 32 39 30 30 34 31
0x20: 31 30 2D 32 30 33 36 2D 30 31 20 20 41 30 31 20

```

```

Vendor Specific :
0x00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x20: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x30: 00 00 00 00 00 11 E2 69 A9 2F 95 C6 EE D2 DA B3 FD
0x40: 9A 34 4A 24 CB 00 00 00 00 00 00 00 00 00 EF FC
0x50: F4 AC 1A D7 11 08 01 36 00

```

Switch#

This example shows how to display IDPROM information for the supervisor engine:

```

Switch# show idprom supervisor
Supervisor Idprom:
Common Block Signature = 0xABAB
Common Block Version = 1
Common Block Length = 144
Common Block Checksum = 4153
Idprom Size = 256
Block Count = 2
FRU Major Type = 0x4101
FRU Minor Type = 333
OEM String = Cisco Systems, Inc.
Product Number = WS-X4014
Serial Number = JAB05320CCE
Part Number = 73-6854-04
Part Revision = 05
Manufacturing Deviation String = 0
Hardware Revision = 0.4
Manufacturing Bits = 0x0000
Engineering Bits = 0x0000
Snmp OID = 0.0.0.0.0.0.0
Power Consumption = 0
RMA Failure Code = 0 0 0 0
Supervisor Block Signature = 0x4101
Supervisor Block Version = 1
Supervisor Block Length = 24
Supervisor Block Checksum = 548
Feature Bits = 0x0000000000000000
Card Feature Index = 95
MAC Base = 0007.0ee5.2a44
MAC Count = 2
Switch#

```

This example shows how to display IDPROM information for the chassis:

```
Switch# show idprom chassis
Chassis Idprom:
Common Block Signature = 0xABAB
Common Block Version = 1
Common Block Length = 144
Common Block Checksum = 4285
Idprom Size = 256
Block Count = 2
FRU Major Type = 0x4001
FRU Minor Type = 24
OEM String = Cisco Systems, Inc.
Product Number = WS-C4006
Serial Number = FOX04473737
Part Number = 73-4289-02
Part Revision = 02
Manufacturing Deviation String = 0x00
Hardware Revision = 0.2
Manufacturing Bits = 0x0000
Engineering Bits = 0x0000
Snmp OID = 0.0.0.0.0.0.0.0
Chassis Block Signature = 0x4001
Chassis Block Version = 1
Chassis Block Length = 22
Chassis Block Checksum = 421
Feature Bits = 0x0000000000000000
MAC Base = 0004.dd42.2600
MAC Count = 1024
Switch#
```

This example shows how to display IDPROM information for power supply 1:

```
Switch# show idprom power-supply 1
Power Supply 0 Idprom:
Common Block Signature = 0xABAB
Common Block Version = 1
Common Block Length = 144
Common Block Checksum = 10207
Idprom Size = 256
Block Count = 1
FRU Major Type = 0xAB01
FRU Minor Type = 8224
OEM String = Cisco Systems, Inc.
Product Number = WS-CAC-1440W
Serial Number = ACP05180002
Part Number = 34-XXXX-01
Part Revision = A0
Manufacturing Deviation String =
Hardware Revision = 1.1
Manufacturing Bits = 0x0000
Engineering Bits = 0x3031
Snmp OID = 9.12.3.65535.65535.65535.65535.65535
Power Consumption = -1
RMA Failure Code = 255 255 255 255
Power Supply Block Signature = 0xFFFF
PowerSupply Block Version = 255
PowerSupply Block Length = 255
PowerSupply Block Checksum = 65535
Feature Bits = 0x00000000FFFFFFFF
Current @ 110V = -1
Current @ 220V = -1
StackMIB OID = 65535
Switch#
```

This example shows how to display IDPROM information for the fan tray:

```
Switch# show idprom fan-tray
Fan Tray Idprom :
  Common Block Signature = 0xABAB
  Common Block Version = 1
  Common Block Length = 144
  Common Block Checksum = 19781
  Idprom Size = 256
  Block Count = 1
  FRU Major Type = 0x4002
  FRU Minor Type = 0
  OEM String = "Cisco Systems"
  Product Number = WS-X4502-fan
  Serial Number =
  Part Number =
  Part Revision =
  Manufacturing Deviation String =
  Hardware Revision = 0.1
  Manufacturing Bits = 0xFFFF
  Engineering Bits = 0xFFFF
  Snmp OID = 65535.65535.65535.65535.65535.65535.65535
  Power Consumption = -1
  RMA Failure Code = 255 255 255 255
Switch#
```

# show interfaces

To display traffic on a specific interface, use the **show interfaces** command.

```
show interfaces [{ fastethernet mod/interface-number } | { gigabitethernet
mod/interface-number } | { tengigabitethernet mod/interface-number } | { null
interface-number } | vlan vlan_id } | status}]
```

Syntax Description	<b>fastethernet</b> <i>mod/interface-number</i>	(Optional) Specifies the Fast Ethernet module and interface.
	<b>gigabitethernet</b> <i>mod/interface-number</i>	(Optional) Specifies the Gigabit Ethernet module and interface.
	<b>tengigabitethernet</b> <i>mod/interface-number</i>	(Optional) Specifies the 10-Gigabit Ethernet module and interface.
	<b>null</b> <i>interface-number</i>	(Optional) Specifies the null interface; the valid value is 0.
	<b>vlan</b> <i>vlan_id</i>	(Optional) Specifies the VLAN; valid values are from 1 to 4094.
	<b>status</b>	(Optional) Displays status information.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended VLAN addresses was added.
	12.2(25)EW	Support for the 10-Gigabit Ethernet interface was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The statistics are collected on a per-VLAN basis for Layer 2-switched packets and Layer 3-switched packets. The statistics are available for both unicast and multicast. The Layer 3-switched packet counts are available for both the ingress and egress directions. The per-VLAN statistics are updated every 5 seconds.

In some cases, you might see a difference in the duplex mode that is displayed between the **show interfaces** command and the **show running-config** commands. The duplex mode that is displayed in the **show interfaces** command is the actual duplex mode that the interface is running. The **show interfaces** command shows the operating mode for an interface, while the **show running-config** command shows the configured mode for an interface.

If you do not enter any keywords, all counters for all modules are displayed.

**Examples**

This example shows how to display traffic for a Gigabit Ethernet interface 2/5:

```
Switch# show interfaces gigabitethernet2/5
GigabitEthernet9/5 is up, line protocol is up
Hardware is C4k 1000Mb 802.3, address is 0001.64f8.3fa5 (bia 0001.64f8.3fa5)
Internet address is 172.20.20.20/24
MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
Full-duplex, 1000Mb/s
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:00, output never, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 1000 bits/sec, 2 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
L2 Switched: ucast: 8199 pkt, 1362060 bytes - mcast: 6980 pkt, 371952 bytes
L3 in Switched: ucast: 0 pkt, 0 bytes - mcast: 0 pkt, 0 bytes mcast
L3 out Switched: ucast: 0 pkt, 0 bytes - mcast: 0 pkt, 0 bytes
300114 packets input, 27301436 bytes, 0 no buffer
Received 43458 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
0 input packets with dribble condition detected
15181 packets output, 1955836 bytes, 0 underruns
0 output errors, 0 collisions, 3 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
Switch#
```

This example shows how to display traffic for a 10-Gigabit Ethernet interface 1/1:

```
Switch# show interfaces tengigabitethernet1/1
Name: Tengigabitethernet1/1
Switchport: Enabled
Administrative Mode: private-vlan promiscuous trunk
Operational Mode: private-vlan promiscuous (suspended member of bundle Po1)
Administrative Trunking Encapsulation: negotiate
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: none
Trunking Native Mode VLAN: none
Administrative Native VLAN tagging: enabled
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: 202 (VLAN0202) 303 (VLAN0303) 304 (VLAN0304)
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk
Native VLAN tagging: enabled
Administrative private-vlan trunk encapsulation: 802.1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Administrative private-vlan mapping trunk: New 202 (VLAN0202) 303 (VLAN0303) 304
(VLAN0304) 204 (VLAN0204) 305 (VLAN0305) 306 (VLAN0306)
Operational private-vlan: 202 (VLAN0202) 303 (VLAN0303) 304 (VLAN0304)
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Switch#
```



This example shows how to display status information for Gigabit Ethernet interface 1/2:

```
Switch# show interfaces gigabitethernet1/2 status
Port      Name      Status      Vlan      Duplex  Speed  Type
Gi1/2     notconnect  1          auto      1000    1000-XWDM-RXONLY
Switch#
```

This example shows how to display status information for the interfaces on the supervisor engine:

```
Switch# show interfaces status

Port      Name      Status      Vlan      Duplex  Speed  Type
Te1/1     connected  1          full      10G     10GBase-LR
Te1/2     connected  1          full      10G     10GBase-LR
Switch#
```

# show interfaces capabilities

To display the interface capabilities for an interface or for all the interfaces on a switch, use the **show interfaces capabilities** command.

**show interfaces capabilities** [{**module** *mod*}]

**show interfaces** [*interface interface-number*] **capabilities**

Syntax Description	<b>module</b> <i>mod</i>	(Optional) Display information for the specified module only.
	<i>interface</i>	(Optional) Interface type; valid values are <b>fastethernet</b> , <b>gigabitethernet</b> , <b>tengigabitethernet</b> , and <b>port-channel</b> .
	<i>interface-number</i>	(Optional) Port number.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EW	Support for the 10-Gigabit Ethernet interface was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The *interface-number* argument designates the module and port number. Valid values for *interface-number* depend on the chassis and module used. For example, if you have a 48-port 10/100-Mbps Fast Ethernet RJ-21 (telco connector) switching module installed in a Catalyst 4507 chassis, valid values for the slot number are from 2 to 13 and valid values for the port number are 1 to 48.

**Examples** This example shows how to display the interface capabilities for a module:

```
Switch# show interfaces capabilities module 1
GigabitEthernet1/1
  Model: WS-X4516-Gbic
  Type: Unsupported GBIC
  Speed: 1000
  Duplex: full
  Trunk encap. type: 802.1Q, ISL
  Trunk mode: on, off, desirable, nonegotiate
  Channel: yes
  Broadcast suppression: percentage (0-100), hw
  Flowcontrol: rx- (off, on, desired), tx- (off, on, desired)
  VLAN Membership: static, dynamic
  Fast Start: yes
  Queuing: rx- (N/A), tx- (4q1t, Sharing/Shaping)
```

```

CoS rewrite:          yes
ToS rewrite:          yes
Inline power:         no
SPAN:                 source/destination
UDLD                  yes
Link Debounce:        no
Link Debounce Time:   no
Port Security         yes
Dot1x                 yes
GigabitEthernet1/2
Model:                WS-X4516-Gbic
Type:                 Unsupported GBIC
Speed:                1000
Duplex:               full
Trunk encap. type:    802.1Q, ISL
Trunk mode:           on, off, desirable, nonegotiate
Channel:              yes
Broadcast suppression: percentage(0-100), hw
Flowcontrol:          rx- (off, on, desired), tx- (off, on, desired)
VLAN Membership:      static, dynamic
Fast Start:           yes
Queuing:              rx- (N/A), tx- (4q1t, Sharing/Shaping)
CoS rewrite:          yes
ToS rewrite:          yes
Inline power:         no
SPAN:                 source/destination
UDLD                  yes
Link Debounce:        no
Link Debounce Time:   no
Port Security         yes
Dot1x                 yes
Switch#

```

This example shows how to display the interface capabilities for the 10-Gigabit Ethernet interface 1/1:

```

Switch# show interfaces tengigabitethernet1/1 capabilities
TenGigabitEthernet1/1
Model:                WS-X4517-X2
Type:                 10GBase-LR
Speed:                10000
Duplex:               full
Trunk encap. type:    802.1Q, ISL
Trunk mode:           on, off, desirable, nonegotiate
Channel:              yes
Broadcast suppression: percentage(0-100), hw
Flowcontrol:          rx- (off, on), tx- (off, on)
VLAN Membership:      static, dynamic
Fast Start:           yes
Queuing:              rx- (N/A), tx- (1p3q1t, Sharing/Shaping)
CoS rewrite:          yes
ToS rewrite:          yes
Inline power:         no
SPAN:                 source/destination
UDLD:                 yes
Link Debounce:        no
Link Debounce Time:   no
Port Security         yes
Dot1x                 yes
Maximum MTU:          9198 bytes (Jumbo Frames)
Multiple Media Types: no
Diagnostic Monitoring: N/A
Switch#

```

This example shows how to display the interface capabilities for Gigabit Ethernet interface 1/1:

```
Switch# show interfaces gigabitethernet1/1 capabilities
GigabitEthernet1/1
  Model: WS-X4014-Gbic
  Type: No Gbic
  Speed: 1000
  Duplex: full
  Trunk encap. type: 802.1Q, ISL
  Trunk mode: on, off, desirable, nonegotiate
  Channel: yes
  Broadcast suppression: percentage(0-100), hw
  Flowcontrol: rx- (off, on, desired), tx- (off, on, desired)
  VLAN Membership: static, dynamic
  Fast Start: yes
  Queuing: rx- (N/A), tx- (4q1t, Shaping/Shaping)
  CoS rewrite: yes
  ToS rewrite: yes
  Inline power: no
  SPAN: source/destination
  UDLD: yes
  Link Debounce: no
  Link Debounce Time: no
  Port Security: yes
  Dot1x: yes
  MTU Supported: jumbo frames, baby giants
Switch#
```

This example shows how to display the interface capabilities for Fast Ethernet interface 3/1:

```
Switch# show interfaces fastethernet3/1 capabilities
FastEthernet3/1
  Model: WS-X4148-RJ-RJ-45
  Type: 10/100BaseTX
  Speed: 10,100,auto
  Duplex: half,full,auto
  Trunk encap. type: 802.1Q, ISL
  Trunk mode: on, off, desirable, nonegotiate
  Channel: yes
  Broadcast suppression: percentage(0-100), sw
  Flowcontrol: rx- (none), tx- (none)
  VLAN Membership: static, dynamic
  Fast Start: yes
  Queuing: rx- (N/A), tx- (4q1t, Shaping)
  CoS rewrite: yes
  ToS rewrite: yes
  Inline power: no
  SPAN: source/destination
  UDLD: yes
  Link Debounce: no
  Link Debounce Time: no
  Port Security: yes
  Dot1x: yes
  MTU Supported: no jumbo frames, baby giants
Switch#
```

Related Commands [show interfaces counters](#)

# show interfaces counters

To display the traffic on the physical interface, use the **show interfaces counters** command.

**show interfaces counters** [**all** | **detail** | **errors** | **storm-control** | **trunk**] [**module** *mod*]

Syntax Description	<b>all</b>	(Optional) Displays all the interface counters including errors, trunk, and detail.
	<b>detail</b>	(Optional) Displays the detailed interface counters.
	<b>errors</b>	(Optional) Displays the interface error counters.
	<b>storm-control</b>	(Optional) Displays the number of packets discarded due to suppression on the interface.
	<b>trunk</b>	(Optional) Displays the interface trunk counters.
	<b>module</b> <i>mod</i>	(Optional) Limits the display to interfaces on a specific module.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(19)EW	Support for storm control.
	12.2(18)EW	Support for the display of total suppression discards.

**Usage Guidelines** If you do not enter any keywords, all the counters for all modules are displayed.  
The display for the **storm-control** keyword includes the suppressed multicast bytes.

**Examples** This example shows how to display the error counters for a specific module:

```
Switch# show interfaces counters errors module 1
```

```
Port          Align-Err    FCS-Err    Xmit-Err    Rcv-Err    UnderSize
Gi1/1          0            0          0           0           0
Gi1/2          0            0          0           0           0
```

```
Port          Single-Col  Multi-Col  Late-Col  Excess-Col  Carri-Sen    Runts    Giants
Gi1/1          0           0         0         0           0           0        0
Gi1/2          0           0         0         0           0           0        0
Switch#
```

This example shows how to display the traffic that is seen by a specific module:

```
Switch# show interfaces counters module 1
```

```
Port          InOctets    InUcastPkts    InMcastPkts    InBcastPkts
```

**show interfaces counters**

```

Gi1/1          0          0          0          0
Gi1/2          0          0          0          0

Port           OutOctets  OutUcastPkts  OutMcastPkts  OutBcastPkts
Gi1/1          0          0          0          0
Gi1/2          0          0          0          0
Switch#

```

This example shows how to display the trunk counters for a specific module:

```

Switch# show interfaces counters trunk module 1

Port           TrunkFramesTx  TrunkFramesRx  WrongEncap
Gi1/1          0          0          0
Gi1/2          0          0          0
Switch#

```

This example shows how to display the number of packets that are discarded due to suppression:

```

Switch# show interfaces counters storm-control

Multicast Suppression : Enabled

Port           BcastSuppLevel  TotalSuppressionDiscards
Fa5/35         10.00%          6278550
Switch#

```

**Related Commands**    [show interfaces capabilities](#)

# show interfaces description

To display a description and status of an interface, use the **show interfaces description** command.

**show interfaces** [*interface*] **description**

Syntax Description	<i>interface</i> (Optional) Type of interface.
--------------------	--

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

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Examples	This example shows how to display information for all interfaces:
----------	---

```
Switch# show interfaces description
Interface Status      Protocol Description
PO0/0      admin down          down    First interface
PO0/1      admin down          down
Gi1/1      up                  up      GigE to server farm
Switch#
```

Related Commands	<b>description</b> (refer to Cisco IOS documentation)
------------------	---

# show interfaces link

To display how long a cable has been disconnected from an interface, use the **show interfaces link** command:

**show interfaces link** [**module** *mod\_num*]

<b>Syntax Description</b>	<b>module</b> <i>mod_num</i> (Optional) Limits the display to interfaces on a module.
---------------------------	---

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	If the interface state is up, the command displays 0:00. If the interface state is down, the time (in hours, minutes, and seconds) is displayed.
-------------------------	--

<b>Examples</b>	This example shows how to display active link-level information:
-----------------	--

Switch# **show interfaces link**

```

Port      Name           Down Time
Gi1/1     00:00:00
Gi1/2     00:00:00
Gi3/1     00:00:00
Gi3/2     00:00:00
Fa4/1     00:00:00
Fa4/2     00:00:00
Fa4/3     00:00:00
Fa4/4     00:00:00

```

This example shows how to display inactive link-level information:

Switch# **show interfaces link**

```

Port      Name           Down Time
Gi3/4     1 minute 28 secs
Gi3/5     1 minute 28 secs
Gi3/6     1 minute 28 secs
Gi4/1     1 minute 28 secs

```

In this example, the cable has been disconnected from the port for 1 minute and 28 seconds.



# show interfaces mtu

To display the maximum transmission unit (MTU) size of all the physical interfaces and SVIs on the switch, use the **show interfaces mtu** command.

**show interfaces mtu** [*module mod*]

Syntax Description	<b>module mod</b> (Optional) Limits the display to interfaces on a specific module.
--------------------	---

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

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

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Examples	This example shows how to display the MTU size for all interfaces on module 1:
----------	--

```
Switch> show interfaces mtu module 1

Port      Name      MTU
Gi1/1     1500
Gi1/2     1500
Switch>
```

Related Commands	<a href="#">mtu</a>
------------------	---------------------

# show interfaces private-vlan mapping

To display PVLAN mapping information for VLAN SVIs, use the **show interfaces private-vlan mapping** command.

**show interfaces private-vlan mapping [active]**

Syntax Description	<b>active</b> (Optional) Displays active interfaces only.				
Defaults	This command has no default settings.				
Command Modes	Privileged EXEC				
Command History	<table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>12.1(8a)EW</td><td>Support for this command was introduced on the Catalyst 4500 series switch.</td></tr> </table>	Release	Modification	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Release	Modification				
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.				
Usage Guidelines	This command displays SVI information only.				
Examples	<p>This example shows how to display PVLAN mapping information:</p> <pre>Switch# show interfaces private-vlan mapping Interface Secondary VLAN Type ----- vlan2      301      isolated vlan2      302      isolated Switch#</pre>				
Related Commands	<a href="#">private-vlan</a> <a href="#">private-vlan mapping</a>				

# show interfaces status

To display the interface status or a list of interfaces in error-disabled state, use the **show interfaces status** command.

**show interfaces status [err-disabled]**

<b>Syntax Description</b>	<b>err-disabled</b> (Optional) Displays interfaces in error-disabled state.
---------------------------	---

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display the status of all interfaces:

```
Switch# show interfaces status
```

Port	Name	Status	Vlan	Duplex	Speed	Type
Gi1/1		disabled	routed	full	1000	missing
Gi1/2		notconnect	1	full	1000	unknown (4)
Fa5/1		disabled	routed	auto	auto	10/100BaseTX
Fa5/2		disabled	routed	auto	auto	10/100BaseTX
Fa5/3		disabled	routed	auto	auto	10/100BaseTX
Fa5/4		disabled	routed	auto	auto	10/100BaseTX
...						
Fa5/15		disabled	routed	auto	auto	10/100BaseTX
Fa5/16		disabled	routed	auto	auto	10/100BaseTX
Fa5/17		disabled	routed	auto	auto	10/100BaseTX

```
Switch#
```

This example shows how to display the status of interfaces in an error-disabled state:

```
Switch# show interfaces status err-disabled
```

Port	Name	Status	Reason
Fa9/4		notconnect	link-flap

```
informational error message when the timer expires on a cause
-----
```

```
5d04h:%PM-SP-4-ERR_RECOVER:Attempting to recover from link-flap err-disable state on Fa9/4
Switch#
```

**Related Commands**

- [errdisable detect](#)
- [show errdisable recovery](#)

# show interfaces switchport

To display the administrative and operational status of a switching (nonrouting) port, use the **show interfaces switchport** command.

**show interfaces** [*interface-id*] **switchport** [*module mod*]

## Syntax Description

<i>interface-id</i>	(Optional) Interface ID for the physical port.
<b>module mod</b>	(Optional) Limits the display to interfaces on the specified module; valid values are from 1 to 6.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(19)EW	Support for per-interface display.
12.2(18)EW	Support for displaying the status of native VLAN tagging in the command output.

## Examples

This example shows how to display switch-port information using the **begin** output modifier:

```
Switch# show interfaces switchport | include VLAN
Name: Fa5/6
Access Mode VLAN: 200 (VLAN0200)
Trunking Native Mode VLAN: 1 (default)
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: ALL
Switch#
```

This example shows how to display switch-port information for module 1:

```
Switch# show interfaces switchport module 1
Name:Gi1/1
Switchport:Enabled
Administrative Mode:dynamic auto
Operational Mode:down
Administrative Trunking Encapsulation:negotiate
Negotiation of Trunking:On
Access Mode VLAN:1 (default)
Trunking Native Mode VLAN:1 (default)
Administrative private-vlan host-association:none
Administrative private-vlan mapping:none
Operational private-vlan:none
Trunking VLANs Enabled:ALL
Pruning VLANs Enabled:2-1001

Name:Gi1/2
Switchport:Enabled
```

```

Administrative Mode:dynamic auto
Operational Mode:down
Administrative Trunking Encapsulation:negotiate
Negotiation of Trunking:On
Access Mode VLAN:1 (default)
Trunking Native Mode VLAN:1 (default)
Administrative private-vlan host-association:none
Administrative private-vlan mapping:none
Operational private-vlan:none
Trunking VLANs Enabled:ALL
Pruning VLANs Enabled:2-1001
Switch#

```

This example shows how to display the status of native VLAN tagging on the port:

```

Switch# show interfaces f3/1 switchport
show interface f3/1 switchport
Name: Fa3/1
Switchport: Enabled
Administrative Mode: private-vlan trunk promiscuous
Operational Mode: private-vlan trunk promiscuous
Administrative Trunking Encapsulation: negotiate
Operational Trunking Encapsulation: dot1q
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Administrative Native VLAN tagging: enabled
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: 1
Administrative private-vlan trunk Native VLAN tagging: enabled
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: 1
Administrative private-vlan trunk associations: none
Administrative private-vlan trunk mappings:
    10 (VLAN0010) 100 (VLAN0100)
Operational private-vlan:
    10 (VLAN0010) 100 (VLAN0100)
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL

Unknown unicast blocked: disabled
Unknown multicast blocked: disabled
Appliance trust: none
Switch#

```

#### Related Commands

[show interfaces capabilities](#)  
[show interfaces counters](#)

# show interfaces transceiver

To display diagnostic-monitoring data for all interfaces that have transceivers installed, use the **show interfaces transceiver** command.

```
show interfaces {[int_name] transceiver {[detail]} | {transceiver [module mod] | detail
[module mod]}}
```

## Syntax Description

<i>int_name</i>	(Optional) Interface.
<b>detail</b>	(Optional) Displays the calibrated values and the A2D readouts if the readout values differ from the calibrated values. Also displays the high-alarm, high-warning, low-warning, and low-alarm thresholds.
<b>module mod</b>	(Optional) Limits the display to interfaces on a specific module.

## Defaults

The noninterface-specific versions of the **show interfaces transceiver** command are enabled by default. The interface-specific versions of these commands are enabled by default if the specified interface has a transceiver (GBIC or SFP) that is configured for diagnostic monitoring, and the transceiver is in a module that supports diagnostic monitoring.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(20)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.2(18)EW	Support for the <b>calibration</b> keyword was withdrawn.

## Usage Guidelines

The **show interfaces transceiver** command provides useful information under the following conditions:

- At least one transceiver is installed on a chassis that is configured for diagnostic monitoring.
- The transceiver is in a module that supports diagnostic monitoring.

If you notice that the alarm and warning flags have been set on a transceiver, reenter the command to confirm.

**Examples**

This example shows how to display diagnostic monitoring data for all interfaces with transceivers installed on the switch:

```
Switch# show interfaces transceiver
If device is externally calibrated, only calibrated values are printed.
++ : high alarm, + : high warning, - : low warning, -- : low alarm.
NA or N/A: not applicable, Tx: transmit, Rx: receive.
mA: milliamperes, dBm: decibels (milliwatts).
```

Port	Temperature (Celsius)	Voltage (Volts)	Current (mA)	Optical Tx Power (dBm)	Optical Rx Power (dBm)
Gi1/1	48.1	3.30	0.0	8.1 ++	N/A
Gi1/2	33.0	3.30	1.8	-10.0	-36.9
Gi2/1	43.7	5.03	50.6 +	-16.7 --	N/A
Gi2/2	39.2	5.02	25.7	0.8	N/A

Switch#



**Note** The value for the Optical Tx Power (in dBm) equals ten times log (Tx Power in mW). If the Tx Power value is 3 mW, then the Optical Tx Power value equals  $10 * \log(3)$ , which equals  $10 * .477$  or 4.77 dBm. The Optical Rx Power value behaves similarly. If the Tx Power or the Rx Power is zero, then its dBm value is undefined and is shown as N/A (not applicable).

This example shows how to display detailed diagnostic monitoring data, including calibrated values, alarm and warning thresholds, A2D readouts, and alarm and warning flags. The A2D readouts are reported separately in parentheses only if they differ from the calibrated values:

```
Switch# show interfaces transceiver detail
mA: milliamperes, dBm: decibels (milliwatts), NA or N/A: not applicable.
++ : high alarm, + : high warning, - : low warning, -- : low alarm.
A2D readouts (if they differ), are reported in parentheses.
The threshold values are calibrated.
```

Port	Temperature (Celsius)	High Alarm Threshold (Celsius)	High Warn Threshold (Celsius)	Low Warn Threshold (Celsius)	Low Alarm Threshold (Celsius)
Gi1/1	48.1	100.0	100.0	0.0	0.0
Gi1/2	34.9	100.0	100.0	0.0	0.0
Gi2/1	43.5	70.0	60.0	5.0	0.0
Gi2/2	39.1	70.0	60.0	5.0	0.0

Port	Voltage (Volts)	High Alarm Threshold (Volts)	High Warn Threshold (Volts)	Low Warn Threshold (Volts)	Low Alarm Threshold (Volts)
Gi1/1	3.30	6.50	6.50	N/A	N/A
Gi1/2	3.30	6.50	6.50	N/A	N/A
Gi2/1	5.03	5.50	5.25	4.75	4.50
Gi2/2	5.02	5.50	5.25	4.75	4.50

Port	Current (milliamperes)	High Alarm Threshold (mA)	High Warn Threshold (mA)	Low Warn Threshold (mA)	Low Alarm Threshold (mA)
Gi1/1	0.0	130.0	130.0	N/A	N/A
Gi1/2	1.7	130.0	130.0	N/A	N/A
Gi2/1	50.6 +	60.0	40.0	10.0	5.0
Gi2/2	25.8	60.0	40.0	10.0	5.0

# show interfaces transceiver

```

      Optical
      Transmit Power      High Alarm  High Warn  Low Warn  Low Alarm
      Port      (dBm)      Threshold  Threshold  Threshold Threshold
      -----
Gi1/1      8.1      ++      8.1      8.1      N/A      N/A
Gi1/2     -9.8      8.1      8.1      N/A      N/A
Gi2/1    -16.7 (-13.0) --      3.4      3.2      -0.3     -0.5
Gi2/2      0.8 ( 5.1)      3.4      3.2      -0.3     -0.5

      Optical
      Receive Power      High Alarm  High Warn  Low Warn  Low Alarm
      Port      (dBm)      Threshold  Threshold  Threshold Threshold
      -----
Gi1/1      N/A      8.1      8.1      N/A      N/A
Gi1/2    -30.9      8.1      8.1      N/A      N/A
Gi2/1      N/A (-28.5)      5.9      -6.7     -28.5     -28.5
Gi2/2      N/A (-19.5)      5.9      -6.7     -28.5     -28.5
Switch#

```

This example shows how to display the monitoring data for the interfaces that have transceivers installed on module 2:

```
Switch# show interfaces transceiver module 2
```

```

If device is externally calibrated, only calibrated values are printed.
++ : high alarm, + : high warning, - : low warning, -- : low alarm.
NA or N/A: not applicable, Tx: transmit, Rx: receive.
mA: milliamperes, dBm: decibels (milliwatts).

```

```

      Temperature  Voltage  Current      Optical  Optical
      Port      (Celsius)  (Volts)  (mA)      Tx Power  Rx Power
      -----
Gi2/1      43.7      5.03      50.6 +    -16.7 --    N/A
Gi2/2      39.2      5.02      25.7      0.8      N/A
Switch#

```

This example shows how to display the detailed monitoring data for the interfaces that have transceivers installed on module 2:

```
Switch# show interfaces transceiver detail module 2
```

```

mA: milliamperes, dBm: decibels (milliwatts), NA or N/A: not applicable.
++ : high alarm, + : high warning, - : low warning, -- : low alarm.
A2D readouts (if they differ), are reported in parentheses.
The threshold values are calibrated.

```

```

      High Alarm  High Warn  Low Warn  Low Alarm
      Threshold  Threshold  Threshold Threshold
      Port      (Celsius)  (Celsius)  (Celsius) (Celsius)
      -----
Gi2/1      43.5      70.0      60.0      5.0      0.0
Gi2/2      39.1      70.0      60.0      5.0      0.0

      High Alarm  High Warn  Low Warn  Low Alarm
      Threshold  Threshold  Threshold Threshold
      Port      (Volts)  (Volts)  (Volts)  (Volts)
      -----
Gi2/1      5.03      5.50      5.25      4.75      4.50
Gi2/2      5.02      5.50      5.25      4.75      4.50

```



Port	Current (milliamperes)		High Alarm Threshold (mA)	High Warn Threshold (mA)	Low Warn Threshold (mA)	Low Alarm Threshold (mA)
Gi2/1	50.6	+	60.0	40.0	10.0	5.0
Gi2/2	25.8		60.0	40.0	10.0	5.0

Port	Optical Transmit Power (dBm)		High Alarm Threshold (dBm)	High Warn Threshold (dBm)	Low Warn Threshold (dBm)	Low Alarm Threshold (dBm)
Gi2/1	-16.7 (-13.0)	--	3.4	3.2	-0.3	-0.5
Gi2/2	0.8 ( 5.1)		3.4	3.2	-0.3	-0.5

Port	Optical Receive Power (dBm)		High Alarm Threshold (dBm)	High Warn Threshold (dBm)	Low Warn Threshold (dBm)	Low Alarm Threshold (dBm)
Gi2/1	N/A (-28.5)		5.9	-6.7	-28.5	-28.5
Gi2/2	N/A (-19.5)		5.9	-6.7	-28.5	-28.5

Switch#

This example shows how to display the monitoring data for the transceivers on interface Gi1/2:

```
Switch# show interfaces g1/2 transceiver
ITU Channel 23 (1558.98 nm),
Transceiver is externally calibrated.
If device is externally calibrated, only calibrated values are printed.
++ : high alarm, + : high warning, - : low warning, -- : low alarm.
NA or N/A: not applicable, Tx: transmit, Rx: receive.
mA: milliamperes, dBm: decibels (milliwatts).
```

Port	Temperature (Celsius)	Voltage (Volts)	Current (mA)	Optical Tx Power (dBm)	Optical Rx Power (dBm)
Gi2/1	43.7	5.03	50.6 +	-16.7 --	N/A

Switch#

This example shows how to display detailed the monitoring data for the transceivers on interface Gi1/2:

```
Switch# show interfaces g1/2 transceiver detail
ITU Channel 23 (1558.98 nm),
Transceiver is externally calibrated.
mA: milliamperes, dBm: decibels (milliwatts), NA or N/A: not applicable.
++ : high alarm, + : high warning, - : low warning, -- : low alarm.
A2D readouts (if they differ), are reported in parentheses.
The threshold values are calibrated.
```

Port	Temperature (Celsius)	High Alarm Threshold (Celsius)	High Warn Threshold (Celsius)	Low Warn Threshold (Celsius)	Low Alarm Threshold (Celsius)
Gi2/1	43.5	70.0	60.0	5.0	0.0

Port	Voltage (Volts)	High Alarm Threshold (Volts)	High Warn Threshold (Volts)	Low Warn Threshold (Volts)	Low Alarm Threshold (Volts)
Gi2/1	5.03	5.50	5.25	4.75	4.50

# show interfaces transceiver

```

Port          Current          High Alarm  High Warn  Low Warn  Low Alarm
-----          (milliamperes)  Threshold  Threshold  Threshold  Threshold
Gi2/1         50.6            +          60.0       40.0       10.0       5.0

Port          Optical          High Alarm  High Warn  Low Warn  Low Alarm
-----          Transmit Power  Threshold  Threshold  Threshold  Threshold
Gi2/1         -16.7 (-13.0)  --          3.4        3.2        -0.3       -0.5
              (dBm)
Port          Optical          High Alarm  High Warn  Low Warn  Low Alarm
-----          Receive Power  Threshold  Threshold  Threshold  Threshold
Gi2/1         N/A  (-28.5)    5.9        -6.7       -28.5      -28.5
Switch#

```

## Related Commands

[show idprom](#)  
[show interfaces status](#)

# show interfaces trunk

To display port and module interface-trunk information, use the **show interfaces trunk** command.

**show interfaces trunk** [**module** *mod*]

Syntax Description	<b>module</b> <i>mod</i>	(Optional) Limits the display to interfaces on the specified module; valid values are from 1 to 6.
--------------------	--------------------------	--

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

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	If you do not specify a keyword, only information for trunking ports is displayed.
------------------	--

Examples	This example shows how to display interface-trunk information for module 5:
----------	---

```
Switch# show interfaces trunk module 5
```

Port	Mode	Encapsulation	Status	Native vlan
Fa5/1	routed	negotiate	routed	1
Fa5/2	routed	negotiate	routed	1
Fa5/3	routed	negotiate	routed	1
Fa5/4	routed	negotiate	routed	1
Fa5/5	routed	negotiate	routed	1
Fa5/6	off	negotiate	not-trunking	10
Fa5/7	off	negotiate	not-trunking	10
Fa5/8	off	negotiate	not-trunking	1
Fa5/9	desirable	n-isl	trunking	1
Fa5/10	desirable	negotiate	not-trunking	1
Fa5/11	routed	negotiate	routed	1
Fa5/12	routed	negotiate	routed	1
...				
Fa5/48	routed	negotiate	routed	1

Port	Vlans allowed on trunk
Fa5/1	none
Fa5/2	none
Fa5/3	none
Fa5/4	none
Fa5/5	none
Fa5/6	none
Fa5/7	none
Fa5/8	200
Fa5/9	1-1005

# show interfaces trunk

```

Fa5/10    none
Fa5/11    none
Fa5/12    none

Fa5/48    none

Port      Vlans allowed and active in management domain
Fa5/1     none
Fa5/2     none
Fa5/3     none
Fa5/4     none
Fa5/5     none
Fa5/6     none
Fa5/7     none
Fa5/8     200
Fa5/9     1-6,10,20,50,100,152,200,300,303-305,349-351,400,500,521,524,570,801-8
02,850,917,999,1002-1005
Fa5/10    none
Fa5/11    none
Fa5/12    none

Fa5/48    none

Port      Vlans in spanning tree forwarding state and not pruned
Fa5/1     none
Fa5/2     none
Fa5/3     none
Fa5/4     none
Fa5/5     none
Fa5/6     none
Fa5/7     none
Fa5/8     200
Fa5/9     1-6,10,20,50,100,152,200,300,303-305,349-351,400,500,521,524,570,801-8
02,850,917,999,1002-1005
Fa5/10    none
Fa5/11    none

Fa5/48    none
Switch#

```

This example shows how to display trunking information for active trunking ports:

Switch# **show interfaces trunk**

```

Port      Mode          Encapsulation  Status        Native vlan
Fa5/9     desirable    n-isl          trunking      1

Port      Vlans allowed on trunk
Fa5/9     1-1005

Port      Vlans allowed and active in management domain
Fa5/9     1-6,10,20,50,100,152,200,300,303-305,349-351,400,500,521,524,570,801-8
02,850,917,999,1002-1005

Port      Vlans in spanning tree forwarding state and not pruned
Fa5/9     1-6,10,20,50,100,152,200,300,303-305,349-351,400,500,521,524,570,801-8
02,850,917,999,1002-1005
Switch#

```

# show ip arp inspection

To show the status of dynamic ARP inspection for a specific range of VLANs, use the **show ip arp inspection** command.

**show ip arp inspection** {[**statistics**] **vlan** *vlan-range* | **interfaces** [*interface-name*]}

<b>Syntax Description</b>	<b>statistics</b>	(Optional) Displays statistics for the following types of packets that have been processed by this feature: forwarded, dropped, MAC validation failure, and IP validation failure.
	<b>vlan</b> <i>vlan-range</i>	(Optional) When used with the <b>statistics</b> keyword, displays the statistics for the selected range of VLANs. Without the <b>statistics</b> keyword, displays the configuration and operating state of DAI for the selected range of VLANs.
	<b>interfaces</b> <i>interface-name</i>	(Optional) Displays the trust state and the rate limit of ARP packets for the provided interface. When the interface name is not specified, the command displays the trust state and rate limit for all applicable interfaces in the system.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display the statistics of packets that have been processed by DAI for VLAN 3:

Switch# **show ip arp inspection statistics vlan 3**

```

Vlan      Forwarded      Dropped      DHCP Drops      ACL Drops
----      -
3          31753          102407        102407          0

Vlan      DHCP Permits      ACL Permits      Source MAC Failures
----      -
3          31753          0              0

Vlan      Dest MAC Failures      IP Validation Failures
----      -
3          0                      0
Switch#
```

## show ip arp inspection

This example shows how to display the statistics of packets that have been processed by DAI for all active VLANs:

Switch# **show ip arp inspection statistics**

Vlan	Forwarded	Dropped	DHCP Drops	ACL Drops
----	-----	-----	-----	-----
1	0	0	0	0
2	0	0	0	0
3	68322	220356	220356	0
4	0	0	0	0
100	0	0	0	0
101	0	0	0	0
1006	0	0	0	0
1007	0	0	0	0

Vlan	DHCP Permits	ACL Permits	Source MAC Failures
----	-----	-----	-----
1	0	0	0
2	0	0	0
3	68322	0	0
4	0	0	0
100	0	0	0
101	0	0	0
1006	0	0	0
1007	0	0	0

Vlan	Dest MAC Failures	IP Validation Failures
----	-----	-----
1	0	0
2	0	0
3	0	0
4	0	0
100	0	0
101	0	0
1006	0	0
1007	0	0

Switch#

This example shows how to display the configuration and operating state of DAI for VLAN 1:

Switch# **show ip arp inspection vlan 1**  
 Source Mac Validation : Disabled  
 Destination Mac Validation : Disabled  
 IP Address Validation : Disabled

Vlan	Configuration	Operation	ACL Match	Static ACL
----	-----	-----	-----	-----
1	Enabled	Active		

Vlan	ACL Logging	DHCP Logging
----	-----	-----
1	Deny	Deny

Switch#

This example shows how to display the trust state of Fast Ethernet interface 6/1:

Switch# **show ip arp inspection interfaces fastEthernet 6/1**

Interface	Trust State	Rate (pps)	Burst Interval
-----	-----	-----	-----
Fa6/1	Untrusted	20	5

Switch#

This example shows how to display the trust state of the interfaces on the switch:

```
Switch# show ip arp inspection interfaces
Interface      Trust State      Rate (pps)
-----
Gi1/1          Untrusted        15
Gi1/2          Untrusted        15
Gi3/1          Untrusted        15
Gi3/2          Untrusted        15
Fa3/3          Trusted          None
Fa3/4          Untrusted        15
Fa3/5          Untrusted        15
Fa3/6          Untrusted        15
Fa3/7          Untrusted        15
Switch#
```

#### Related Commands

[arp access-list](#)  
[clear ip arp inspection log](#)  
[show ip arp inspection](#)

# show ip arp inspection log

To show the status of the log buffer, use the **show ip arp inspection log** command.

## show ip arp inspection log

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

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display the current contents of the log buffer before and after the buffers are cleared:

```
Switch# show ip arp inspection log
Total Log Buffer Size : 10
Syslog rate : 0 entries per 10 seconds.
```

Interface	Vlan	Sender MAC	Sender IP	Num of Pkts
Fa6/3	1	0002.0002.0002	1.1.1.2	1(12:02:52 UTC Fri Apr 25 2003)
Fa6/3	1	0002.0002.0002	1.1.1.3	1(12:02:52 UTC Fri Apr 25 2003)
Fa6/3	1	0002.0002.0002	1.1.1.4	1(12:02:52 UTC Fri Apr 25 2003)
Fa6/3	1	0002.0002.0002	1.1.1.5	1(12:02:52 UTC Fri Apr 25 2003)
Fa6/3	1	0002.0002.0002	1.1.1.6	1(12:02:52 UTC Fri Apr 25 2003)
Fa6/3	1	0002.0002.0002	1.1.1.7	1(12:02:52 UTC Fri Apr 25 2003)
Fa6/3	1	0002.0002.0002	1.1.1.8	1(12:02:52 UTC Fri Apr 25 2003)
Fa6/3	1	0002.0002.0002	1.1.1.9	1(12:02:52 UTC Fri Apr 25 2003)
Fa6/3	1	0002.0002.0002	1.1.1.10	1(12:02:52 UTC Fri Apr 25 2003)
Fa6/3	1	0002.0002.0002	1.1.1.11	1(12:02:52 UTC Fri Apr 25 2003)
--	--	--	--	5(12:02:52 UTC Fri Apr 25 2003)

```
Switch#
```

This example shows how to clear the buffer with the **clear ip arp inspection log** command:

```
Switch# clear ip arp inspection log
Switch# show ip arp inspection log
Total Log Buffer Size : 10
Syslog rate : 0 entries per 10 seconds.
No entries in log buffer.
Switch#
```

**Related Commands** [arp access-list](#)  
[clear ip arp inspection log](#)



# show ip cef vlan

To view IP CEF VLAN interface status and configuration information and display the prefixes for a specific interface, use the **show ip cef vlan** command.

**show ip cef vlan** *vlan\_num* [**detail**]

Syntax Description	<i>vlan_num</i>	Number of the VLAN.
	<b>detail</b>	(Optional) Displays detailed information.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display the prefixes for a specific VLAN:

```
Switch# show ip cef vlan 1003
Prefix          Next Hop          Interface
0.0.0.0/0       172.20.52.1       FastEthernet3/3
0.0.0.0/32      receive
10.7.0.0/16     172.20.52.1       FastEthernet3/3
10.16.18.0/23   172.20.52.1       FastEthernet3/3
Switch#
```

This example shows how to display detailed IP CEF information for a specific VLAN:

```
Switch# show ip cef vlan 1003 detail
IP Distributed CEF with switching (Table Version 2364), flags=0x0
 1383 routes, 0 reresolve, 0 unresolved (0 old, 0 new)
 1383 leaves, 201 nodes, 380532 bytes, 2372 inserts, 989 invalidations
 0 load sharing elements, 0 bytes, 0 references
 universal per-destination load sharing algorithm, id 9B6C9823
 3 CEF resets, 0 revisions of existing leaves
 refcounts: 54276 leaf, 51712 node

Adjacency Table has 5 adjacencies
Switch#
```

# show ip dhcp snooping

To display the DHCP snooping configuration, use the **show ip dhcp snooping** command.

## show ip dhcp snooping

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

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EWA	Support for option 82 on untrusted ports was added.

**Examples** This example shows how to display the DHCP snooping configuration:

```
Switch# show ip dhcp snooping
Switch DHCP snooping is enabled
DHCP snooping is configured on the following VLANs:
5 10
Insertion of option 82 is enabled
Option82 on untrusted port is not allowed
Verification of hwaddr field is enabled
Interface          Trusted      Rate limit (pps)
-----
FastEthernet6/11   no          10
FastEthernet6/36   yes         50
Switch#
```

**Related Commands**

- [ip dhcp snooping](#)
- [ip dhcp snooping information option](#)
- [ip dhcp snooping limit rate](#)
- [ip dhcp snooping trust](#)
- [ip dhcp snooping vlan](#)

# show ip dhcp snooping binding

To display the DHCP snooping binding entries, use the **show ip dhcp snooping binding** command.

```
show ip dhcp snooping binding [ip-address] [mac-address] [vlan vlan_num]
[interface interface_num]
```

Syntax Description	<i>ip-address</i>	(Optional) IP address for the binding entries.
	<i>mac-address</i>	(Optional) MAC address for the binding entries.
	<b>vlan</b> <i>vlan_num</i>	(Optional) Specifies a VLAN.
	<b>interface</b> <i>interface_num</i>	(Optional) Specifies an interface.

**Defaults** If no argument is specified, the switch will display the entire DHCP snooping binding table.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** DHCP snooping is enabled on a VLAN only if both the global snooping and the VLAN snooping are enabled.

To configure a range of VLANs, use the optional *last\_vlan* argument to specify the end of the VLAN range.

**Examples** This example shows how to display the DHCP snooping binding entries for a switch:

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

MacAddress	IP Address	Lease (seconds)	Type	VLAN	Interface
0000.0100.0201	10.0.0.1	1600	dhcp-snooping	100	FastEthernet3/1

```
Switch#
```

This example shows how to display an IP address for DHCP snooping binding entries:

```
Switch# show ip dhcp snooping binding 172.100.101.102
```

MacAddress	IP Address	Lease (seconds)	Type	VLAN	Interface
0000.0100.0201	172.100.101.102	1600	dhcp-snooping	100	FastEthernet3/1

```
Switch#
```

## ■ show ip dhcp snooping binding

This example shows how to display the MAC address for the DHCP snooping binding entries:

```
Switch# show ip dhcp snooping binding 55.5.5.2 0002.b33f.3d5f
```

MacAddress	IpAddress	Lease(sec)	Type	VLAN	Interface
00:02:B3:3F:3D:5F	55.5.5.2	492	dhcp-snooping	99	FastEthernet6/36

This example shows how to display the DHCP snooping binding entries' MAC address for a specific VLAN:

```
Switch# show ip dhcp snooping binding 55.5.5.2 0002.b33f.3d5f vlan 99
```

MacAddress	IpAddress	Lease(sec)	Type	VLAN	Interface
00:02:B3:3F:3D:5F	55.5.5.2	479	dhcp-snooping	99	FastEthernet6/36

This example shows how to display the dynamic DHCP snooping binding entries:

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

MacAddress	IP Address	Lease (seconds)	Type	VLAN	Interface
0000.0100.0201	10.0.0.1	1600	dhcp-snooping	100	FastEthernet3/1

This example shows how to display the DHCP snooping binding entries on VLAN 100:

```
Switch# show ip dhcp snooping binding vlan 100'
```

MacAddress	IP Address	Lease (seconds)	Type	VLAN	Interface
0000.0100.0201	10.0.0.1	1600	dhcp-snooping	100	FastEthernet3/1

This example shows how to display the DHCP snooping binding entries on Ethernet interface 0/1:

```
Switch# show ip dhcp snooping binding interface fastethernet3/1
```

MacAddress	IP Address	Lease (seconds)	Type	VLAN	Interface
0000.0100.0201	10.0.0.1	1600	dhcp-snooping	100	FastEthernet3/1

Table 2-19 describes the fields in the **show ip dhcp snooping** command output.

**Table 2-19** *show ip dhcp snooping Command Output*

Field	Description
Mac Address	Client hardware MAC address.
IP Address	Client IP address assigned from the DHCP server.
Lease (seconds)	IP address lease time.
Type	Binding type; statically configured from CLI or dynamically learned.
VLAN	VLAN number of the client interface.
Interface	Interface that connects to the DHCP client host.

---

Related Commands

[ip dhcp snooping information option](#)  
[ip dhcp snooping limit rate](#)  
[ip dhcp snooping trust](#)  
[ip igmp snooping](#)  
[ip igmp snooping vlan](#)

# show ip dhcp snooping database

To display the status of the DHCP snooping database agent, use the **show ip dhcp snooping database** command.

## show ip dhcp snooping database [detail]

Syntax Description	<b>detail</b> (Optional) Provides additional operating state and statistics information.
--------------------	--

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

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(19)EW	Added support of state and statistics information.

## Examples

This example shows how to display the DHCP snooping database:

```
Switch# show ip dhcp snooping database
Agent URL :
Write delay Timer : 300 seconds
Abort Timer : 300 seconds

Agent Running : No
Delay Timer Expiry : Not Running
Abort Timer Expiry : Not Running

Last Succeeded Time : None
Last Failed Time : None
Last Failed Reason : No failure recorded.

Total Attempts      :          0   Startup Failures :          0
Successful Transfers :          0   Failed Transfers :          0
Successful Reads    :          0   Failed Reads    :          0
Successful Writes   :          0   Failed Writes   :          0
Media Failures      :          0

Switch#
```

This example shows how to view additional operating statistics:

```
Switch# show ip dhcp snooping database detail
Agent URL : tftp://10.1.1.1/directory/file
Write delay Timer : 300 seconds
Abort Timer : 300 seconds

Agent Running : No
Delay Timer Expiry : 7 (00:00:07)
Abort Timer Expiry : Not Running
```

```

Last Succeeded Time : None
Last Failed Time : 17:14:25 UTC Sat Jul 7 2001
Last Failed Reason : Unable to access URL.

Total Attempts      :      21   Startup Failures :      0
Successful Transfers :      0   Failed Transfers :     21
Successful Reads    :      0   Failed Reads   :      0
Successful Writes   :      0   Failed Writes  :     21
Media Failures      :      0

First successful access: Read

Last ignored bindings counters :
Binding Collisions   :      0   Expired leases   :      0
Invalid interfaces   :      0   Unsupported vlans :      0
Parse failures       :      0

Last Ignored Time : None

Total ignored bindings counters:
Binding Collisions   :      0   Expired leases   :      0
Invalid interfaces   :      0   Unsupported vlans :      0
Parse failures       :      0

Switch#

```

**Related Commands**

[ip dhcp snooping](#)  
[ip dhcp snooping database](#)  
[ip dhcp snooping information option](#)  
[ip dhcp snooping limit rate](#)  
[ip dhcp snooping trust](#)  
[ip dhcp snooping vlan](#)

# show ip igmp interface

To view IP IGMP interface status and configuration information, use the **show ip igmp interface** command.

**show ip igmp interface** [**fastethernet** *slot/port* | **gigabitethernet** *slot/port* | **tengigabitethernet** *slot/port* | **null** *interface-number* | **vlan** *vlan\_id*]

Syntax Description	<b>fastethernet</b> <i>slot/port</i>	(Optional) Specifies the Fast Ethernet interface and the number of the slot and port.
	<b>gigabitethernet</b> <i>slot/port</i>	(Optional) Specifies the Gigabit Ethernet interface and the number of the slot and port; valid values are from 1 to 9.
	<b>tengigabitethernet</b> <i>slot/port</i>	(Optional) Specifies the 10-Gigabit Ethernet interface and the number of the slot and port; valid values are from 1 to 2.
	<b>null</b> <i>interface-number</i>	(Optional) Specifies the null interface and the number of the interface; the only valid value is <b>0</b> .
	<b>vlan</b> <i>vlan_id</i>	(Optional) Specifies the VLAN and the number of the VLAN; valid values are from 1 to 4094.

**Defaults** If you do not specify a VLAN, information for VLAN 1 is shown.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Added support for extended VLAN addresses.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

**Usage Guidelines** If you omit the optional arguments, the **show ip igmp interface** command displays information about all interfaces.

**Examples** This example shows how to view IGMP information for VLAN 200:

```
Switch# show ip igmp interface vlan 200
IGMP snooping is globally enabled
IGMP snooping is enabled on this Vlan
IGMP snooping immediate-leave is disabled on this Vlan
IGMP snooping mrouter learn mode is pim-dvmrp on this Vlan
IGMP snooping is running in IGMP-ONLY mode on this VLAN
Switch#
```



---

Related Commands

[clear ip igmp group](#)  
[show ip igmp snooping mrouter](#)

# show ip igmp profile

To view all configured IGMP profiles or a specified IGMP profile, use the **show ip igmp profile** privileged EXEC command.

**show ip igmp profile** [*profile number*]

Syntax Description	<i>profile number</i> (Optional) IGMP profile number to be displayed; valid ranges are from 1 to 4294967295.
--------------------	--

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

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

Command History	Release	Modification
	12.1(11b)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	If no profile number is entered, all IGMP profiles are displayed.
------------------	---

Examples	This example shows how to display IGMP profile 40:
----------	--

```
Switch# show ip igmp profile 40
IGMP Profile 40
  permit
  range 233.1.1.1 233.255.255.255
Switch#
```

This example shows how to display all IGMP profiles:

```
Switch# show ip igmp profile
IGMP Profile 3
  range 230.9.9.0 230.9.9.0
IGMP Profile 4
  permit
  range 229.9.9.0 229.255.255.255
Switch#
```

Related Commands	<a href="#">ip igmp profile</a>
------------------	---------------------------------

# show ip igmp snooping

To display information on dynamically learned and manually configured VLAN switch interfaces, use the **show ip igmp snooping** command.

**show ip igmp snooping** [**querier** | **groups** | **mrouter**] [**vlan** *vlan\_id*] *a.b.c.d* [*summary* | *sources* | *hosts*] [*count*]

Syntax Description	
<b>querier</b>	(Optional) Specifies that the display will contain IP address and version information.
<b>groups</b>	(Optional) Specifies that the display will list VLAN members sorted by group IP addresses.
<b>mrouter</b>	(Optional) Specifies that the display will contain information on dynamically learned and manually configured multicast switch interfaces.
<b>vlan</b> <i>vlan_id</i>	(Optional) Specifies a VLAN; valid values are from 1 to 1001 and from 1006 to 4094.
<i>a.b.c.d</i>	Group or multicast IP address.
<b>summary</b>	(Optional) Specifies a display of detailed information for a v2 or v3 group.
<b>sources</b>	(Optional) Specifies a list of the source IPs for the specified group.
<b>hosts</b>	(Optional) Specifies a list of the host IPs for the specified group.
<b>count</b>	(Optional) Specifies a display of the total number of group addresses learned by the system on a global or per-VLAN basis.

**Defaults** This command has no default settings.

**Command Modes** EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(19)EW	Support for extended addressing was added.
	12.1(20)EW	Added support to display configuration state for IGMPv3 explicit host tracking.

**Usage Guidelines** You can also use the **show mac-address-table multicast** command to display the entries in the MAC address table for a VLAN that has IGMP snooping enabled.

You can display IGMP snooping information for VLAN interfaces by entering the **show ip igmp snooping** command.

**Examples**

This example shows how to display the global snooping information on the switch:

```
Switch# show ip igmp snooping
Global IGMP Snooping configuration:
-----
IGMP snooping           : Enabled
IGMPv3 snooping         : Enabled
Report suppression      : Enabled
TCN solicit query       : Disabled
TCN flood query count   : 2

Vlan 1:
-----
IGMP snooping           : Enabled
IGMPv2 immediate leave  : Disabled
Explicit host tracking   : Enabled
Multicast router learning mode : pim-dvmrp
CGMP interoperability mode : IGMP_ONLY

Vlan 2:
-----
IGMP snooping           : Enabled
IGMPv2 immediate leave  : Disabled
Explicit host tracking   : Enabled
Multicast router learning mode : pim-dvmrp
CGMP interoperability mode : IGMP_ONLY
Switch>
```

This example shows how to display the snooping information on VLAN 2:

```
Switch# show ip igmp snooping vlan 2
Global IGMP Snooping configuration:
-----
IGMP snooping           : Enabled
IGMPv3 snooping         : Enabled
Report suppression      : Enabled
TCN solicit query       : Disabled
TCN flood query count   : 2

Vlan 2:
-----
IGMP snooping           : Enabled
IGMPv2 immediate leave  : Disabled
Explicit host tracking   : Enabled
Multicast router learning mode : pim-dvmrp
CGMP interoperability mode : IGMP_ONLY
Switch>
```

This example shows how to display IGMP querier information for all VLANs on a switch:

```
Switch# show ip igmp snooping querier
Vlan      IP Address      IGMP Version      Port
-----
2         10.10.10.1       v2                 Router
3         172.20.50.22    v3                 Fa3/15
Switch>
```

This example shows how to display IGMP querier information for VLAN 5 when running IGMPv2:

```
Switch# show ip igmp snooping querier vlan 5
IP address           :5.5.5.10
IGMP version         :v2
Port                 :Fa3/1
Max response time    :10s
Switch>
```

This example shows how to display IGMP querier information for VLAN 5 when running IGMPv3:

```
Switch# show ip igmp snooping querier vlan 5
IP address           :5.5.5.10
IGMP version         :v3
Port                 :Fa3/1
Max response time    :10s
Query interval       :60s
Robustness variable  :2
Switch>
```

This example shows how to display snooping information for a specific group:

```
Switch# show ip igmp snooping group
```

Vlan	Group	Version	Ports
2	224.0.1.40	v3	Router
2	224.2.2.2	v3	Fa6/2

```
Switch>
```

This example shows how to display the group's host types and ports in VLAN 1:

```
Switch# show ip igmp snooping group vlan 1
```

Vlan	Group	Host Type	Ports
1	229.2.3.4	v3	fa2/1 fa2/3
1	224.2.2.2	v3	Fa6/2

```
Switch>
```

This example shows how to display the group's host types and ports in VLAN 1:

```
Switch# show ip igmp snooping group vlan 10 226.6.6.7
```

Vlan	Group	Version	Ports
10	226.6.6.7	v3	Fa7/13, Fa7/14

```
Switch>
```

This example shows how to display the current state of a group with respect to a source IP address:

```
Switch# show ip igmp snooping group vlan 10 226.6.6.7 sources
Source information for group 226.6.6.7:
Timers: Expired sources are deleted on next IGMP General Query
```

SourceIP	Expires	Uptime	Inc Hosts	Exc Hosts
2.0.0.1	00:03:04	00:03:48	2	0
2.0.0.2	00:03:04	00:02:07	2	0

```
Switch>
```

## ■ show ip igmp snooping

This example shows how to display the current state of a group with respect to a host MAC address:

```
Switch# show ip igmp snooping group vlan 10 226.6.6.7 hosts
IGMPv3 host information for group 226.6.6.7
Timers: Expired hosts are deleted on next IGMP General Query

Host (MAC/IP)  Filter mode    Expires    Uptime     # Sources
-----
175.1.0.29     INCLUDE      stopped    00:00:51   2
175.2.0.30     INCLUDE      stopped    00:04:14   2
Switch>
```

This example shows how to display summary information for a v3 group:

```
Switch# show ip igmp snooping group vlan 10 226.6.6.7 summary
Group Address (Vlan 10)      : 226.6.6.7
Host type                    : v3
Member Ports                 : Fa7/13, Fa7/14
Filter mode                  : INCLUDE
Expires                      : stopped
Sources                      : 2
Reporters (Include/Exclude) : 2/0
Switch>
```

This example shows how to display multicast router information for VLAN 1:

```
Switch# show ip igmp snooping mrouter vlan 1
vlan      ports
-----+-----
1         Gi1/1,Gi2/1,Fa3/48,Router
Switch#
```

This example shows how to display the total number of group addresses learned by the system globally:

```
Switch# show ip igmp snooping group count
Total number of groups: 54
Switch>
```

This example shows how to display the total number of group addresses learned on VLAN 5:

```
Switch# show ip igmp snooping group vlan 5 count
Total number of groups: 30
Switch>
```

## Related Commands

- [ip igmp snooping](#)
- [ip igmp snooping vlan immediate-leave](#)
- [ip igmp snooping vlan mrouter](#)
- [ip igmp snooping vlan static](#)
- [show ip igmp interface](#)
- [show ip igmp snooping mrouter](#)
- [show mac-address-table multicast](#)

# show ip igmp snooping membership

To display host membership information, use the **show ip igmp snooping membership** command.

**show ip igmp snooping membership** [**interface** *interface\_num*] [**vlan** *vlan\_id*]  
 [**reporter** *a.b.c.d*] [**source** *a.b.c.d* **group** *a.b.c.d*]

Syntax Description	<b>interface</b> <i>interface_num</i>	(Optional) Displays IP address and version information of an interface.
	<b>vlan</b> <i>vlan_id</i>	(Optional) Displays VLAN members sorted by group IP address of a VLAN; valid values are from 1 to 1001 and from 1006 to 4094.
	<b>reporter</b> <i>a.b.c.d</i>	(Optional) Displays membership information for a specified reporter.
	<b>source</b> <i>a.b.c.d</i>	(Optional) Specifies a reporter, source, or group IP address.
	<b>group</b> <i>a.b.c.d</i>	(Optional) Displays all members of a channel (source, group), sorted by interface or VLAN.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(20)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

**Usage Guidelines** This command is valid only if explicit host tracking is enabled on the switch.

**Examples** This example shows how to display host membership for the Gigabit Ethernet interface 4/1:

```
Switch# show ip igmp snooping membership interface gigabitethernet4/1
#channels: 5
#hosts : 1
Source/Group Interface Reporter Uptime Last-Join Last-Leave
40.40.40.2/224.10.10.10 Gi4/1 20.20.20.20 00:23:37 00:06:50 00:20:30
40.40.40.4/224.10.10.10Gi4/1 20.20.20.20 00:39:42 00:09:17 -
Switch#
```

This example shows how to display host membership for VLAN 20 and group 224.10.10.10:

```
Switch# show ip igmp snooping membership vlan 20 source 40.40.40.2 group 224.10.10.10
#channels: 5
#hosts : 1
Source/Group Interface Reporter Uptime Last-Join Last-Leave
40.40.40.2/224.10.10.10 Gi4/1 20.20.20.20 00:23:37 00:06:50 00:20:30
Switch#
```

## ■ show ip igmp snooping membership

This example shows how to display host membership information for VLAN 20 and to delete the explicit host tracking:

```
Switch# show ip igmp snooping membership vlan 20
Snooping Membership Summary for Vlan 20
```

```
-----
Total number of channels:5
```

```
Total number of hosts :4
```

Source/Group	Interface	Reporter	Uptime	Last-Join/	Last-Leave
40.0.0.1/224.1.1.1	Fa7/37	0002.4ba0.a4f6	00:00:04	00:00:04 /	-
40.0.0.2/224.1.1.1	Fa7/37	0002.fd80.f770	00:00:17	00:00:17 /	-
40.0.0.3/224.1.1.1	Fa7/36	20.20.20.20	00:00:04	00:00:04 /	-
40.0.0.4/224.1.1.1	Fa7/35	20.20.20.210	00:00:17	00:00:17 /	-
40.0.0.5/224.1.1.1	Fa7/37	0002.fd80.f770	00:00:17	00:00:17 /	-

```
Switch# clear ip igmp snooping membership vlan 20
Switch#
```

### Related Commands

[clear ip igmp snooping membership](#)  
[ip igmp snooping vlan explicit-tracking](#)  
[show ip igmp snooping vlan](#)



# show ip igmp snooping mrouter

To display information on the dynamically learned and manually configured multicast switch interfaces, use the **show ip igmp snooping mrouter** command.

**show ip igmp snooping mrouter** [{vlan *vlan-id*}]

<b>Syntax Description</b>	<b>vlan <i>vlan-id</i></b> (Optional) Specifies a VLAN; valid values are from 1 to 1001 and from 1006 to 4094.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(19)EW	Added support for extended VLAN addresses.

<b>Usage Guidelines</b>	You can also use the <b>show mac-address-table multicast</b> command to display entries in the MAC address table for a VLAN that has IGMP snooping enabled.
	You can display IGMP snooping information for the VLAN interfaces by entering the <b>show ip igmp interface vlan <i>vlan-num</i></b> command.

<b>Examples</b>	This example shows how to display snooping information for a specific VLAN:
-----------------	---

```
Switch# show ip igmp snooping mrouter vlan 1
vlan                ports
-----+-----
1                   Gi1/1, Gi2/1, Fa3/48, Switch
Switch#
```

<b>Related Commands</b>	<b>ip igmp snooping vlan mrouter</b> <b>show ip igmp interface</b> <b>show mac-address-table multicast</b>
-------------------------	--

# show ip igmp snooping vlan

To display information on the dynamically learned and manually configured VLAN switch interfaces, use the **show ip igmp snooping vlan** command.

**show ip igmp snooping vlan** *vlan\_num*

Syntax Description	<i>vlan_num</i> Number of the VLAN; valid values are from 1 to 1001 and from 1006 to 4094.
--------------------	--

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

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended addressing was added.

Usage Guidelines	You can also use the <a href="#">show mac-address-table multicast</a> command to display the entries in the MAC address table for a VLAN that has IGMP snooping enabled.
------------------	--

Examples	This example shows how to display snooping information for a specific VLAN:
----------	---

```
Switch# show ip igmp snooping vlan 2
vlan 2
-----
IGMP snooping is globally enabled
IGMP snooping TCN solicit query is globally enabled
IGMP snooping global TCN flood query count is 2
IGMP snooping is enabled on this Vlan
IGMP snooping immediate-leave is disabled on this Vlan
IGMP snooping mrouter learn mode is pim-dvmrp on this Vlan
IGMP snooping is running in IGMP_ONLY mode on this Vlan
Switch#
```

Related Commands	<a href="#">ip igmp snooping</a> <a href="#">ip igmp snooping vlan immediate-leave</a> <a href="#">ip igmp snooping vlan mrouter</a> <a href="#">ip igmp snooping vlan static</a> <a href="#">show ip igmp interface</a> <a href="#">show ip igmp snooping mrouter</a> <a href="#">show mac-address-table multicast</a>
------------------	---

# show ip interface

To display the usability status of interfaces that are configured for IP, use the **show ip interface** command.

**show ip interface** [*type number*]

## Syntax Description

<i>type</i>	(Optional) Interface type.
<i>number</i>	(Optional) Interface number.

## Defaults

This command has no default settings.

## Command Modes

EXEC

## Command History

Release	Modification
12.2(25)EW	Extended to include the 10-Gigabit Ethernet interface.

## Usage Guidelines

The Cisco IOS software automatically enters a directly connected route in the routing table if the interface is usable. A usable interface is one through which the software can send and receive packets. If the software determines that an interface is not usable, it removes the directly connected routing entry from the routing table. Removing the entry allows the software to use dynamic routing protocols to determine backup routes to the network, if any.

If the interface can provide two-way communication, the line protocol is marked “up.” If the interface hardware is usable, the interface is marked “up.”

If you specify an optional interface type, you see information only on that specific interface.

If you specify no optional arguments, you see information on all the interfaces.

When an asynchronous interface is encapsulated with PPP or Serial Line Internet Protocol (SLIP), IP fast switching is enabled. The **show ip interface** command on an asynchronous interface that is encapsulated with PPP or SLIP displays a message indicating that IP fast switching is enabled.

## Examples

This example shows how to display the usability status for a specific VLAN:

```
Switch# show ip interface vlan 1
Vlan1 is up, line protocol is up
  Internet address is 10.6.58.4/24
  Broadcast address is 255.255.255.255
  Address determined by non-volatile memory
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound access list is not set
  Proxy ARP is enabled
```

## ■ show ip interface

```

Local Proxy ARP is disabled
Security level is default
Split horizon is enabled
ICMP redirects are always sent
ICMP unreachable are always sent
ICMP mask replies are never sent
IP fast switching is enabled
IP fast switching on the same interface is disabled
IP Flow switching is disabled
IP CEF switching is enabled
IP Fast switching turbo vector
IP Normal CEF switching turbo vector
IP multicast fast switching is enabled
IP multicast distributed fast switching is disabled
IP route-cache flags are Fast, CEF
Router Discovery is disabled
IP output packet accounting is disabled
IP access violation accounting is disabled
TCP/IP header compression is disabled
RTP/IP header compression is disabled
Probe proxy name replies are disabled
Policy routing is disabled
Network address translation is disabled
WCCP Redirect outbound is disabled
WCCP Redirect inbound is disabled
WCCP Redirect exclude is disabled
BGP Policy Mapping is disabled
Sampled Netflow is disabled
IP multicast multilayer switching is disabled
Netflow Data Export (hardware) is enabled
Switch#

```

Table 2-20 describes the fields that are shown in the example.

**Table 2-20** *show ip interface Field Descriptions*

Field	Description
Ethernet0 is up	If the interface hardware is usable, the interface is marked “up.” For an interface to be usable, both the interface hardware and line protocol must be up.
line protocol is up	If the interface can provide two-way communication, the line protocol is marked “up.” For an interface to be usable, both the interface hardware and line protocol must be up.
Internet address and subnet mask	IP address and subnet mask of the interface.
Broadcast address	Broadcast address.
Address determined by...	Status of how the IP address of the interface was determined.
MTU	MTU value that is set on the interface.
Helper address	Helper address, if one has been set.
Secondary address	Secondary address, if one has been set.
Directed broadcast forwarding	Status of directed broadcast forwarding.
Multicast groups joined	Multicast groups to which this interface belongs.
Outgoing access list	Status of whether the interface has an outgoing access list set.
Inbound access list	Status of whether the interface has an incoming access list set.

**Table 2-20** *show ip interface Field Descriptions (continued)*

Field	Description
Proxy ARP	Status of whether Proxy Address Resolution Protocol (ARP) is enabled for the interface.
Security level	IP Security Option (IPSO) security level set for this interface.
Split horizon	Status of split horizon.
ICMP redirects	Status of the redirect messages on this interface.
ICMP unreachable	Status of the unreachable messages on this interface.
ICMP mask replies	Status of the mask replies on this interface.
IP fast switching	Status of whether fast switching has been enabled for this interface. Fast switching is typically enabled on serial interfaces, such as this one.
IP SSE switching	Status of the IP silicon switching engine (SSE).
Router Discovery	Status of the discovery process for this interface. It is typically disabled on serial interfaces.
IP output packet accounting	Status of IP accounting for this interface and the threshold (maximum number of entries).
TCP/IP header compression	Status of compression.
Probe proxy name	Status of whether the HP Probe proxy name replies are generated.
WCCP Redirect outbound is enabled	Status of whether packets that are received on an interface are redirected to a cache engine.
WCCP Redirect exclude is disabled	Status of whether packets that are targeted for an interface are excluded from being redirected to a cache engine.
Netflow Data Export (hardware) is enabled	NDE hardware flow status on the interface.

# show ip mfib

To display all active Multicast Forwarding Information Base (MFIB) routes, use the **show ip mfib** command.

**show ip mfib [all | counters | log [n]]**

Syntax Description	<b>all</b>	(Optional) Specifies all routes in the MFIB, including those routes that are used to accelerate fast switching but that are not necessarily in the upper-layer routing protocol table.
	<b>counters</b>	(Optional) Specifies the counts of MFIB-related events. Only nonzero counters are shown.
	<b>log</b>	(Optional) Specifies a log of the most recent number of MFIB-related events. The most recent event is first.
	<b>n</b>	(Optional) Number of events.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The MFIB table contains a set of IP multicast routes; each route in the MFIB table contains several flags that associate to the route.

The route flags indicate how a packet that matches a route is forwarded. For example, the IC flag on an MFIB route indicates that some process on the switch needs to receive a copy of the packet. These flags are associated with MFIB routes:

- Internal Copy (IC) flag—Set on a route when a process on the switch needs to receive a copy of all packets matching the specified route.
- Signaling (S) flag—Set on a route when a switch process needs notification that a packet matching the route is received. In the expected behavior, the protocol code updates the MFIB state in response to having received a packet on a signaling interface.
- Connected (C) flag—When set on a route, the C flag has the same meaning as the S flag, except that the C flag indicates that only packets sent by directly connected hosts to the route should be signaled to a protocol process.

A route can also have a set of flags associated with one or more interfaces. For an (S,G) route, the flags on interface 1 indicate how the ingress packets should be treated and whether packets matching the route should be forwarded onto interface 1. These per-interface flags are associated with the MFIB routes:

- Accepting (A)—Set on the RPF interface when a packet that arrives on the interface and that is marked as Accepting (A) is forwarded to all Forwarding (F) interfaces.

- Forwarding (F)—Used with the A flag as described above. The set of forwarding interfaces together form a multicast olist or output interface list.
- Signaling (S)—Set on an interface when a multicast routing protocol process in Cisco IOS needs to be notified of ingress packets on that interface.
- Not Platform (NP) fast-switched—Used with the F flag. A forwarding interface is also marked as Not Platform fast-switched whenever that output interface cannot be fast-switched by the platform hardware and requires software forwarding.

For example, the Catalyst 4006 switch with Supervisor Engine III cannot switch tunnel interfaces in hardware so these interfaces are marked with the NP flag. When an NP interface is associated with a route, a copy of every ingress packet arriving on an Accepting interface is sent to the switch software forwarding path for software replication and then forwarded to the NP interface.

## Examples

This example shows how to display all active MFIB routes:

```
Switch# show ip mfib
IP Multicast Forwarding Information Base
Entry Flags: C - Directly Connected, S - Signal,
              IC - Internal Copy
Interface Flags: A - Accept, F - Forward, NS - Signal,
                 NP - Not platform switched
Packets: Fast/Partial/Slow Bytes: Fast/Partial/Slow:
(171.69.10.13, 224.0.1.40), flags (IC)
  Packets: 2292/2292/0, Bytes: 518803/0/518803
  Vlan7 (A)
  Vlan100 (F NS)
  Vlan105 (F NS)
(*, 224.0.1.60), flags ()
  Packets: 2292/0/0, Bytes: 518803/0/0
  Vlan7 (A NS)
(*, 224.0.1.75), flags ()
  Vlan7 (A NS)
(10.34.2.92, 239.192.128.80), flags ()
  Packets: 24579/100/0, 2113788/15000/0 bytes
  Vlan7 (F NS)
  Vlan100 (A)
(*, 239.193.100.70), flags ()
  Packets: 1/0/0, 1500/0/0 bytes
  Vlan7 (A)
Switch#
```

## Related Commands

[clear ip mfib counters](#)

# show ip mfib fastdrop

To show all currently active fast-drop entries and to show whether fast drop is enabled, use the **show ip mfib fastdrop** command.

**show ip mfib fastdrop**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to display all currently active fast-drop entries and whether fast drop is enabled.
-----------------	--

```
Switch# show ip mfib fastdrop
MFIB fastdrop is enabled.
MFIB fast-dropped flows:
(10.0.0.1, 224.1.2.3, Vlan9 ) 00:01:32
(10.1.0.2, 224.1.2.3, Vlan9 ) 00:02:30
(1.2.3.4, 225.6.7.8, Vlan3) 00:01:50
Switch#
```

<b>Related Commands</b>	<a href="#">clear ip mfib fastdrop</a>
-------------------------	--



# show ip mroute

To display IP multicast routing table information, use the **show ip mroute** command.

```
show ip mroute [interface_type slot/port | host_name | host_address [source] | active [kbits |
interface_type num] | count | pruned | static | summary]
```

Syntax Description	
<i>interface_type slot/port</i>	(Optional) Interface type and number of the slot and port; valid values for <i>interface type</i> are <b>fastethernet</b> , <b>gigabitethernet</b> , <b>tengigabitethernet</b> , <b>null</b> , and <b>vlan</b> .
<i>host_name</i>	(Optional) Name or IP address as defined in the DNS hosts table.
<i>host_address source</i>	(Optional) IP address or name of a multicast source.
<b>active</b>	(Optional) Displays the rate that active sources are sending to multicast groups.
<i>kbits</i>	(Optional) Minimum rate at which active sources are sending to multicast groups; active sources sending at this rate or greater will be displayed. Valid values are from 1 to 4294967295 kbits.
<i>interface_type num</i>	
<b>count</b>	(Optional) Displays the route and packet count information.
<b>pruned</b>	(Optional) Displays the pruned routes.
<b>static</b>	(Optional) Displays the static multicast routes.
<b>summary</b>	(Optional) Displays a one-line, abbreviated summary of each entry in the IP multicast routing table.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

**Usage Guidelines** If you omit all the optional arguments and keywords, the **show ip mroute** command displays all the entries in the IP multicast routing table.

The **show ip mroute active kbits** command displays all the sources sending at a rate greater than or equal to *kbits*.

The multicast routing table is populated by creating source, group (S,G) entries from star, group (\*,G) entries. The star refers to all source addresses, the “S” refers to a single source address, and the “G” refers to the destination multicast group address. In creating (S,G) entries, the software uses the best path to that destination group found in the unicast routing table (through Reverse Path Forwarding (RPF)).

**Examples**

This example shows how to display all the entries in the IP multicast routing table:

```
Switch# show ip mroute

IP Multicast Routing Table
Flags:D - Dense, S - Sparse, s - SSM Group, C - Connected, L - Local,
      P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
      J - Join SPT, M - MSDP created entry, X - Proxy Join Timer Running
      A - Advertised via MSDP, U - URD, I - Received Source Specific Host
      Report
Outgoing interface flags:H - Hardware switched
Timers:Uptime/Expires
Interface state:Interface, Next-Hop or VCD, State/Mode

(*, 230.13.13.1), 00:16:41/00:00:00, RP 10.15.1.20, flags:SJC
  Incoming interface:GigabitEthernet4/8, RPF nbr 10.15.1.20
  Outgoing interface list:

    GigabitEthernet4/9, Forward/Sparse-Dense, 00:16:41/00:00:00, H

(*, 230.13.13.2), 00:16:41/00:00:00, RP 10.15.1.20, flags:SJC
  Incoming interface:GigabitEthernet4/8, RPF nbr 10.15.1.20, RPF-MFD
  Outgoing interface list:
    GigabitEthernet4/9, Forward/Sparse-Dense, 00:16:41/00:00:00, H

(10.20.1.15, 230.13.13.1), 00:14:31/00:01:40, flags:CJT
  Incoming interface:GigabitEthernet4/8, RPF nbr 10.15.1.20, RPF-MFD
  Outgoing interface list:
    GigabitEthernet4/9, Forward/Sparse-Dense, 00:14:31/00:00:00, H
(132.206.72.28, 224.2.136.89), 00:14:31/00:01:40, flags:CJT
  Incoming interface:GigabitEthernet4/8, RPF nbr 10.15.1.20, RPF-MFD

  Outgoing interface list:Null
Switch#
```

This example shows how to display the rate that the active sources are sending to the multicast groups and to display only the active sources that are sending at greater than the default rate:

```
Switch# show ip mroute active

Active IP Multicast Sources - sending > = 4 kbps

Group: 224.2.127.254, (sdr.cisco.com)
  Source: 146.137.28.69 (mbone.ipd.anl.gov)
    Rate: 1 pps/4 kbps(1sec), 4 kbps(last 1 secs), 4 kbps(life avg)

Group: 224.2.201.241, ACM 97
  Source: 130.129.52.160 (webcast3-e1.acm97.interop.net)
    Rate: 9 pps/93 kbps(1sec), 145 kbps(last 20 secs), 85 kbps(life avg)

Group: 224.2.207.215, ACM 97
  Source: 130.129.52.160 (webcast3-e1.acm97.interop.net)
    Rate: 3 pps/31 kbps(1sec), 63 kbps(last 19 secs), 65 kbps(life avg)
Switch#
```

This example shows how to display route and packet count information:

```
Switch# show ip mroute count
IP Multicast Statistics
56 routes using 28552 bytes of memory
13 groups, 3.30 average sources per group
Forwarding Counts:Pkt Count/Pkts per second/Avg Pkt Size/Kilobits per second
```

```

Other counts:Total/RPF failed/Other drops(OIF-null, rate-limit etc)

Group:224.2.136.89, Source count:1, Group pkt count:29051
Source:132.206.72.28/32, Forwarding:29051/-278/1186/0, Other:85724/8/56665
Switch#

```

This example shows how to display summary information:

```

Switch# show ip mroute summary
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, s - SSM Group, C - Connected, L - Local,
       P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
       J - Join SPT, M - MSDP created entry, X - Proxy Join Timer Running
       A - Advertised via MSDP, U - URD, I - Received Source Specific Host
       Report
Outgoing interface flags: H - Hardware switched
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

Switch#

```

Table 2-21 describes the fields shown in the output.

**Table 2-21** *show ip mroute Field Descriptions*

Field	Description
Flags:	Information about the entry.
D - Dense	Entry is operating in dense mode.
S - Sparse	Entry is operating in sparse mode.
s - SSM Group	Entry is a member of an SSM group.
C - Connected	Member of the multicast group is present on the directly connected interface.
L - Local	Switch is a member of the multicast group.
P - Pruned	Route has been pruned. This information is retained in case a downstream member wants to join the source.
R - Rp-bit set	Status of the (S,G) entry; is the (S,G) entry pointing toward the RP. The R - Rp-bit set is typically a prune state along the shared tree for a particular source.
F - Register flag	Status of the software; indicates if the software is registered for a multicast source.
T - SPT-bit set	Status of the packets; indicates if the packets been received on the shortest path source tree.

Table 2-21 *show ip mroute Field Descriptions (continued)*

Field	Description
J - Join SPT	<p>For (*, G) entries, indicates that the rate of traffic flowing down the shared tree is exceeding the SPT-Threshold set for the group. (The default SPT-Threshold setting is 0 kbps.) When the J - Join SPT flag is set, the next (S,G) packet received down the shared tree triggers an (S,G) join in the direction of the source causing the switch to join the source tree.</p> <p>For (S, G) entries, indicates that the entry was created because the SPT-Threshold for the group was exceeded. When the J - Join SPT flag is set for (S,G) entries, the switch monitors the traffic rate on the source tree and attempts to switch back to the shared tree for this source if the traffic rate on the source tree falls below the group's SPT-Threshold for more than one minute.</p> <p>The switch measures the traffic rate on the shared tree and compares the measured rate to the group's SPT-Threshold once every second. If the traffic rate exceeds the SPT-Threshold, the J- Join SPT flag is set on the (*, G) entry until the next measurement of the traffic rate. The flag is cleared when the next packet arrives on the shared tree and a new measurement interval is started.</p> <p>If the default SPT-Threshold value of 0 Kbps is used for the group, the J- Join SPT flag is always set on (*, G) entries and is never cleared. When the default SPT-Threshold value is used, the switch immediately switches to the shortest-path tree when traffic from a new source is received.</p>
Outgoing interface flag:	Information about the outgoing entry.
H - Hardware switched	Entry is hardware switched.
Timer:	Uptime/Expires.
Interface state:	Interface, Next-Hop or VCD, State/Mode.
(*, 224.0.255.1) (198.92.37.100/32, 224.0.255.1)	<p>Entry in the IP multicast routing table. The entry consists of the IP address of the source switch followed by the IP address of the multicast group. An asterisk (*) in place of the source switch indicates all sources.</p> <p>Entries in the first format are referred to as (*,G) or "star comma G" entries. Entries in the second format are referred to as (S,G) or "S comma G" entries. (*,G) entries are used to build (S,G) entries.</p>
uptime	How long (in hours, minutes, and seconds) the entry has been in the IP multicast routing table.
expires	How long (in hours, minutes, and seconds) until the entry is removed from the IP multicast routing table on the outgoing interface.

**Table 2-21** *show ip mroute Field Descriptions (continued)*

Field	Description
RP	Address of the RP switch. For switches and access servers operating in sparse mode, this address is always 0.0.0.0.
flags:	Information about the entry.
Incoming interface	Expected interface for a multicast packet from the source. If the packet is not received on this interface, it is discarded.
RPF neighbor	IP address of the upstream switch to the source. “Tunneling” indicates that this switch is sending data to the RP encapsulated in Register packets. The hexadecimal number in parentheses indicates to which RP it is registering. Each bit indicates a different RP if multiple RPs per group are used.
DVMRP or Mroute	Status of whether the RPF information is obtained from the DVMRP routing table or the static mroutes configuration.
Outgoing interface list	Interfaces through which packets are forwarded. When the <b>ip pim nbma-mode</b> command is enabled on the interface, the IP address of the PIM neighbor is also displayed.
Ethernet0	Name and number of the outgoing interface.
Next hop or VCD	Next hop specifies downstream neighbor’s IP address. VCD specifies the virtual circuit descriptor number. VCD0 indicates that the group is using the static-map virtual circuit.
Forward/Dense	Status of the packets; indicates if they are they forwarded on the interface if there are no restrictions due to access lists or the TTL threshold. Following the slash (/), mode in which the interface is operating (dense or sparse).
Forward/Sparse	Sparse mode interface is in forward mode.
time/time (uptime/expiration time)	Per interface, how long (in hours, minutes, and seconds) the entry has been in the IP multicast routing table. Following the slash (/), how long (in hours, minutes, and seconds) until the entry is removed from the IP multicast routing table.

**Related Commands****ip multicast-routing** (refer to Cisco IOS documentation)**ip pim** (refer to Cisco IOS documentation)

# show ip source binding

To display IP source bindings that are configured on the system, use the **show ip source binding** EXEC command.

**show ip source binding** [*ip-address*] [*mac-address*] [**dhcp-snooping** | **static**] [**vlan** *vlan-id*]  
[**interface** *interface-name*]

Syntax Description	<i>ip-address</i>	(Optional) Binding IP address.
	<i>mac-address</i>	(Optional) Binding MAC address.
	<b>dhcp-snooping</b>	(Optional) DHCP-snooping type binding.
	<b>static</b>	(Optional) Statically configured binding.
	<b>vlan</b> <i>vlan-id</i>	(Optional) VLAN number.
	<b>interface</b> <i>interface-name</i>	(Optional) Binding interface.

**Defaults** Displays both static and DHCP snooping bindings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The optional parameters filter the display output result.

**Examples** This example shows how to display the IP source bindings:

```
Switch# show ip source binding
MacAddress      IpAddress      Lease(sec)  Type           VLAN  Interface
-----
00:00:00:0A:00:0B  11.0.0.1      infinite    static         10    FastEthernet6/10

Switch#
```

This example shows how to display the static IP binding entry of IP address 11.0.01:

```
Switch# show ip source binding 11.0.0.1 0000.000A.000B static vlan 10 interface Fa6/10
show ip source binding 11.0.0.1 0000.000A.000B static vlan 10 interface Fa6/10
MacAddress      IpAddress      Lease(sec)  Type           VLAN  Interface
-----
00:00:00:0A:00:0B  11.0.0.1      infinite    static         10    FastEthernet6/10

Switch#
```

**Related Commands** [ip source binding](#)

# show ip verify source

To display the IP source guard configuration and filters on a particular interface, use the **show ip verify source** command.

**show ip verify source** [**interface** *interface\_num*]

<b>Syntax Description</b>	<b>interface</b> <i>interface_num</i> (Optional) Specifies an interface.				
<b>Defaults</b>	This command has no default settings.				
<b>Command Modes</b>	Privileged EXEC				
<b>Command History</b>	<table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>12.1(19)EW</td><td>Support for this command was introduced on the Catalyst 4500 series switch.</td></tr> </table>	Release	Modification	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Release	Modification				
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.				

## Examples

These examples show how to display the IP source guard configuration and filters on a particular interface with the **show ip verify source interface** command:

- This output appears when DHCP snooping is enabled on VLANs 10–20, interface fa6/1 has IP source filter mode that is configured as IP, and an existing IP address binding 10.0.0.1 is on VLAN 10:

Interface	Filter-type	Filter-mode	IP-address	Mac-address	Vlan
-----	-----	-----	-----	-----	-----
fa6/1	ip	active	10.0.0.1		10
fa6/1	ip	active	deny-all		11-20



**Note** The second entry shows that a default PVACL (deny all IP traffic) is installed on the port for those snooping-enabled VLANs that do not have a valid IP source binding.

- This output appears when you enter the **show ip verify source interface fa6/2** command and DHCP snooping is enabled on VLANs 10–20, interface fa6/1 has IP source filter mode that is configured as IP, and there is an existing IP address binding 10.0.0.1 on VLAN 10:

Interface	Filter-type	Filter-mode	IP-address	Mac-address	Vlan
-----	-----	-----	-----	-----	-----
fa6/2	ip	inactive-trust-port			

- This output appears when you enter the **show ip verify source interface fa6/3** command and the interface fa6/3 does not have a VLAN enabled for DHCP snooping:

Interface	Filter-type	Filter-mode	IP-address	Mac-address	Vlan
-----	-----	-----	-----	-----	-----
fa6/3	ip	inactive-no-snooping-vlan			

- This output appears when you enter the **show ip verify source interface fa6/4** command and the interface fa6/4 has an IP source filter mode that is configured as IP MAC and the existing IP MAC that binds 10.0.0.2/aaaa.bbbb.cccc on VLAN 10 and 11.0.0.1/aaaa.bbbb.cccd on VLAN 11:

Interface	Filter-type	Filter-mode	IP-address	Mac-address	Vlan
-----	-----	-----	-----	-----	-----
fa6/4	ip-mac	active	10.0.0.2	aaaa.bbbb.cccc	10
fa6/4	ip-mac	active	11.0.0.1	aaaa.bbbb.cccd	11
fa6/4	ip-mac	active	deny-all	deny-all	12-20

- This output appears when you enter the **show ip verify source interface fa6/5** command and the interface fa6/5 has IP source filter mode that is configured as IP MAC and existing IP MAC binding 10.0.0.3/aaaa.bbbb.ccce on VLAN 10, but port security is not enabled on fa6/5:

Interface	Filter-type	Filter-mode	IP-address	Mac-address	Vlan
-----	-----	-----	-----	-----	-----
fa6/5	ip-mac	active	10.0.0.3	permit-all	10
fa6/5	ip-mac	active	deny-all	permit-all	11-20



**Note** Enable port security first because the DHCP security MAC filter cannot apply to the port or VLAN.

- This output appears when you enter the **show ip verify source interface fa6/6** command and the interface fa6/6 does not have IP source filter mode that is configured:

DHCP security is not configured on the interface fa6/6.

This example shows how to display all the interfaces on the switch that have DHCP snooping security enabled with the **show ip verify source** command.

The output is an accumulation of per-interface **show** CLIs:

Interface	Filter-type	Filter-mode	IP-address	Mac-address	Vlan
-----	-----	-----	-----	-----	-----
fa6/1	ip	active	10.0.0.1		10
fa6/1	ip	active	deny-all		11-20
fa6/2	ip	inactive-trust-port			
fa6/3	ip	inactive-no-snooping-vlan			
fa6/4	ip-mac	active	10.0.0.2	aaaa.bbbb.cccc	10
fa6/4	ip-mac	active	11.0.0.1	aaaa.bbbb.cccd	11
fa6/4	ip-mac	active	deny-all	deny-all	12-20
fa6/5	ip-mac	active	10.0.0.3	permit-all	10
fa6/5	ip-mac	active	deny-all	permit-all	11-20

#### Related Commands

[ip dhcp snooping information option](#)  
[ip dhcp snooping limit rate](#)  
[ip dhcp snooping trust](#)  
[ip igmp snooping](#)  
[ip igmp snooping vlan](#)  
[ip source binding](#)  
[ip verify source vlan dhcp-snooping](#)  
[show ip source binding](#)



# show ipc

To display IPC information, use the **show ipc** command.

**show ipc {nodes | ports | queue | status}**

Syntax Description	<b>nodes</b>	Displays the participating nodes.
	<b>ports</b>	Displays the local IPC ports.
	<b>queue</b>	Displays the contents of the IPC retransmission queue.
	<b>status</b>	Displays the status of the local IPC server.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display the participating nodes:

```
Switch# show ipc nodes
There are 3 nodes in this IPC realm.
      ID      Type      Name      Last Sent      Last Heard
      10000 Local      IPC Master      0      0
      2010000 Local      GALIOS IPC:Card 1      0      0
      2020000 Ethernet    GALIOS IPC:Card 2      12     26
Switch#
```

This example shows how to display the local IPC ports:

```
Switch# show ipc ports
There are 11 ports defined.
Port ID      Type      Name      (current/peak/total)
      10000.1 unicast   IPC Master:Zone
      10000.2 unicast   IPC Master:Echo
      10000.3 unicast   IPC Master:Control
      10000.4 unicast   Remote TTY Server Port
      10000.5 unicast   GALIOS RF :Active
      index = 0 seat_id = 0x2020000 last sent = 0 heard = 1635 0/1/1635
      10000.6 unicast   GALIOS RED:Active
      index = 0 seat_id = 0x2020000 last sent = 0 heard = 2 0/1/2
      2020000.3 unicast   GALIOS IPC:Card 2:Control
      2020000.4 unicast   GALIOS RFS :Standby
      2020000.5 unicast   Slave: Remote TTY Client Port
      2020000.6 unicast   GALIOS RF :Standby
      2020000.7 unicast   GALIOS RED:Standby
```

```

RPC packets: current/peak/total
                                           0/1/17
Switch#

```

This example shows how to display the contents of the IPC retransmission queue:

```

Switch# show ipc queue
There are 0 IPC messages waiting for acknowledgement in the transmit queue.
There are 0 IPC messages waiting for a response.
There are 0 IPC messages waiting for additional fragments.
There are 0 IPC messages currently on the IPC inboundQ.
There are 0 messages currently in use by the system.
Switch#

```

This example shows how to display the status of the local IPC server:

```

Switch# show ipc status
IPC System Status:

This processor is the IPC master server.

6000 IPC message headers in cache
3363 messages in, 1680 out, 1660 delivered to local port,
1686 acknowledgements received, 1675 sent,
0 NACKS received, 0 sent,
0 messages dropped on input, 0 messages dropped on output
0 no local port, 0 destination unknown, 0 no transport
0 missing callback or queue, 0 duplicate ACKs, 0 retries,
0 message timeouts.
0 ipc_output failures, 0 mtu failures,
0 msg alloc failed, 0 emer msg alloc failed, 0 no origs for RPC replies
0 pak alloc failed, 0 memd alloc failed
0 no hwq, 1 failed opens, 0 hardware errors
No regular dropping of IPC output packets for test purposes
Switch#

```

# show l2protocol-tunnel

To display information about the Layer 2 protocol tunnel ports, use the **show l2protocol-tunnel** command. This command displays information for the interfaces with protocol tunneling enabled.

```
show l2protocol-tunnel [interface interface-id] [summary] | { begin | exclude | include }
                        expression
```

Syntax Description	
<b>interface</b> <i>interface-id</i>	(Optional) Specifies the interface for which protocol tunneling information appears. Valid interfaces are physical ports and port channels; the port channel range is 1 to 64.
<b>summary</b>	(Optional) Displays only Layer 2 protocol summary information.
<b>begin</b>	(Optional) Displays information beginning with the line that matches the <i>expression</i> .
<b>exclude</b>	(Optional) Displays information that excludes lines that match the <i>expression</i> .
<b>include</b>	(Optional) Displays the lines that match the specified <i>expression</i> .
<i>expression</i>	(Optional) Expression in the output to use as a reference point.

Command Modes	User EXEC
---------------	-----------

Command History	Release	Modification
	12.2(18)EW	This command was first introduced on the Catalyst 4500 series switch.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

**Usage Guidelines** After enabling Layer 2 protocol tunneling on an access or 802.1Q tunnel port with the **l2protocol-tunnel** command, you can configure some or all of these parameters:

- Protocol type to be tunneled
- Shutdown threshold
- Drop threshold

If you enter the **show l2protocol-tunnel** [**interface** *interface-id*] command, only information about the active ports on which all the parameters are configured appears.

If you enter the **show l2protocol-tunnel summary** command, only information about the active ports on which some or all of the parameters are configured appears.

Expressions are case sensitive. For example, if you enter | **exclude output**, the lines that contain *output* do not appear, but the lines that contain *Output* appear.

**Examples**

This is an example of output from the **show l2protocol-tunnel** command:

```
Switch> show l2protocol-tunnel
COS for Encapsulated Packets: 5
```

Port	Protocol	Shutdown Threshold	Drop Threshold	Encapsulation Counter	Decapsulation Counter	Drop Counter
Fa0/10	---	----	----	----	----	----
	stp	----	----	9847	1866	0
	vtp	----	----	77	12	0
	pagp	----	----	859	860	0
	lacp	----	----	0	0	0
	udld	----	----	219	211	0
Fa0/11	cdp	1100	----	2356	2350	0
	stp	1100	----	116	13	0
	vtp	1100	----	3	67	0
	pagp	----	900	856	5848	0
	lacp	----	900	0	0	0
	udld	----	900	0	0	0
Fa0/12	cdp	----	----	2356	0	0
	stp	----	----	11787	0	0
	vtp	----	----	81	0	0
	pagp	----	----	0	0	0
	lacp	----	----	849	0	0
	udld	----	----	0	0	0
Fa0/13	cdp	----	----	2356	0	0
	stp	----	----	11788	0	0
	vtp	----	----	81	0	0
	pagp	----	----	0	0	0
	lacp	----	----	849	0	0
	udld	----	----	0	0	0

Switch#

This is an example of output from the **show l2protocol-tunnel summary** command:

```
Switch> show l2protocol-tunnel summary
COS for Encapsulated Packets: 5
```

Port	Protocol	Shutdown Threshold (cdp/stp/vtp) (pagp/lacp/udld)	Drop Threshold (cdp/stp/vtp) (pagp/lacp/udld)	Status
Fa0/10	stp vtp	----/----/----	----/----/----	up
	pagp lacp udld	----/----/----	----/----/----	
Fa0/11	cdp stp vtp	1100/1100/1100	----/----/----	up
	pagp lacp udld	----/----/----	900/ 900/ 900	
Fa0/12	cdp stp vtp	----/----/----	----/----/----	up
	pagp lacp udld	----/----/----	----/----/----	
Fa0/13	cdp stp vtp	----/----/----	----/----/----	up
	pagp lacp udld	----/----/----	----/----/----	
Fa0/14	cdp stp vtp	----/----/----	----/----/----	down
	pagp ---- udld	----/----/----	----/----/----	
Fa0/15	cdp stp vtp	----/----/----	----/----/----	down
	pagp ---- udld	----/----/----	----/----/----	
Fa0/16	cdp stp vtp	----/----/----	----/----/----	down
	pagp lacp udld	----/----/----	----/----/----	
Fa0/17	cdp stp vtp	----/----/----	----/----/----	down
	pagp lacp udld	----/----/----	----/----/----	

Switch#

---

Related Commands

**clear l2protocol-tunnel counter** (refer to Cisco IOS documentation)  
**l2protocol-tunnel**  
**l2protocol-tunnel cos**

# show lacp

To display LACP information, use the **show lacp** command.

**show lacp** [*channel-group*] {**counters** | **internal** | **neighbors** | **sys-id**}

Syntax Description	
<i>channel-group</i>	(Optional) Number of the channel group; valid values are from 1 to 64.
<b>counters</b>	Displays the LACP statistical information.
<b>internal</b>	Displays the internal information.
<b>neighbors</b>	Displays the neighbor information.
<b>sys-id</b>	Displays the LACP system identification.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switches.

**Usage Guidelines** This command is not supported on systems that are configured with a Supervisor Engine I.

If you do not specify a *channel-group* value, all channel groups are displayed.

You can enter the optional *channel-group* value to specify a channel group for all keywords, except the **sys-id** keyword.

**Examples** This example shows how to display LACP statistical information for a specific channel group:

```
Switch# show lacp 1 counters
          LACPDU          Marker          LACPDU
Port      Sent   Recv      Sent   Recv      Pkts Err
-----
Channel group: 1
  Fa4/1      8     15         0     0         3    0
  Fa4/2     14     18         0     0         3    0
  Fa4/3     14     18         0     0         0
  Fa4/4     13     18         0     0         0
Switch#
```

The output displays the following information:

- The LACPDU Sent and Recv columns display the LACPDU sent and received on each specific interface.
- The LACPDU Pkts and Err columns display the marker protocol packets.

This example shows how to display internal information for the interfaces belonging to a specific channel:

```
Switch# show lacp 1 internal
Flags: S - Device sends PDUs at slow rate. F - Device sends PDUs at fast rate.
      A - Device is in Active mode.           P - Device is in Passive mode.

Channel group 1

Port      Flags   State   LACPDU  LACP Port  Admin  Oper   Port   Port
         Interval Priority  Key     Key     Number State
Fa4/1     saC    bndl   30s     32768     100    100    0xc1   0x75
Fa4/2     saC    bndl   30s     32768     100    100    0xc2   0x75
Fa4/3     saC    bndl   30s     32768     100    100    0xc3   0x75
Fa4/4     saC    bndl   30s     32768     100    100    0xc4   0x75
Switch#
```

Table 2-22 lists the output field definitions.

**Table 2-22** *show lacp internal Command Output Fields*

Field	Description
State	State of the specific port at the current moment is displayed; allowed values are as follows: <ul style="list-style-type: none"> <li><i>bndl</i>—Port is attached to an aggregator and bundled with other ports.</li> <li><i>susp</i>—Port is in a suspended state; it is not attached to any aggregator.</li> <li><i>indep</i>—Port is in an independent state (not bundled but able to switch data traffic. In this case, LACP is not running on the partner port).</li> <li><i>hot-sby</i>—Port is in a Hot-standby state.</li> <li><i>down</i>—Port is down.</li> </ul>
LACPDU Interval	Interval setting.
LACP Port Priority	Port priority setting.
Admin Key	Administrative key.
Oper Key	Operator key.
Port Number	Port number.
Port State	State variables for the port encoded as individual bits within a single octet with the following meaning [1]: <ul style="list-style-type: none"> <li><b>bit0</b>: <i>LACP_Activity</i></li> <li><b>bit1</b>: <i>LACP_Timeout</i></li> <li><b>bit2</b>: <i>Aggregation</i></li> <li><b>bit3</b>: <i>Synchronization</i></li> <li><b>bit4</b>: <i>Collecting</i></li> <li><b>bit5</b>: <i>Distributing</i></li> <li><b>bit6</b>: <i>Defaulted</i></li> <li><b>bit7</b>: <i>Expired</i></li> </ul>

This example shows how to display LACP neighbors information for a specific port channel:

```
Switch# show lacp 1 neighbor
Flags: S - Device sends PDUs at slow rate. F - Device sends PDUs at fast rate.
       A - Device is in Active mode.           P - Device is in Passive mode.
```

Channel group 1 neighbors

Port	Partner System ID	Partner Port Number	Age	Flags
Fa4/1	8000,00b0.c23e.d84e	0x81	29s	P
Fa4/2	8000,00b0.c23e.d84e	0x82	0s	P
Fa4/3	8000,00b0.c23e.d84e	0x83	0s	P
Fa4/4	8000,00b0.c23e.d84e	0x84	0s	P

	Port Priority	Admin Key	Oper Key	Port State
Fa4/1	32768	200	200	0x81
Fa4/2	32768	200	200	0x81
Fa4/3	32768	200	200	0x81
Fa4/4	32768	200	200	0x81

Switch#

In the case where no PDUs have been received, the default administrative information is displayed in braces.

This example shows how to display the LACP system identification:

```
Switch> show lacp sys-id
8000,AC-12-34-56-78-90
Switch>
```

The system identification is made up of the system priority and the system MAC address. The first two bytes are the system priority, and the last six bytes are the globally administered individual MAC address associated to the system.

#### Related Commands

[lacp port-priority](#)  
[lacp system-priority](#)



# show mac access-group interface

To display the ACL configuration on a Layer 2 interface, use the **show mac access-group interface** command.

**show mac access-group interface** [*interface interface-number*]

Syntax Description	<i>interface</i>	(Optional) Specifies the interface type; valid values are <b>ethernet</b> , <b>fastethernet</b> , <b>gigabitethernet</b> , <b>tengigabitethernet</b> , <b>pos</b> , <b>atm</b> , <b>port-channel</b> , and <b>ge-wan</b> .
	<i>interface-number</i>	(Optional) Specifies the port number.

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

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

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	The valid values for the port number depend on the chassis used.
------------------	--

Examples	This example shows how to display the ACL configuration on interface fast 6/1:
----------	--

```
Switch# show mac access-group interface fast 6/1
Interface FastEthernet6/1:
  Inbound access-list is simple-mac-acl
  Outbound access-list is not set
```

Related Commands	<a href="#">access-group mode</a>
------------------	-----------------------------------

# show mac-address-table address

To display MAC address table information for a specific MAC address, use the **show mac-address-table address** command.

**show mac-address-table address** *mac\_addr* [**interface** *type slot/port* | **protocol** *protocol* | **vlan** *vlan\_id*]

Syntax Description	<i>mac_addr</i>	48-bit MAC address; the valid format is H.H.H.
	<b>interface</b> <i>type slot/port</i>	(Optional) Displays information for a specific interface; valid values for <i>type</i> are <b>fastethernet</b> , <b>gigabitethernet</b> , and <b>tengigabitethernet</b> .
	<b>protocol</b> <i>protocol</i>	(Optional) Specifies a protocol. See the “Usage Guidelines” section for more information.
	<b>vlan</b> <i>vlan_id</i>	(Optional) Displays entries for the specific VLAN only; valid values are from 1 to 4094.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Added support for extended VLAN addresses.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

**Usage Guidelines** For the MAC address table entries that are used by the routed ports, the routed port name is displayed in the “vlan” column not the internal VLAN number.

The keyword definitions for the *protocol* variable are as follows:

- **ip** specifies the IP protocol.
- **ipx** specifies the IPX protocols.
- **assigned** specifies the assigned protocol entries.
- **other** specifies the other protocol entries.

**Examples**

This example shows how to display MAC address table information for a specific MAC address:

```
Switch# show mac-address-table address 0030.94fc.0dff
Unicast Entries
  vlan  mac address      type      protocols      port
-----+-----+-----+-----+-----
      1   0030.94fc.0dff   static   ip,ipx,assigned,other  Switch
Fa6/1   0030.94fc.0dff   static   ip,ipx,assigned,other  Switch
Fa6/2   0030.94fc.0dff   static   ip,ipx,assigned,other  Switch
Switch#
```

**Related Commands**

[show mac-address-table aging-time](#)  
[show mac-address-table count](#)  
[show mac-address-table dynamic](#)  
[show mac-address-table interface](#)  
[show mac-address-table multicast](#)  
[show mac-address-table protocol](#)  
[show mac-address-table static](#)  
[show mac-address-table vlan](#)

# show mac-address-table aging-time

To display the MAC address aging time, use the **show mac-address-table aging-time** command.

**show mac-address-table aging-time** [**vlan** *vlan\_id*]

<b>Syntax Description</b>	<b>vlan</b> <i>vlan_id</i> (Optional) Specifies a VLAN; valid values are from 1 to 4094.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended addressing was added.

**Examples** This example shows how to display the currently configured aging time for all VLANs:

```
Switch# show mac-address-table aging-time
Vlan    Aging Time
----    -
100     300
200     1000
```

```
Switch#
```

This example shows how to display the currently configured aging time for a specific VLAN:

```
Switch# show mac-address-table aging-time vlan 100
Vlan    Aging Time
----    -
100     300
```

```
Switch#
```

<b>Related Commands</b>	<a href="#">show mac-address-table address</a> <a href="#">show mac-address-table count</a> <a href="#">show mac-address-table dynamic</a> <a href="#">show mac-address-table interface</a> <a href="#">show mac-address-table multicast</a> <a href="#">show mac-address-table protocol</a> <a href="#">show mac-address-table static</a> <a href="#">show mac-address-table vlan</a>
-------------------------	---

# show mac-address-table count

To display the number of entries currently in the MAC address table, use the **show mac-address-table count** command.

**show mac-address-table count** [**vlan** *vlan\_id*]

<b>Syntax Description</b>	<b>vlan</b> <i>vlan_id</i> (Optional) Specifies a VLAN; valid values are from 1 to 4094.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Added support for extended VLAN addresses.

<b>Examples</b>	This example shows how to display the entry count for a specific VLAN:
-----------------	--

```
Switch# show mac-address-table count vlan 1
MAC Entries for Vlan 1:
Dynamic Unicast Address Count:                0
Static Unicast Address (User-defined) Count:   0
Static Unicast Address (System-defined) Count: 1
Total Unicast MAC Addresses In Use:            1
Total Unicast MAC Addresses Available:         32768
Multicast MAC Address Count:                   1
Total Multicast MAC Addresses Available:       16384
Switch#
```

<b>Related Commands</b>	<a href="#">show mac-address-table address</a> <a href="#">show mac-address-table aging-time</a> <a href="#">show mac-address-table dynamic</a> <a href="#">show mac-address-table interface</a> <a href="#">show mac-address-table multicast</a> <a href="#">show mac-address-table protocol</a> <a href="#">show mac-address-table static</a> <a href="#">show mac-address-table vlan</a>
-------------------------	--

# show mac-address-table dynamic

To display the dynamic MAC address table entries only, use the **show mac-address-table dynamic** command.

```
show mac-address-table dynamic [address mac_addr | interface type slot/port |  
protocol protocol | vlan vlan_id]
```

Syntax Description	<b>address</b> <i>mac_addr</i>	(Optional) Specifies a 48-bit MAC address; the valid format is H.H.H.
	<b>interface</b> <i>type slot/port</i>	(Optional) Specifies an interface to match; valid values for <i>type</i> are <b>fastethernet</b> , <b>gigabitethernet</b> , and <b>tengigabitethernet</b> .
	<b>protocol</b> <i>protocol</i>	(Optional) Specifies a protocol. See the “Usage Guidelines” section for more information.
	<b>vlan</b> <i>vlan_id</i>	(Optional) Displays entries for a specific VLAN; valid values are from 1 to 4094.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Added support for extended VLAN addresses.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

**Usage Guidelines** The keyword definitions for the *protocol* argument are as follows:

- **assigned** specifies assigned protocol entries.
- **ip** specifies IP protocol.
- **ipx** specifies IPX protocols.
- **other** specifies other protocol entries.

The **show mac-address-table dynamic** command output for an EtherChannel interface changes the port number designation (such as, 5/7) to a port group number (such as, Po80).

For the MAC address table entries that are used by the routed ports, the routed port name is displayed in the “vlan” column not the internal VLAN number.

**Examples**

This example shows how to display all the dynamic MAC address entries:

```
Switch# show mac-address-table dynamic
Unicast Entries
  vlan  mac address      type      protocols      port
-----+-----+-----+-----+-----
    1   0000.0000.0201   dynamic  ip             FastEthernet6/15
    1   0000.0000.0202   dynamic  ip             FastEthernet6/15
    1   0000.0000.0203   dynamic  ip,assigned    FastEthernet6/15
    1   0000.0000.0204   dynamic  ip,assigned    FastEthernet6/15
    1   0000.0000.0205   dynamic  ip,assigned    FastEthernet6/15
    2   0000.0000.0101   dynamic  ip             FastEthernet6/16
    2   0000.0000.0102   dynamic  ip             FastEthernet6/16
    2   0000.0000.0103   dynamic  ip,assigned    FastEthernet6/16
    2   0000.0000.0104   dynamic  ip,assigned    FastEthernet6/16
    2   0000.0000.0105   dynamic  ip,assigned    FastEthernet6/16
Switch#
```

This example shows how to display the dynamic MAC address entries with a specific protocol type (in this case, assigned):

```
Switch# show mac-address-table dynamic protocol assigned
Unicast Entries
  vlan  mac address      type      protocols      port
-----+-----+-----+-----+-----
    1   0000.0000.0203   dynamic  ip,assigned    FastEthernet6/15
    1   0000.0000.0204   dynamic  ip,assigned    FastEthernet6/15
    1   0000.0000.0205   dynamic  ip,assigned    FastEthernet6/15
    2   0000.0000.0103   dynamic  ip,assigned    FastEthernet6/16
    2   0000.0000.0104   dynamic  ip,assigned    FastEthernet6/16
    2   0000.0000.0105   dynamic  ip,assigned    FastEthernet6/16
Switch#
```

**Related Commands**

[show mac-address-table protocol](#)  
[show mac-address-table static](#)  
[show mac-address-table vlan](#)

# show mac-address-table interface

To display the MAC address table information for a specific interface, use the **show mac-address-table interface** command.

**show mac-address-table interface** *type slot/port*

Syntax Description	<i>type</i>	Interface type; valid values are <b>ethernet</b> , <b>fastethernet</b> , <b>gigabitethernet</b> , and <b>tengigabitethernet</b> .
	<i>slot/port</i>	Number of the slot and port.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

**Usage Guidelines** For the MAC address table entries that are used by the routed ports, the routed port name is displayed in the “vlan” column not the internal VLAN number.

**Examples** This example shows how to display MAC address table information for a specific interface:

```
Switch# show mac-address-table interface fastethernet6/16
```

```
Unicast Entries
```

vlan	mac address	type	protocols	port
2	0000.0000.0101	dynamic	other	FastEthernet6/16
2	0000.0000.0102	dynamic	other	FastEthernet6/16
2	0000.0000.0103	dynamic	other	FastEthernet6/16
2	0000.0000.0104	dynamic	other	FastEthernet6/16
2	0000.0000.0105	dynamic	other	FastEthernet6/16
2	0000.0000.0106	dynamic	other	FastEthernet6/16

```
Multicast Entries
```

vlan	mac address	type	ports
2	ffff.ffff.ffff	system	Fa6/16

```
Switch#
```



---

Related Commands

[show mac-address-table address](#)  
[show mac-address-table aging-time](#)  
[show mac-address-table count](#)  
[show mac-address-table dynamic](#)  
[show mac-address-table multicast](#)  
[show mac-address-table protocol](#)  
[show mac-address-table static](#)  
[show mac-address-table vlan](#)

# show mac-address-table multicast

To display information about the multicast MAC address table, use the **show mac-address-table multicast** command.

```
show mac-address-table multicast [count | {igmp-snooping [count]} | {user [count]} |
{vlan vlan_num}]
```

Syntax Description	<b>count</b>	(Optional) Displays the number of multicast entries.
	<b>igmp-snooping</b>	(Optional) Displays only the addresses learned by IGMP snooping.
	<b>user</b>	(Optional) Displays only the user-entered static addresses.
	<b>vlan vlan_num</b>	(Optional) Displays information for a specific VLAN only; valid values are from 1 to 4094.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Added support for extended VLAN addresses.

**Usage Guidelines** For the MAC address table entries that are used by the routed ports, the routed port name is displayed in the “vlan” column not the the internal VLAN number.

**Examples** This example shows how to display multicast MAC address table information for a specific VLAN:

```
Switch# show mac-address-table multicast vlan 1
Multicast Entries
  vlan    mac address      type    ports
-----+-----+-----+-----
    1     ffff.ffff.ffff    system  Switch,Fa6/15
Switch#
```

This example shows how to display the number of multicast MAC entries for all VLANs:

```
Switch# show mac-address-table multicast count
MAC Entries for all vlans:
Multicast MAC Address Count:                141
Total Multicast MAC Addresses Available:    16384
Switch#
```

---

**Related Commands**

**show mac-address-table address**  
**show mac-address-table aging-time**  
**show mac-address-table count**  
**show mac-address-table dynamic**  
**show mac-address-table interface**  
**show mac-address-table protocol**  
**show mac-address-table static**  
**show mac-address-table vlan**

# show mac-address-table notification

To display the MAC address table notification status and history, use the **show mac-address-table notification** command.

**show mac-address-table notification** [**change**] [**interface** *interface-id*] | [**mac-move**] | [**threshold**]

Syntax Description	<b>change</b>	(Optional) Displays the MAC address change notification status.
	<b>interface</b>	(Optional) Displays MAC change information for an interfaces.
	<i>interface-id</i>	(Optional) Displays the information for a specific interface. Valid interfaces include physical ports and port channels.
	<b>mac-move</b>	(Optional) Displays MAC move notification status.
	<b>threshold</b>	(Optional) Displays the MAC threshold notification status.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch

**Usage Guidelines** Use the **show mac-address-table notification change** command to display whether the MAC change feature is enabled or disabled, the MAC change notification interval, the maximum number of entries allowed in the history table, and the history table contents.

Use the **interface** keyword to display the flags for all interfaces. If the *interface-id* is included, only the flags for that interface are displayed.

**Examples** This example shows how to display all the MAC address notification information:

```
Switch# show mac-address-table notification change
MAC Notification Feature is Enabled on the switch
Interval between Notification Traps : 1 secs
Number of MAC Addresses Added : 5
Number of MAC Addresses Removed : 1
Number of Notifications sent to NMS : 3
Maximum Number of entries configured in History Table : 500
Current History Table Length : 3
MAC Notification Traps are Enabled
History Table contents
-----
History Index 1, Entry Timestamp 478433, Despatch Timestamp 478433
MAC Changed Message :
Operation: Added   Vlan: 1       MAC Addr: 1234.5678.9ab0 Dot1dBasePort: 323
```

```

History Index 2, Entry Timestamp 481834, Despatch Timestamp 481834
MAC Changed Message :
Operation: Added   Vlan: 1      MAC Addr: 1234.5678.9ab1 Dot1dBasePort: 323
Operation: Added   Vlan: 1      MAC Addr: 1234.5678.9ab2 Dot1dBasePort: 323
Operation: Added   Vlan: 1      MAC Addr: 1234.5678.9ab3 Dot1dBasePort: 323
Operation: Added   Vlan: 1      MAC Addr: 1234.5678.9ab4 Dot1dBasePort: 323
History Index 3, Entry Timestamp 484334, Despatch Timestamp 484334
MAC Changed Message :
Operation: Deleted Vlan: 1      MAC Addr: 1234.5678.9ab0 Dot1dBasePort: 323
Switch#

```

This example shows how to display the MAC address change status on the FastEthernet interface 7/1:

```

Switch# show mac-address-table notification change interface FastEthernet 7/1
MAC Notification Feature is Enabled on the switch
Interface          MAC Added Trap MAC Removed Trap
-----
FastEthernet7/1    Enabled        Disabled

Switch#

```

This example shows how to display the MAC address move status:

```

Switch# show mac-address-table notification mac-move
MAC Move Notification: Enabled
Switch#

```

This example shows how to display the MAC address table utilization status:

```

Switch# show mac-address-table notification threshold
Status      limit      Interval
-----+-----+-----
enabled      50          120
Switch#

```

## Related Commands

[clear mac-address-table](#)  
[mac-address-table notification](#)  
[snmp-server enable traps](#)  
[snmp trap mac-notification change](#)

# show mac-address-table protocol

To display the MAC address table information that is based on the protocol, use the **show mac-address-table protocol** command.

**show mac-address-table protocol { assigned | ip | ipx | other }**

Syntax Description	<b>assigned</b>	Specifies the assigned protocol entries.
	<b>ip</b>	Specifies the IP protocol entries.
	<b>ipx</b>	Specifies the IPX protocol entries.
	<b>other</b>	Specifies the other protocol entries.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** For the MAC address table entries that are used by the routed ports, the routed port name is displayed in the “vlan” column not the the internal VLAN number.

**Examples** This example shows how to display the MAC address table entries that have a specific protocol type (in this case, assigned):

```
Switch# show mac-address-table protocol assigned
vlan  mac address      type    protocol  qos      ports
-----+-----+-----+-----+-----+-----
 200  0050.3e8d.6400    static  assigned  --      Switch
 100  0050.3e8d.6400    static  assigned  --      Switch
   5  0050.3e8d.6400    static  assigned  --      Switch
4092  0000.0000.0000    dynamic  assigned  --      Switch
   1  0050.3e8d.6400    static  assigned  --      Switch
   4  0050.3e8d.6400    static  assigned  --      Switch
4092  0050.f0ac.3058    static  assigned  --      Switch
4092  0050.f0ac.3059    dynamic  assigned  --      Switch
   1  0010.7b3b.0978    dynamic  assigned  --      Fa5/9
Switch#
```

This example shows the other output for the previous example:

```
Switch# show mac-address-table protocol other
Unicast Entries
vlan  mac address      type    protocols  port
-----+-----+-----+-----+-----
   1  0000.0000.0201    dynamic  other      FastEthernet6/15
   1  0000.0000.0202    dynamic  other      FastEthernet6/15
```

```

1      0000.0000.0203    dynamic other          FastEthernet6/15
1      0000.0000.0204    dynamic other          FastEthernet6/15
1      0030.94fc.0dff     static ip,ipx,assigned,other Switch
2      0000.0000.0101    dynamic other          FastEthernet6/16
2      0000.0000.0102    dynamic other          FastEthernet6/16
2      0000.0000.0103    dynamic other          FastEthernet6/16
2      0000.0000.0104    dynamic other          FastEthernet6/16
Fa6/1  0030.94fc.0dff     static ip,ipx,assigned,other Switch
Fa6/2  0030.94fc.0dff     static ip,ipx,assigned,other Switch

```

## Multicast Entries

vlan	mac address	type	ports
1	ffff.ffff.ffff	system	Switch, Fa6/15
2	ffff.ffff.ffff	system	Fa6/16
1002	ffff.ffff.ffff	system	
1003	ffff.ffff.ffff	system	
1004	ffff.ffff.ffff	system	
1005	ffff.ffff.ffff	system	
Fa6/1	ffff.ffff.ffff	system	Switch, Fa6/1
Fa6/2	ffff.ffff.ffff	system	Switch, Fa6/2

Switch#

## Related Commands

[show mac-address-table address](#)  
[show mac-address-table aging-time](#)  
[show mac-address-table count](#)  
[show mac-address-table dynamic](#)  
[show mac-address-table interface](#)  
[show mac-address-table multicast](#)  
[show mac-address-table static](#)  
[show mac-address-table vlan](#)

# show mac-address-table static

To display the static MAC address table entries only, use the **show mac-address-table static** command.

**show mac-address-table static** [**address** *mac\_addr* | **interface** *type number* | **protocol** *protocol* | **vlan** *vlan\_id*]

Syntax Description	<b>address</b> <i>mac_addr</i>	(Optional) Specifies a 48-bit MAC address to match; the valid format is H.H.H.
	<b>interface</b> <i>type number</i>	(Optional) Specifies an interface to match; valid values for <i>type</i> are <b>fastethernet</b> , <b>gigabitethernet</b> , and <b>tengigabitethernet</b> .
	<b>protocol</b> <i>protocol</i>	(Optional) Specifies a protocol. See the “Usage Guidelines” section for more information.
	<b>vlan</b> <i>vlan_id</i>	(Optional) Displays the entries for a specific VLAN; valid values are from 1 to 4094.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Added support for extended VLAN addresses.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

**Usage Guidelines** For the MAC address table entries that are used by the routed ports, the routed port name is displayed in the “vlan” column not the internal VLAN number.

The keyword definitions for the *protocol* argument are as follows:

- **assigned** specifies the assigned protocol entries.
- **ip** specifies the IP protocol.
- **ipx** specifies the IPX protocols.
- **other** specifies the other protocol entries.

**Examples** This example shows how to display all the static MAC address entries:

```
Switch# show mac-address-table static
Unicast Entries
  vlan   mac address      type      protocols                port
-----+-----+-----+-----+-----
    1    0030.94fc.0dff    static   ip,ipx,assigned,other    Switch
Fa6/1    0030.94fc.0dff    static   ip,ipx,assigned,other    Switch
```



```
Fa6/2    0030.94fc.0dff    static ip,ipx,assigned,other    Switch
```

#### Multicast Entries

vlan	mac address	type	ports
1	ffff.ffff.ffff	system	Switch, Fa6/15
2	ffff.ffff.ffff	system	Fa6/16
1002	ffff.ffff.ffff	system	
1003	ffff.ffff.ffff	system	
1004	ffff.ffff.ffff	system	
1005	ffff.ffff.ffff	system	
Fa6/1	ffff.ffff.ffff	system	Switch, Fa6/1
Fa6/2	ffff.ffff.ffff	system	Switch, Fa6/2

```
.
```

```
.
```

```
Switch#
```

This example shows how to display the static MAC address entries with a specific protocol type (in this case, assigned):

```
Switch# show mac-address-table static protocol assigned
```

#### Unicast Entries

vlan	mac address	type	protocols	port
1	0030.94fc.0dff	static	ip,ipx,assigned,other	Switch
Fa6/1	0030.94fc.0dff	static	ip,ipx,assigned,other	Switch
Fa6/2	0030.94fc.0dff	static	ip,ipx,assigned,other	Switch

#### Multicast Entries

vlan	mac address	type	ports
1	ffff.ffff.ffff	system	Switch, Fa6/15
2	ffff.ffff.ffff	system	Fa6/16
1002	ffff.ffff.ffff	system	
1003	ffff.ffff.ffff	system	
1004	ffff.ffff.ffff	system	
1005	ffff.ffff.ffff	system	
Fa6/1	ffff.ffff.ffff	system	Switch, Fa6/1
Fa6/2	ffff.ffff.ffff	system	Switch, Fa6/2

```
Switch#
```

### Related Commands

[show mac-address-table address](#)  
[show mac-address-table aging-time](#)  
[show mac-address-table count](#)  
[show mac-address-table dynamic](#)  
[show mac-address-table interface](#)  
[show mac-address-table multicast](#)  
[show mac-address-table protocol](#)  
[show mac-address-table vlan](#)

# show mac-address-table vlan

To display information about the MAC address table for a specific VLAN, use the **show mac-address-table vlan** command.

**show mac-address-table** [**vlan** *vlan\_id*] [**protocol** *protocol*]

Syntax Description	<b>vlan</b> <i>vlan_id</i>	(Optional) Displays the entries for a specific VLAN; valid values are from 1 to 4094.
	<b>protocol</b> <i>protocol</i>	(Optional) Specifies a protocol. See the “Usage Guidelines” section for more information.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended addressing was added.

**Usage Guidelines** For the MAC address table entries used by the routed ports, the routed port name is displayed in the “vlan” column not the the internal VLAN number.

The keyword definitions for the *protocol* variable are as follows:

- **assigned** specifies the assigned protocol entries.
- **ip** specifies the IP protocol.
- **ipx** specifies the IPX protocols.
- **other** specifies the other protocol entries.

**Examples** This example shows how to display information about the MAC address table for a specific VLAN:

```
Switch# show mac-address-table vlan 1
Unicast Entries
  vlan  mac address      type      protocols      port
-----+-----+-----+-----+-----
    1   0000.0000.0201   dynamic ip                        FastEthernet6/15
    1   0000.0000.0202   dynamic ip                        FastEthernet6/15
    1   0000.0000.0203   dynamic other                    FastEthernet6/15
    1   0000.0000.0204   dynamic other                    FastEthernet6/15
    1   0030.94fc.0dff   static ip,ipx,assigned,other    Switch

Multicast Entries
  vlan  mac address      type      ports
-----+-----+-----+-----

```

```

1      ffff.ffff.ffff    system Switch,Fa6/15
Switch#

```

This example shows how to display MAC address table information for a specific protocol type:

```
Switch# show mac-address-table vlan 100 protocol other
```

```
Unicast Entries
```

vlan	mac address	type	protocols	port
1	0000.0000.0203	dynamic	other	FastEthernet6/15
1	0000.0000.0204	dynamic	other	FastEthernet6/15
1	0030.94fc.0dff	static	ip,ipx,assigned,other	Switch

```
Multicast Entries
```

vlan	mac address	type	ports
1	ffff.ffff.ffff	system	Switch,Fa6/15

```
Switch#
```

### Related Commands

```

show mac-address-table address
show mac-address-table aging-time
show mac-address-table count
show mac-address-table dynamic
show mac-address-table interface
show mac-address-table multicast
show mac-address-table protocol
show mac-address-table static

```

# show module

To display information about the module, use the **show module** command.

**show module** [*mod* | **all**]

Syntax Description	<i>mod</i>	(Optional) Number of the module; valid values vary from chassis to chassis.
	<b>all</b>	(Optional) Displays information for all modules.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EW	Enhanced the output of the <b>show idprom interface command</b> to include the 10-Gigabit Ethernet interface.

**Usage Guidelines** In the Mod Sub-Module fields in the command output, the **show module** command displays the supervisor engine number but appends the uplink daughter card's module type and information.

If the PoE consumed by the module is more than 50 W above the administratively allocated PoE, the "Status" displays as "PwrOver." If the PoE consumed by the module is more than 50 W above the PoE module limit, the "Status" displays as "PwrFault."

**Examples** This example shows how to display information for all the modules.

This example shows the **show module** command output for a system with inadequate power for all installed modules. The system does not have enough power for Module 5; the "Status" displays it as "PwrDeny."

```
Switch# show module all
Mod  Ports Card Type                               Model                Serial No.
-----+-----+-----+-----+-----+-----+-----
 1      2  1000BaseX (GBIC) Supervisor(active)  WS-X4014             JAB054109GH
 2      6  1000BaseX (GBIC)                               WS-X4306             00000110
 3     18  1000BaseX (GBIC)                               WS-X4418             JAB025104WK
 5      0 Not enough power for module          WS-X4148-FX-MT       000000000000
 6     48  10/100BaseTX (RJ45)                        WS-X4148             JAB023402RP

M MAC addresses                               Hw  Fw          Sw          Status
-----+-----+-----+-----+-----+-----+-----
1 005c.9d1a.f9d0 to 005c.9d1a.f9df 0.5 12.1(11br)EW 12.1(20020313:00 Ok
2 0010.7bab.9920 to 0010.7bab.9925 0.2                               Ok
3 0050.7356.2b36 to 0050.7356.2b47 1.0                               Ok
5 0001.64fe.a930 to 0001.64fe.a95f 0.0                               PwrDeny
```

```

6 0050.0f10.28b0 to 0050.0f10.28df 1.0
Switch#

```

Ok

This example shows how to display information for a specific module:

```

Switch# show module mod2
Mod Ports Card Type                               Model                               Serial No.
-----
 2    2 Catalyst 4000 supervisor 2 (Active)      WS-X6K-SUP2-2GE                      SAD04450LF1
Mod MAC addresses                               Hw  Fw  Sw                               Status
-----
 2 0001.6461.39c0 to 0001.6461.39c1 1.1 6.1(3) 6.2(0.97) Ok
Mod Sub-Module                               Model                               Serial                               Hw  Status
-----
 2 Policy Feature Card 2                    WS-F6K-PFC2                        SAD04440HVU                        1.0 Ok
 2 Cat4k MSFC 2 daughterboard              WS-F6K-MSFC2                      SAD04430J9K                        1.1 Ok
Switch#

```

This example shows how to display information for all the modules on the switch:

```

Switch# show module
Chassis Type : WS-C4506

Power consumed by backplane : 0 Watts

Mod Ports Card Type                               Model                               Serial No.
-----
 1    6 XG (X2), 1000BaseX (SFP) Supervisor(ac WS-X4517                      " "
 3    6 1000BaseX (GBIC)                      WS-X4306                          00000110

M MAC addresses                               Hw  Fw  Sw                               Status
-----
 1 0004.dd46.7700 to 0004.dd46.7705 0.0 12.2(20r)EW( 12.2(20040513:16 Ok
 3 0010.7bab.9920 to 0010.7bab.9925 0.2                               Ok
Switch#

```

# show monitor

To display information about the SPAN session, use the **show monitor** command.

**show monitor** [**session**] [**range** *session-range* | **local** | **remote** | **all** | *session-number*] [**detail**]

Syntax Description	<b>session</b>	(Optional) Displays the SPAN information for a session.
	<b>range</b>	(Optional) Displays information for a range of sessions.
	<i>session-range</i>	(Optional) Specifies a range of sessions.
	<b>local</b>	(Optional) Displays all local SPAN sessions.
	<b>remote</b>	(Optional) Displays the RSPAN source and destination sessions.
	<b>all</b>	(Optional) Displays the SPAN and RSPAN sessions.
	<i>session-number</i>	(Optional) Session number; valid values are from 1 to 6.
	<b>detail</b>	(Optional) Displays the detailed SPAN information for a session.

**Defaults** The **detail** keyword only displays lines with a nondefault configuration.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(13)EW	Added support for differing directions within a single user session.
	12.1(19)EW	Output enhanced to display configuration status of SPAN enhancements.
	12.1(20)EW	Added support to display configuration state for remote SPAN and learning.
	12.2(20)EW	Added support to display ACLs that are applied to SPAN sessions.

**Examples** This example shows how to display whether ACLs are applied to a given SPAN session on a Catalyst 4500 series switch:

```
Switch# show monitor

Session 1
-----
Type           : Local Session
Source Ports   :
    Both       : Fa6/1
Destination Ports : Fa6/2
    Encapsulation : Native
    Ingress      : Disabled
    Learning     : Disabled
Filter VLANs    : 1
IP Access-group : 10
```

This example shows how to display SPAN information for session 2:

```
Switch# show monitor session 2
Session 2
-----
Type : Remote Source Session
Source Ports:
    RX Only:      Fa1/1-3
Dest RSPAN VLAN: 901
Ingress : Enabled, default VLAN=2
Learning : Disabled
Switch#
```

This example shows how to display the detailed SPAN information for session 1:

```
Switch# show monitor session 1 detail
Session 1
-----
Type                : Local Session
Source Ports        :
    RX Only         : None
    TX Only         : None
    Both            : Gi1/1, CPU
Source VLANs        :
    RX Only         : None
    TX Only         : None
    Both            : None
Source RSPAN VLAN   : Fa6/1
Destination Ports   : Fa6/1
    Encapsulation   : DOT1Q
    Ingress         : Enabled, default VLAN = 2
Filter VLANs        : None
    Filter Types RX : Good
    Filter Types TX : None
Dest Rspan Vlan     : 901
Ingress             : Enabled, default VLAN=2
Learning            : Disabled
IP Access-group     : None
Switch#
```

This example shows how to display SPAN information for session 1 beginning with the line that starts with Destination:

```
Switch# show monitor session 1 | begin Destination
Destination Ports: None
Filter VLANs:      None
Switch#
Switch#
```

## Related Commands [monitor session](#)

# show pagp

To display information about the port channel, use the **show pagp** command.

**show pagp** [*group-number*] {**counters** | **internal** | **neighbor**}

Syntax Description	<i>group-number</i>	(Optional) Channel-group number; valid values are from 1 to 64.
	<b>counters</b>	Specifies the traffic counter information.
	<b>internal</b>	Specifies the PAgP internal information.
	<b>neighbor</b>	Specifies the PAgP neighbor information.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** You can enter any **show pagp** command to display the active PAgP port-channel information. To display the nonactive information, enter the **show pagp** command with a group.

**Examples** This example shows how to display information about the PAgP counter:

```
Switch# show pagp counters
      Information      Flush
Port      Sent  Recv   Sent  Recv
-----
Channel group: 1
  Fa5/4    2660  2452    0     0
  Fa5/5    2676  2453    0     0
Channel group: 2
  Fa5/6     289   261     0     0
  Fa5/7     290   261     0     0
Switch#
```



This example shows how to display internal PAGP information:

```
Switch# show pagp 1 internal
Flags: S - Device is sending Slow hello. C - Device is in Consistent state.
      A - Device is in Auto mode.
Timers: H - Hello timer is running.      Q - Quit timer is running.
      S - Switching timer is running.    I - Interface timer is running.

Channel group 1

```

Port	Flags	State	Timers	Hello Interval	Partner Count	PAGP Priority	Learning Method	IfIndx
Fa5/4	SC	U6/S7		30s	1	128	Any	129
Fa5/5	SC	U6/S7		30s	1	128	Any	129

```
Switch#
```

This example shows how to display PAGP neighbor information for all neighbors:

```
Switch# show pagp neighbor
Flags: S - Device is sending Slow hello. C - Device is in Consistent state.
      A - Device is in Auto mode.      P - Device learns on physical port.

Channel group 1 neighbors

```

Port	Partner Name	Partner Device ID	Partner Port	Age	Flags	Partner Group Cap.
Fa5/4	JAB031301	0050.0f10.230c	2/45	2s	SAC	2D
Fa5/5	JAB031301	0050.0f10.230c	2/46	27s	SAC	2D

```
Channel group 2 neighbors

```

Port	Partner Name	Partner Device ID	Partner Port	Age	Flags	Partner Group Cap.
Fa5/6	JAB031301	0050.0f10.230c	2/47	10s	SAC	2F
Fa5/7	JAB031301	0050.0f10.230c	2/48	11s	SAC	2F

```
Switch#
```

## Related Commands

[pagp learn-method](#)  
[pagp port-priority](#)

# show policy-map

To display information about the policy map, use the **show policy-map** command.

**show policy-map** [*policy\_map\_name*]

Syntax Description	<i>policy_map_name</i> (Optional) Name of the policy map.	
Defaults	This command has no default settings.	
Command Modes	Privileged EXEC	
Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Examples	<p>This example shows how to display information for all the policy maps:</p> <pre>Switch# show policy-map Policy Map ipp5-policy   class ipp5     set ip precedence 6 Switch#</pre> <p>This example shows how to display information for a specific policy map:</p> <pre>Switch# show policy ipp5-policy Policy Map ipp5-policy   class ipp5     set ip precedence 6 Switch#</pre>	
Related Commands	<a href="#">class-map</a> <a href="#">policy-map</a> <a href="#">show class-map</a> <a href="#">show policy-map interface</a>	

# show policy-map control-plane

To display the configuration either of a class or of all classes for the policy map of a control plane, use the **show policy-map control-plane** command.

**show policy-map control-plane** [**input** [**class** *class-name*] | [**class** *class-name*]]

Syntax Description	<b>input</b>	(Optional) Displays statistics for the attached input policy.
	<b>class</b> <i>class-name</i>	(Optional) Displays the name of the class.

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

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

Command History	Release	Modification
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch

Usage Guidelines	The <b>show policy-map control-plane</b> command displays information for aggregate control-plane services that control the number or rate of packets that are going to the process level.
------------------	--

Examples	This example shows that the policy map TEST is associated with the control plane. This policy map polices traffic that matches the class-map TEST, while allowing all other traffic (that matches the class-map class-default) to go through as is. <a href="#">Table 2-23</a> describes the fields shown in the display.
----------	---

```
Switch# show policy-map control-plane

Control Plane

Service-policy input: system-cpp-policy

  Class-map: system-cpp-eapol (match-all)
    0 packets
    Match: access-group name system-cpp-eapol

  Class-map: system-cpp-bpdu-range (match-all)
    0 packets
    Match: access-group name system-cpp-bpdu-range

  Class-map: system-cpp-cdp (match-all)
    28 packets
    Match: access-group name system-cpp-cdp
    police: Per-interface
      Conform: 530 bytes Exceed: 0 bytes

  Class-map: system-cpp-garp (match-all)
    0 packets
```

```
Match: access-group name system-cpp-garp

Class-map: system-cpp-sstp (match-all)
  0 packets
  Match: access-group name system-cpp-sstp

Class-map: system-cpp-cgmp (match-all)
  0 packets
  Match: access-group name system-cpp-cgmp

Class-map: system-cpp-ospf (match-all)
  0 packets
  Match: access-group name system-cpp-ospf

Class-map: system-cpp-igmp (match-all)
  0 packets
  Match: access-group name system-cpp-igmp

Class-map: system-cpp-pim (match-all)
  0 packets
  Match: access-group name system-cpp-pim

Class-map: system-cpp-all-systems-on-subnet (match-all)
  0 packets
  Match: access-group name system-cpp-all-systems-on-subnet

Class-map: system-cpp-all-routers-on-subnet (match-all)
  0 packets
  Match: access-group name system-cpp-all-routers-on-subnet

Class-map: system-cpp-ripv2 (match-all)
  0 packets
  Match: access-group name system-cpp-ripv2

Class-map: system-cpp-ip-mcast-linklocal (match-all)
  0 packets
  Match: access-group name system-cpp-ip-mcast-linklocal

Class-map: system-cpp-dhcp-cs (match-all)
  0 packets
  Match: access-group name system-cpp-dhcp-cs

Class-map: system-cpp-dhcp-sc (match-all)
  0 packets
  Match: access-group name system-cpp-dhcp-sc

Class-map: system-cpp-dhcp-ss (match-all)
  0 packets
  Match: access-group name system-cpp-dhcp-ss

Class-map: class-default (match-any)
  0 packets
  Match: any
  0 packets
Switch#
```

**Table 2-23** *show policy-map control-plane* Field Descriptions

Field	Description
<b>Fields Associated with Classes or Service Policies</b>	
Service-policy input	Name of the input service policy that is applied to the control plane. (If configured, this field will also show the output service policy.)
Class-map	Class of traffic being displayed. Traffic is displayed for each configured class. The choice for implementing class matches (for example, match-all or match-any) can also appear next to the traffic class.
Match	Match criteria for the specified class of traffic.  <b>Note</b> For more information about the variety of match criteria options available, refer to the chapter “Configuring the Modular Quality of Service Command-Line Interface” in the <i>Cisco IOS Quality of Service Solutions Configuration Guide</i> .
<b>Fields Associated with Traffic Policing</b>	
police	<b>police</b> command has been configured to enable traffic policing.
conformed	Action to be taken on packets conforming to a specified rate; displays the number of packets and bytes on which the action was taken.
exceeded	Action to be taken on packets exceeding a specified rate; displays the number of packets and bytes on which the action was taken.

**Related Commands**

[control-plane](#)  
[service-policy input \(control-plane\)](#)

# show policy-map interface

To display the statistics and configurations of the input and output policies that are attached to an interface, use the **show policy-map interface** command.

**show policy-map interface** [{**fastethernet** *interface-number*} | {**gigabitethernet** *interface-number*} | {**port-channel** *number*} | {**vlan** *vlan\_id*}] [**input** | **output**]

Syntax Description	<b>fastethernet</b> <i>interface-number</i>	(Optional) Specifies the Fast Ethernet 802.3 interface.
	<b>gigabitethernet</b> <i>interface-number</i>	(Optional) Specifies the Gigabit Ethernet 802.3z interface.
	<b>port-channel</b> <i>number</i>	(Optional) Specifies the port channel.
	<b>vlan</b> <i>vlan_id</i>	(Optional) Specifies the VLAN ID; valid values are from 1 to 4094.
	<b>input</b>	(Optional) Specifies input policies only.
	<b>output</b>	(Optional) Specifies output policies only.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Added support for extended VLAN addresses.
	12.2(25)SG	Displays results for full flow policing.

**Examples** This example shows how to display the statistics and configurations of all input and output policies attached to an interface:

```
Switch# show policy-map interface

FastEthernet6/1

  service-policy input:ipp5-policy

    class-map:ipp5 (match-all)
      0 packets
      match:ip precedence 5
      set:
        ip precedence 6

    class-map:class-default (match-any)
      0 packets
      match:any
      0 packets
```

```

service-policy output:ipp5-policy

class-map:ipp5 (match-all)
  0 packets
  match:ip precedence 5
  set:
    ip precedence 6

class-map:class-default (match-any)
  0 packets
  match:any
  0 packets
Switch#

```

This example shows how to display the input policy statistics and configurations for a specific interface:

```

Switch# show policy-map interface fastethernet 5/36 input
service-policy input:ipp5-policy

class-map:ipp5 (match-all)
  0 packets
  match:ip precedence 5
  set:
    ip precedence 6

class-map:class-default (match-any)
  0 packets
  match:any
  0 packets
Switch#

```

With the following configuration, each flow is policed to a 1000000 bps with an allowed 9000-byte burst value.



#### Note

If you use the **match flow ip source-address|destination-address** command, these two flows are consolidated into one flow and they have the same source and destination address.

```

Switch# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# class-map c1
Switch(config-cmap)# match flow ip source-address ip destination-address ip protocol 14
source-port 14 destination-port
Switch(config-cmap)# exit
Switch(config)# policy-map p1
Switch(config-pmap)# class c1
Switch(config-pmap-c)# police 1000000 9000
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
Switch(config)# interface fastEthernet 6/1
Switch(config-if)# service-policy input p1
Switch(config-if)# end
Switch# write memory
Switch# show policy-map interface
FastEthernet6/1

class-map c1
  match flow ip source-address ip destination-address ip protocol 14 source-port 14
  destination-port
  !

```

## show policy-map interface

```

policy-map p1
  class c1
    police 1000000 bps 9000 byte conform-action transmit exceed-action drop
!
interface FastEthernet 6/1
  service-policy input p1

Switch# show policy-map p1
Policy Map p1
Class c1
  police 1000000 bps 9000 byte conform-action transmit exceed-action drop

Switch# show policy-map interface
FastEthernet6/1

Service-policy input: p1

Class-map: c1 (match-all)
  15432182 packets
  Match: flow ip source-address ip destination-address ip protocol 14 source-port 14
destination-port
  police: Per-interface
    Conform: 64995654 bytes Exceed: 2376965424 bytes

Class-map: class-default (match-any)
  0 packets
  Match: any
    0 packets
Switch#

```

### Related Commands

[class-map](#)  
[policy-map](#)  
[show class-map](#)  
[show qos](#)



# show policy-map interface vlan

To show the QoS policy-map information applied to a specific VLAN on an interface, use the **show policy-map interface vlan** command.

**show policy-map interface vlan** *interface-id* **vlan** *vlan-id*

Syntax Description	<b>interface</b> <i>interface-id</i>	(Optional) Displays QoS policy-map information for a specific interface.
	<b>vlan</b> <i>vlan-id</i>	(Optional) Displays QoS policy-map information for a specific VLAN.

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

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** Take the following configuration as an example:

```
interface GigabitEthernet3/1
  vlan-range 20,400
  service-policy input p1
  vlan-range 300-301
  service-policy output p2
```

This example shows how to display policy-map statistics on VLAN 20 on the Gigabit Ethernet 6/1 interface:

```
Switch# show policy-map interface gigabitEthernet 3/1 vlan 20
GigabitEthernet3/1 vlan 20

Service-policy input: p1

Class-map: class-default (match-any)
  0 packets
  Match: any
    0 packets
  police: Per-interface
    Conform: 0 bytes Exceed: 0 bytes
```

Related Commands	<a href="#">service-policy</a> <a href="#">show policy-map interface</a>
------------------	---

# show port-security

To display the port security settings for an interface or for the switch, use the **show port-security** command.

**show port-security** [**address**] [**interface** *interface-id*] [**vlan** *vlan-id*]

Syntax Description	<b>address</b>	(Optional) Displays all secure MAC addresses for all ports or for a specific port.
	<b>interface</b> <i>interface-id</i>	(Optional) Displays port security settings for a specific interface.
	<b>vlan</b> <i>vlan-id</i>	(Optional) Displays port security settings for a specific VLAN.

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

Command History	<b>Release</b>	<b>Modification</b>
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(18)EW	Support was enhanced to display sticky MAC addresses.
	12.2(25)EWA	Support was enhanced to display setting on a per-VLAN basis.

Usage Guidelines	If you enter the command without keywords, the output includes the administrative and operational status of all secure ports on the switch.
	If you enter the <i>interface-id</i> value, the <b>show port-security</b> command displays port security settings for the interface.
	If you enter the <b>address</b> keyword, the <b>show port-security address</b> command displays the secure MAC addresses for all interfaces and the aging information for each secure address.
	If you enter the <i>interface-id</i> value and the <b>address</b> keyword, the <b>show port-security address interface</b> command displays all the MAC addresses for the interface with aging information for each secure address. You can also use this command to display all the MAC addresses for an interface even if you have not enabled port security on it.

Examples	This example shows how to display port security settings for the entire switch:
----------	---

```
Switch# show port-security
Secure Port  MaxSecureAddr  CurrentAddr  SecurityViolation  Security Action
          (Count)         (Count)          (Count)
-----
    Fa3/1             2             2              0          Restrict
    Fa3/2             2             2              0          Restrict
    Fa3/3             2             2              0          Shutdown
    Fa3/4             2             2              0          Shutdown
    Fa3/5             2             2              0          Shutdown
    Fa3/6             2             2              0          Shutdown
    Fa3/7             2             2              0          Shutdown
    Fa3/8             2             2              0          Shutdown
    Fa3/10            1             0              0          Shutdown
```

```

Fa3/11          1          0          0          Shutdown
Fa3/12          1          0          0          Restrict
Fa3/13          1          0          0          Shutdown
Fa3/14          1          0          0          Shutdown
Fa3/15          1          0          0          Shutdown
Fa3/16          1          0          0          Shutdown
-----
Total Addresses in System (excluding one mac per port)      :8
Max Addresses limit in System (excluding one mac per port) :1024
Global SNMP trap control for port-security                  :20 (traps per second)
Switch#

```

This example shows how to display port security settings for interface Fast Ethernet port 1:

```

Switch# show port-security interface fastethernet 5/1
Port Security          : Enabled
Port Status            : Secure-up
Violation Mode         : Shutdown
Aging Time             : 0 mins
Aging Type             : Absolute
SecureStatic Address Aging : Disabled
Maximum MAC Addresses  : 1
Total MAC Addresses    : 1
Configured MAC Addresses : 0
Sticky MAC Addresses   : 1
Last Source Address    : 0000.0001.001a
Security Violation Count : 0
Switch#

```

This example shows how to display the maximum allowed number of secure MAC addresses and the current number of secure MAC addressees on Fast Ethernet port 1:

```

Switch# show port-security interface fastethernet5/1 vlan
Default maximum: 22
VLAN  Maximum    Current
2      22         3
3      22         3
4      22         3
5      22         1
6      22         2
Switch#

```

This example shows how to display the port security settings on Fast Ethernet port 1 for VLANs 2 and 3:

```

Switch# show port-security interface fastethernet5/1 vlan 2-3
Default maximum: 22
VLAN  Maximum    Current
2      22         3
3      22         3
Switch#

```

This example shows how to display all secure MAC addresses configured on Fast Ethernet port 1 with aging information for each address.

```

Switch# show port-security interface fastethernet5/1 address

Secure Mac Address Table
-----
Vlan  Mac Address      Type                Ports    Remaining Age(mins)
----  -
2     0001.0001.0001   SecureConfigured   Gi1/1    -
2     0001.0001.0002   SecureSticky       Gi1/1    -
2     0001.0001.0003   SecureSticky       Gi1/1    -
3     0001.0001.0001   SecureConfigured   Gi1/1    -

```

# show port-security

```

3      0001.0001.0002      SecureSticky      Gi1/1      -
3      0001.0001.0003      SecureSticky      Gi1/1      -
4      0001.0001.0001      SecureConfigured  Gi1/1      -
4      0001.0001.0002      SecureSticky      Gi1/1      -
4      0001.0001.0003      SecureSticky      Gi1/1      -
5      0001.0001.0001      SecureConfigured  Gi1/1      -
6      0001.0001.0001      SecureConfigured  Gi1/1      -
6      0001.0001.0002      SecureConfigured  Gi1/1      -

```

-----

Total Addresses: 12

Switch#

This example shows how to display all secure MAC addresses configured on VLANs 2 and 3 on Fast Ethernet port 1 with aging information for each address:

Switch# **show port-security interface fastethernet5/1 address vlan 2-3**

## Secure Mac Address Table

```

-----
Vlan    Mac Address      Type                Ports      Remaining Age (mins)
-----
2       0001.0001.0001    SecureConfigured    Gi1/1      -
2       0001.0001.0002    SecureSticky        Gi1/1      -
2       0001.0001.0003    SecureSticky        Gi1/1      -
3       0001.0001.0001    SecureConfigured    Gi1/1      -
3       0001.0001.0002    SecureSticky        Gi1/1      -
3       0001.0001.0003    SecureSticky        Gi1/1      -

```

-----

Total Addresses: 12

Switch#

This example shows how to display all secure MAC addresses configured on all switch interfaces:

Switch# **show port-security address**

## Secure Mac Address Table

```

-----
Vlan    Mac Address      Type                Ports      Remaining Age (mins)
-----
1       0000.0001.0000    SecureConfigured    Fa3/1      15 (I)
1       0000.0001.0001    SecureConfigured    Fa3/1      14 (I)
1       0000.0001.0100    SecureConfigured    Fa3/2      -
1       0000.0001.0101    SecureConfigured    Fa3/2      -
1       0000.0001.0200    SecureConfigured    Fa3/3      -
1       0000.0001.0201    SecureConfigured    Fa3/3      -
1       0000.0001.0300    SecureConfigured    Fa3/4      -
1       0000.0001.0301    SecureConfigured    Fa3/4      -
1       0000.0001.1000    SecureDynamic       Fa3/5      -
1       0000.0001.1001    SecureDynamic       Fa3/5      -
1       0000.0001.1100    SecureDynamic       Fa3/6      -
1       0000.0001.1101    SecureDynamic       Fa3/6      -
1       0000.0001.1200    SecureSticky        Fa3/7      -
1       0000.0001.1201    SecureSticky        Fa3/7      -
1       0000.0001.1300    SecureSticky        Fa3/8      -
1       0000.0001.1301    SecureSticky        Fa3/8      -

```

-----

Total Addresses in System (excluding one mac per port) :8

Max Addresses limit in System (excluding one mac per port) :3072

Switch#

This example shows how to display the maximum allowed number of secure MAC addresses and the current number of secure MAC addresses on interface GigabitEthernet1/1:

```
Switch# show port-security interface gigabitEthernet1/1 vlan
Default maximum: 22
VLAN Maximum Current
  2      22      3
  3      22      3
  4      22      3
  5      22      1
  6      22      2
Switch#
```

This example shows how to display the port security settings on interface GigabitEthernet1/1 for VLANs 2 and 3:

```
Switch# show port-security interface gigabitEthernet1/1 vlan 2-3
Default maximum: 22
VLAN Maximum Current
  2      22      3
  3      22      3
Switch#
```

This example shows how to display all secure MAC addresses configured on interface GigabitEthernet1/1 with aging information for each address.

```
Switch# show port-security interface gigabitEthernet1/1 address
```

```
Secure Mac Address Table
-----
Vlan  Mac Address      Type                Ports  Remaining Age(mins)
----  -
  2    0001.0001.0001    SecureConfigured    Gi1/1  -
  2    0001.0001.0002    SecureSticky        Gi1/1  -
  3    0001.0001.0001    SecureConfigured    Gi1/1  -
  3    0001.0001.0002    SecureSticky        Gi1/1  -
  3    0001.0001.0003    SecureSticky        Gi1/1  -
  4    0001.0001.0001    SecureConfigured    Gi1/1  -
  4    0001.0001.0003    SecureSticky        Gi1/1  -
  6    0001.0001.0001    SecureConfigured    Gi1/1  -
  6    0001.0001.0002    SecureConfigured    Gi1/1  -
-----
Total Addresses: 12
Switch#
```

This example shows how to display all secure MAC addresses configured on VLANs 2 and 3 on interface GigabitEthernet1/1 with aging information for each address:

```
Switch# show port-security interface gigabitEthernet1/1 address vlan 2-3
```

```
Secure Mac Address Table
-----
Vlan  Mac Address      Type                Ports  Remaining Age(mins)
----  -
  2    0001.0001.0001    SecureConfigured    Gi1/1  -
  2    0001.0001.0002    SecureSticky        Gi1/1  -
  2    0001.0001.0003    SecureSticky        Gi1/1  -
  3    0001.0001.0001    SecureConfigured    Gi1/1  -
  3    0001.0001.0002    SecureSticky        Gi1/1  -
  3    0001.0001.0003    SecureSticky        Gi1/1  -
-----
Total Addresses: 12
Switch#
```

■ show port-security

---

Related Commands    [switchport port-security](#)

# show power

To display information about the power status, use the **show power** command.

**show power** [**available** | **capabilities** | **detail** | **inline** {[*interface*] | **consumption default** | **module** *mod*} | **module** | **status** | **supplies**]

Syntax Description	
<b>available</b>	(Optional) Displays the available system power.
<b>capabilities</b>	(Optional) Displays the individual power supply capabilities.
<b>detail</b>	(Optional) Displays detailed information on power resources.
<b>inline</b>	(Optional) Displays the PoE status.
<i>interface</i>	(Optional) Type of interface; the only valid value is <b>fastethernet</b> .
<b>consumption default</b>	(Optional ) Displays the PoE consumption.
<b>module</b> <i>mod</i>	(Optional) Displays the PoE consumption for the specified module.
<b>module</b>	(Optional) Displays the power consumption for each module.
<b>status</b>	(Optional) Displays the power supply status.
<b>supplies</b>	(Optional) Displays the number of power supplies needed by the system.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)SG	Displays inline power handling for the Supervisor Engine II-TS.

**Usage Guidelines** If a powered device is connected to an interface with external power, the switch does not recognize the powered device. The Device column in the output of the **show power inline** command displays as unknown.

If your port is not capable of supporting Power over Ethernet, you will receive this message:

```
Power over Ethernet not supported on interface Admin
```

The **show power in-line interface | module** command displays the amount of power that is used to operate a Cisco 7960 IP Phone. To view the amount of power requested, use the **show cdp neighbors** command.

Because of the PoE consumed by FPGAs and other hardware components on the module the operating PoE consumption for an 802.3af-compliant module can be nonzero, even when there are no powered devices attached to the module. The operating PoE can vary by as much as 20 W because of fluctuations in the PoE that is consumed by the hardware components.

**Examples**

This example shows how to display information about the general power supply:

```
Switch# show power
Power
Supply  Model No          Type      Status      Fan      Inline
        -----
PS1     PWR-C45-2800AC         AC 2800W   good        good      good
PS2     PWR-C45-1000AC         AC 1000W   err-disable good      n.a.

*** Power Supplies of different type have been detected***

Power supplies needed by system   :1
Power supplies currently available :1

Power Summary
(in Watts)          Used      Maximum
-----
System Power (12V)   328        1360
Inline Power (-50V)   0          1400
Backplane Power (3.3V) 10          40
-----
Total Used           338 (not to exceed Total Maximum Available = 750)
Switch#
```

This example shows how to display the amount of available system power:

```
Switch# show power available
Power Summary
(in Watts)  Available  Used  Remaining
-----
System Power   1360      280   1080
Inline Power   1400       0   1400
Maximum Power  2800      280   2520
Switch#
```

This example shows how to display detailed information for system power.

```
Switch# show power detail
Power
Supply  Model No          Type      Status      Fan      Inline
        -----
PS1     PWR-C45-1400DC         DCSP1400W good        good      n.a.
PS1-1                   12.5A      good
PS1-2                   15.0A      off
PS1-3                   15.0A      off
PS2     none                --         --         --         --

Power supplies needed by system   : 1
Power supplies currently available : 1

Power Summary
(in Watts)          Used      Maximum
-----
System Power (12V)   360        360
Inline Power (-50V)   0          0
Backplane Power (3.3V) 0          40
-----
Total                360        400
```



Module Inline Power Summary (Watts)  
(12V -> -48V on board conversion)

Mod	Used	Maximum Available
---	----	-----
1	5	25
---	----	-----

		Watts Used of System Power (12V)		
Mod	Model	currently	out of reset	in reset
---	-----	-----	-----	-----
1	WS-X4013+TS	180	180	180
2	WS-X4506-GB-T	60	60	20
3	WS-X4424-GB-RJ45	90	90	50
--	Fan Tray	30	--	--
---	-----	-----	-----	-----
Total		360	330	250

		Watts used of Chassis Inline Power (-50V)			
		Inline Power Admin		Inline Power Oper	
Mod	Model	PS	Device	PS	Device
---	-----	-----	-----	-----	-----
2	WS-X4506-GB-T	0	0	0	0
3	WS-X4424-GB-RJ45	-	-	-	-
---	-----	-----	-----	-----	-----
Total		0	0	0	0

		Watts used of Module Inline Power (12V -> -50V)			
		Inline Power Admin		Inline Power Oper	
Mod	Model	PS	Device	PS	Device
---	-----	-----	-----	-----	-----
1	WS-X4013+TS	6	5	3	3
---	-----	-----	-----	-----	-----

Switch#

This example shows how to display power consumption for the module.

Switch# **show power module**

Watts Used of System Power (12V)

Mod	Model	currently	out of reset	in reset
---	-----	-----	-----	-----
1	WS-X4013+TS	180	180	180
2	WS-X4506-GB-T	60	60	20
3	WS-X4424-GB-RJ45	90	90	50
--	Fan Tray	30	--	--
---	-----	-----	-----	-----
Total		360	330	250

		Watts used of Chassis Inline Power (-50V)			
		Inline Power Admin		Inline Power Oper	
Mod	Model	PS	Device	PS	Device
---	-----	-----	-----	-----	-----
2	WS-X4506-GB-T	0	0	0	0
3	WS-X4424-GB-RJ45	-	-	-	-
---	-----	-----	-----	-----	-----
Total		0	0	0	0

Watts used of Module Inline Power (12V -> -50V)

		Inline Power Admin			
		Inline Power Admin		Inline Power Oper	
Mod	Model	PS	Device	PS	Device
---	-----	-----	-----	-----	-----
1	WS-X4013+TS	6	5	3	3
---	-----	-----	-----	-----	-----

Switch#

**Note**

The “Inline Power Oper” column displays the PoE consumed by the powered devices attached to the module in addition to the PoE consumed by the FPGAs and other hardware components on the module. The “Inline Power Admin” column displays only the PoE allocated by the powered devices attached to the module.

This example shows how to display the power status information:

```
Switch# show power status
```

Power Supply	Model No	Type	Status	Fan Sensor	Inline Status
PS1	PWR-C45-2800AC	AC 2800W	good	good	good
PS2	PWR-C45-2800AC	AC 2800W	good	good	good

Power Supply (Nos in Watts)	Max Inline	Min Inline	Max System	Min System	Absolute Maximum
PS1	1400	1400	1360	1360	2800
PS2	1400	1400	1360	1360	2800

```
Switch#
```

This example shows how to verify the PoE consumption for the switch:

```
Switch# show power inline consumption default
Default PD consumption : 5000 mW
Switch#
```

This example shows how to display the status of inline power:

```
Switch# show power inline
Available:677(w) Used:117(w) Remaining:560(w)
```

Interface	Admin	Oper	Power(Watts)		Device	Class
			From PS	To Device		
Fa3/1	auto	on	17.3	15.4	Ieee PD	0
Fa3/2	auto	on	4.5	4.0	Ieee PD	1
Fa3/3	auto	on	7.1	6.3	Cisco IP Phone 7960	0
Fa3/4	auto	on	7.1	6.3	Cisco IP Phone 7960	n/a
Fa3/5	auto	on	17.3	15.4	Ieee PD	0
Fa3/6	auto	on	17.3	15.4	Ieee PD	0
Fa3/7	auto	on	4.5	4.0	Ieee PD	1
Fa3/8	auto	on	7.9	7.0	Ieee PD	2
Fa3/9	auto	on	17.3	15.4	Ieee PD	3
Fa3/10	auto	on	17.3	15.4	Ieee PD	4
Fa3/11	auto	off	0	0	n/a	n/a
Fa3/12	auto	off	0	0	n/a	n/a
Fa3/13	auto	off	0	0	n/a	n/a
Fa3/14	auto	off	0	0	n/a	n/a
Fa3/15	auto	off	0	0	n/a	n/a
Fa3/16	auto	off	0	0	n/a	n/a
Fa3/17	auto	off	0	0	n/a	n/a
Fa3/18	auto	off	0	0	n/a	n/a
-----						
Totals:		10 on	117.5	104.6		

```
Switch#
```

This example shows how to display the number of power supplies needed by the system:

```
Switch# show power supplies
Power supplies needed by system = 2
Switch#
```

This example shows how to display the PoE status for Fast Ethernet interface 3/1:

```
Switch# show power inline fastethernet3/1
Available:677(w) Used:11(w) Remaining:666(w)
```

Interface	Admin	Oper	Power(Watts)		Device	Class
			From PS	To Device		
Fa3/1	auto	on	11.2	10.0	Ieee PD	0

Interface	AdminPowerMax (Watts)	AdminConsumption (Watts)
Fa3/1	15.4	10.0

```
Switch#
```



#### Note

When the Supervisor Engine II+TS is used with the 1400 W DC power supply (PWR-C45-1400DC), and only one 12.5 A input of the DC power supply is used, the supervisor engine's power consumption may vary depending on whether there is any linecard inserted at slot 2 and 3, as well as on the type of linecards inserted. This amount varies between 155 W and 330 W. This variability also affects the maximum amount of available supervisor engine inline power, which can also vary from 0 W to 175 W. Therefore, it is possible for a supervisor engine to deny inline power to some connected inline power devices when one or more linecards are inserted into the chassis.

The output of the commands **show power detail** and **show power module** display the supervisor engine's variable power consumption and its inline power summary.

```
Switch# show power detail
sh power detail
Power
Supply Model No Type Status Fan Sensor Inline Status
-----
PS1 PWR-C45-1400DC DCSP1400W good good n.a.
PS1-1 12.5A good
PS1-2 15.0A off
PS1-3 15.0A off
PS2 none -- -- -- --

Power supplies needed by system : 1
Power supplies currently available : 1

Power Summary
(in Watts) Used Maximum Available
-----
System Power (12V) 360 360
Inline Power (-50V) 0 0
Backplane Power (3.3V) 0 40
-----
Total 360 400

Module Inline Power Summary (Watts)
(12V -> -48V on board conversion)
-----
```

show power

Mod	Used	Maximum Available
---	----	-----
1	5	25
---	----	-----

		Watts Used of System Power (12V)		
Mod	Model	currently	out of reset	in reset
---	-----	-----	-----	-----
1	WS-X4013+TS	180	180	180
2	WS-X4506-GB-T	60	60	20
3	WS-X4424-GB-RJ45	90	90	50
--	Fan Tray	30	--	--
---	-----	-----	-----	-----
Total		360	330	250

		Watts used of Chassis Inline Power (-50V)			
		Inline Power Admin		Inline Power Oper	
Mod	Model	PS	Device	PS	Device
---	-----	-----	-----	-----	-----
2	WS-X4506-GB-T	0	0	0	0
3	WS-X4424-GB-RJ45	-	-	-	-
---	-----	-----	-----	-----	-----
Total		0	0	0	0

		Watts used of Module Inline Power (12V -> -50V)			
		Inline Power Admin		Inline Power Oper	
Mod	Model	PS	Device	PS	Device
---	-----	-----	-----	-----	-----
1	WS-X4013+TS	6	5	3	3
---	-----	-----	-----	-----	-----

Switch#sh power module  
sh power module

		Watts Used of System Power (12V)		
Mod	Model	currently	out of reset	in reset
---	-----	-----	-----	-----
1	WS-X4013+TS	180	180	180
2	WS-X4506-GB-T	60	60	20
3	WS-X4424-GB-RJ45	90	90	50
--	Fan Tray	30	--	--
---	-----	-----	-----	-----
Total		360	330	250

		Watts used of Chassis Inline Power (-50V)			
		Inline Power Admin		Inline Power Oper	
Mod	Model	PS	Device	PS	Device
---	-----	-----	-----	-----	-----
2	WS-X4506-GB-T	0	0	0	0
3	WS-X4424-GB-RJ45	-	-	-	-
---	-----	-----	-----	-----	-----
Total		0	0	0	0

		Watts used of Module Inline Power (12V -> -50V)			
		Inline Power Admin		Inline Power Oper	
Mod	Model	PS	Device	PS	Device
---	-----	-----	-----	-----	-----
1	WS-X4013+TS	6	5	3	3
---	-----	-----	-----	-----	-----

Switch#

---

Related Commands

[power dc input](#)  
[power inline](#)  
[power inline consumption](#)  
[power redundancy-mode](#)  
[power supplies required](#)

# show qos

To display QoS information, use the **show qos** command.

**show qos**

---

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

---

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

---

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

---

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---

---

Examples	This example shows the output that might be displayed if you do not enter any keywords:
----------	---

```
Switch# show qos
  QoS is enabled globally
Switch#
```

---

Related Commands	<a href="#">qos (global configuration mode)</a> <a href="#">qos (interface configuration mode)</a>
------------------	---

# show qos aggregate policer

To display QoS aggregate policer information, use the **show qos aggregate policer** command.

**show qos aggregate policer** [*aggregate\_name*]

Syntax Description	<i>aggregate_name</i> (Optional) Named aggregate policer.	
Defaults	This command has no default settings.	
Command Modes	Privileged EXEC	
Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	The aggregate policer name is case sensitive.	
Examples	<p>This example shows the output if you do not enter any keywords:</p> <pre>Switch# show qos aggregate policer Policer aggr-1 Rate(bps):10000000 Normal-Burst(bytes):1000000 conform-action:transmit exceed-action:policed-dscp-transmit Polycymaps using this policer:     ipp5-policy Switch#</pre>	
Related Commands	<a href="#">qos aggregate-policer</a>	

# show qos dbl

To display global Dynamic Buffer Limiting (DBL) information, use the **show qos dbl** command.

**show qos dbl**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to display global DBL information:
-----------------	---

```
Switch# show qos dbl
DBL is enabled globally
DBL flow includes vlan
DBL flow includes l4-ports
DBL does not use ecn to indicate congestion
DBL exceed-action mark probability:15%
DBL max credits:15
DBL aggressive credit limit:10
DBL aggressive buffer limit:2 packets
Switch#
```

<b>Related Commands</b>	<a href="#">qos (global configuration mode)</a> <a href="#">qos dbl</a>
-------------------------	--



# show qos interface

To display queueing information, use the **show qos interface** command.

**show qos interface** {**fastethernet** *interface-number* | **gigabitethernet** *interface-number*} |  
[**vlan** *vlan\_id* | **port-channel** *number*]

Syntax Description	<b>fastethernet</b> <i>interface-number</i>	Specifies the Fast Ethernet 802.3 interface.
	<b>gigabitethernet</b> <i>interface-number</i>	Specifies the Gigabit Ethernet 802.3z interface.
	<b>vlan</b> <i>vlan_id</i>	(Optional) Specifies the VLAN ID; valid values are from 1 to 4094.
	<b>port-channel</b> <i>number</i>	(Optional) Specifies the port channel; valid ranges are from 1 to 64.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(13)EW	Added support for extended VLAN addresses.
	12.1(19)EW	Display changed to include the Port Trust Device.

**Examples** This example shows how to display queueing information:

```
Switch# show qos interface fastethernet 6/1
QoS is enabled globally
Port QoS is enabled
Administrative Port Trust State: 'dscp'
Operational Port Trust State: 'untrusted'
Port Trust Device: 'cisco-phone'
Default DSCP:0 Default CoS:0

      Tx-Queue   Bandwidth   ShapeRate   Priority   QueueSize
              (bps)        (bps)
      1      31250000   disabled    N/A        240
      2      31250000   disabled    N/A        240
      3      31250000   disabled    normal     240
      4      31250000   disabled    N/A        240
Switch#
```

**Related Commands**

- [qos map cos](#)
- [show qos](#)
- [tx-queue](#)

# show qos maps

To display QoS map information, use the **show qos maps** command.

**show qos maps [cos | dscp [policed | tx-queue]]**

Syntax Description	<b>cos</b>	(Optional) Displays CoS map information.
	<b>dscp</b>	(Optional) Displays DSCP map information.
	<b>policed</b>	(Optional) Displays policed map information.
	<b>tx-queue</b>	(Optional) Displays tx-queue map information.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display QoS map settings:

```
Switch# show qos maps
DSCP-TxQueue Mapping Table (dscp = d1d2)
d1 :d2  0  1  2  3  4  5  6  7  8  9
-----
0 :    01 01 01 01 01 01 01 01 01 01
1 :    01 01 01 01 01 01 02 02 02 02
2 :    02 02 02 02 02 02 02 02 02 02
3 :    02 02 03 03 03 03 03 03 03 03
4 :    03 03 03 03 03 03 03 03 04 04
5 :    04 04 04 04 04 04 04 04 04 04
6 :    04 04 04 04

Policed DSCP Mapping Table (dscp = d1d2)
d1 :d2  0  1  2  3  4  5  6  7  8  9
-----
0 :    00 01 02 03 04 05 06 07 08 09
1 :    10 11 12 13 14 15 16 17 18 19
2 :    20 21 22 23 24 25 26 27 28 29
3 :    30 31 32 33 34 35 36 37 38 39
4 :    40 41 42 43 44 45 46 47 48 49
5 :    50 51 52 53 54 55 56 57 58 59
6 :    60 61 62 63
```

```

DSCP-CoS Mapping Table (dscp = d1d2)
d1 :d2  0  1  2  3  4  5  6  7  8  9
-----
0  :   00 00 00 00 00 00 00 00 01 01
1  :   01 01 01 01 01 01 02 02 02 02
2  :   02 02 02 02 03 03 03 03 03 03
3  :   03 03 04 04 04 04 04 04 04 04
4  :   05 05 05 05 05 05 05 05 06 06
5  :   06 06 06 06 06 06 07 07 07 07
6  :   07 07 07 07

CoS-DSCP Mapping Table
CoS:  0  1  2  3  4  5  6  7
-----
DSCP:  0  8 16 24 32 40 48 56

Switch#

```

**Related Commands**

**qos (global configuration mode)**  
**qos (interface configuration mode)**

# show redundancy

To display redundancy facility information, use the **show redundancy** command.

**show redundancy {clients | counters | history | states}**

Syntax Description	<b>clients</b>	(Optional) Displays information about the redundancy facility client.
	<b>counters</b>	(Optional) Displays information about the redundancy facility counter.
	<b>history</b>	(Optional) Displays a log of past status and related information for the redundancy facility.
	<b>states</b>	(Optional) Displays information about the redundancy facility state.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1.(13)EW	Support for this command was introduced on the Catalyst 4500 series switch (Catalyst 4507R only).

**Examples** This example shows how to display information about the redundancy facility:

```
Switch# show redundancy
4507r-demo#show redundancy
Redundant System Information :
-----
    Available system uptime = 2 days, 2 hours, 39 minutes
Switchovers system experienced = 0
    Standby failures = 0
    Last switchover reason = none

    Hardware Mode = Duplex
    Configured Redundancy Mode = Stateful Switchover
    Operating Redundancy Mode = Stateful Switchover
    Maintenance Mode = Disabled
    Communications = Up

Current Processor Information :
-----
    Active Location = slot 1
    Current Software state = ACTIVE
    Uptime in current state = 2 days, 2 hours, 39 minutes
    Image Version = Cisco Internetwork Operating System Software
IOS (tm) Catalyst 4000 L3 Switch Software (cat4000-I5S-M), Version 12.2(20)EWA(3
.92), CISCO INTERNAL USE ONLY ENHANCED PRODUCTION VERSION
Copyright (c) 1986-2004 by cisco Systems, Inc.
Compiled Wed 14-Jul-04 04:42 by esi
    BOOT = bootflash:cat4000-i5s-mz.122_20_EWA_392,1
    Configuration register = 0x2002
```

```

Peer Processor Information :
-----
      Standby Location = slot 2
      Current Software state = STANDBY HOT
      Uptime in current state = 2 days, 2 hours, 39 minutes
      Image Version = Cisco Internetwork Operating System Software
IOS (tm) Catalyst 4000 L3 Switch Software (cat4000-I5S-M), Version 12.2(20)EWA(3
.92), CISCO INTERNAL USE ONLY ENHANCED PRODUCTION VERSION
Copyright (c) 1986-2004 by cisco Systems, Inc.
Compiled Wed 14-Jul-04 0
      BOOT = bootflash:cat4000-i5s-mz.122_20_EWA_392,1
      Configuration register = 0x2002

```

Switch#

This example shows how to display redundancy facility client information:

```

Switch# show redundancy clients
clientID = 0      clientSeq = 0      RF_INTERNAL_MSG
clientID = 30     clientSeq = 135     Redundancy Mode RF
clientID = 28     clientSeq = 330     GALIOS_CONFIG_SYNC
clientID = 65000  clientSeq = 65000    RF_LAST_CLIENT Switch

```

The output displays the following information:

- clientID displays the client's ID number.
- clientSeq displays the client's notification sequence number.
- Current redundancy facility state.

This example shows how to display the redundancy facility counter information:

```

Switch# show redundancy counters
Redundancy Facility OMs
      comm link up = 1
      comm link down down = 0

      invalid client tx = 0
      null tx by client = 0
      tx failures = 0
      tx msg length invalid = 0

      client not rxing msgs = 0
      rx peer msg routing errors = 0
      null peer msg rx = 0
      errored peer msg rx = 0

      buffers tx = 1535
      tx buffers unavailable = 0
      buffers rx = 1530
      buffer release errors = 0

      duplicate client registers = 0
      failed to register client = 0
      Invalid client syncs = 0

```

This example shows how to display redundancy facility history information:

```

Switch# show redundancy history
00:00:01 client added: RF_INTERNAL_MSG(0) seq=0
00:00:01 client added: RF_LAST_CLIENT(65000) seq=65000
00:00:01 client added: GALIOS_CONFIG_SYNC(28) seq=330
00:00:03 client added: Redundancy Mode RF(30) seq=135

```

## ■ show redundancy

```

00:00:03 *my state = INITIALIZATION(2) *peer state = DISABLED(1)
00:00:03 RF_PROG_INITIALIZATION(100) RF_INTERNAL_MSG(0) op=0 rc=11
00:00:03 RF_PROG_INITIALIZATION(100) Redundancy Mode RF(30) op=0 rc=11
00:00:03 RF_PROG_INITIALIZATION(100) GALIOS_CONFIG_SYNC(28) op=0 rc=11
00:00:03 RF_PROG_INITIALIZATION(100) RF_LAST_CLIENT(65000) op=0 rc=11
00:00:03 *my state = NEGOTIATION(3) peer state = DISABLED(1)
00:00:25 RF_EVENT_GO_ACTIVE(511) op=0
00:00:25 *my state = ACTIVE-FAST(9) peer state = DISABLED(1)
00:00:25 RF_STATUS_MAINTENANCE_ENABLE(403) Redundancy Mode RF(30) op=0
00:00:25 RF_STATUS_MAINTENANCE_ENABLE(403) GALIOS_CONFIG_SYNC(28) op=0
00:00:25 RF_PROG_ACTIVE_FAST(200) RF_INTERNAL_MSG(0) op=0 rc=11
00:00:25 RF_PROG_ACTIVE_FAST(200) Redundancy Mode RF(30) op=0 rc=11
00:00:25 RF_PROG_ACTIVE_FAST(200) GALIOS_CONFIG_SYNC(28) op=0 rc=11
00:00:25 RF_PROG_ACTIVE_FAST(200) RF_LAST_CLIENT(65000) op=0 rc=11
00:00:25 *my state = ACTIVE-DRAIN(10) peer state = DISABLED(1)
00:00:25 RF_PROG_ACTIVE_DRAIN(201) RF_INTERNAL_MSG(0) op=0 rc=11
00:00:25 RF_PROG_ACTIVE_DRAIN(201) Redundancy Mode RF(30) op=0 rc=11
00:00:25 RF_PROG_ACTIVE_DRAIN(201) GALIOS_CONFIG_SYNC(28) op=0 rc=11
00:00:25 RF_PROG_ACTIVE_DRAIN(201) RF_LAST_CLIENT(65000) op=0 rc=11
---cut---cut---cut---
---cut---cut---cut---
00:01:34 RF_PROG_PLATFORM_SYNC(300) RF_INTERNAL_MSG(0) op=0 rc=11
00:01:34 RF_PROG_PLATFORM_SYNC(300) Redundancy Mode RF(30) op=0 rc=11
00:01:34 RF_PROG_PLATFORM_SYNC(300) GALIOS_CONFIG_SYNC(28) op=0 rc=0
00:01:34 RF_EVENT_CLIENT_PROGRESSION(503) GALIOS_CONFIG_SYNC(28) op=1 rc=0
00:01:36 RF_EVENT_PEER_PROG_DONE(506) GALIOS_CONFIG_SYNC(28) op=300
00:01:36 RF_PROG_PLATFORM_SYNC(300) RF_LAST_CLIENT(65000) op=0 rc=0
00:01:36 RF_EVENT_CLIENT_PROGRESSION(503) RF_LAST_CLIENT(65000) op=1 rc=0
00:01:36 RF_EVENT_PEER_PROG_DONE(506) RF_LAST_CLIENT(65000) op=300
00:01:38 *my state = ACTIVE(13) *peer state = STANDBY COLD(4)

```

This example shows how to display information about the redundancy facility state:

```

Switch# show redundancy states
my state = 13 -ACTIVE
    peer state = 8 -STANDBY HOT
        Mode = Duplex
        Unit = Primary
        Unit ID = 2

Redundancy Mode (Operational) = Stateful Switchover
Redundancy Mode (Configured) = Stateful Switchover
    Split Mode = Disabled
    Manual Swact = Enabled
    Communications = Up

    client count = 21
    client_notification_TMR = 240000 milliseconds
        keep_alive TMR = 9000 milliseconds
            keep_alive count = 0
            keep_alive threshold = 18
            RF debug mask = 0x0
Switch#

```

## Related Commands

**redundancy**  
**redundancy force-switchover**

# show running-config

To display the module status and configuration, use the **show running-config** command.

**show running-config** [*module slot*]

Syntax Description	<b>module slot</b> (Optional) Specifies the module slot number; valid values are from 1 to 6.
--------------------	---

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

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>In some cases, you might see a difference in the duplex mode displayed when you enter the <b>show interfaces</b> command and the <b>show running-config</b> command. If you do see a difference, the duplex mode displayed in the <b>show interfaces</b> command is the actual duplex mode that the interface is running. The <b>show interfaces</b> command shows the operating mode for an interface, while the <b>show running-config</b> command shows the configured mode for an interface.</p> <p>The <b>show running-config</b> command output for an interface may display a duplex mode configuration but no configuration for the speed. When no speed is displayed in the output, it indicates that the interface speed is configured to be auto and that the duplex mode shown becomes the operational setting once the speed is configured to something other than auto. With this configuration, it is possible that the operating duplex mode for that interface does not match the duplex mode shown with the <b>show running-config</b> command.</p>
------------------	--

Examples	This example shows how to display the module and status configuration for all modules:
----------	--

```
Switch# show running-config
03:23:36:%SYS-5-CONFIG_I:Configured from console by console$ runn
Building configuration...

Current configuration:3268 bytes
!
version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Switch
!
!
power supplies required 1
ip subnet-zero
```

```
!  
!  
!  
interface FastEthernet1  
  no ip address  
  shutdown  
  duplex auto  
  speed auto  
Switch#
```

This example shows the output for the **show running-config** command when you have enabled the **switchport voice vlan** command:

```
Switch# show running-config int fastethernet 6/1  
Building configuration...  
  
Current configuration:133 bytes  
!  
interface FastEthernet6/1  
  switchport voice vlan 2  
  no snmp trap link-status  
  spanning-tree portfast  
  channel-group 1 mode on  
end  
  
Switch#
```



# show slavebootflash:

To display information about the standby bootflash file system, use the **show slavebootflash:** command.

**show slavebootflash:** [**all** | **chips** | **filesys**]

Syntax Description	<b>all</b>	(Optional) Displays all possible Flash information.
	<b>chips</b>	(Optional) Displays Flash chip information.
	<b>filesys</b>	(Optional) Displays file system information.

**Defaults** This command has no default settings.

**Command Modes** EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display file system status information:

```
Switch# show slavebootflash: filesys

----- F I L E   S Y S T E M   S T A T U S -----
  Device Number = 0
DEVICE INFO BLOCK: bootflash
  Magic Number      = 6887635   File System Vers = 10000   (1.0)
  Length            = 1000000   Sector Size      = 40000
  Programming Algorithm = 39     Erased State     = FFFFFFFF
  File System Offset  = 40000    Length           = F40000
  MONLIB Offset      = 100      Length           = C628
  Bad Sector Map Offset = 3FFF8   Length           = 8
  Squeeze Log Offset  = F80000   Length           = 40000
  Squeeze Buffer Offset = FC0000  Length           = 40000
  Num Spare Sectors   = 0
    Spares:
STATUS INFO:
  Writable
  NO File Open for Write
  Complete Stats
  No Unrecovered Errors
  No Squeeze in progress
USAGE INFO:
  Bytes Used      = 917CE8   Bytes Available = 628318
  Bad Sectors     = 0        Spared Sectors  = 0
  OK Files        = 2        Bytes           = 917BE8
  Deleted Files   = 0        Bytes           = 0
  Files w/Errors  = 0        Bytes           = 0
Switch>
```

show slavebootflash:

This example shows how to display system image information:

```
Switch# show slavebootflash:
-# - ED --type-- --crc--- -seek-- nlen -length- -----date/time----- name
1  .. image      8C5A393A  237E3C   14  2063804 Aug 23 1999 16:18:45 c4-boot-mz
2  .. image      D86EE0AD  957CE8    9  7470636 Sep 20 1999 13:48:49 rp.halley
Switch>
```

This example shows how to display all bootflash information:

```
Switch# show slavebootflash: all
-# - ED --type-- --crc--- -seek-- nlen -length- -----date/time----- name
1  .. image      8C5A393A  237E3C   14  2063804 Aug 23 1999 16:18:45 c4-boot-
mz
2  .. image      D86EE0AD  957CE8    9  7470636 Sep 20 1999 13:48:49 rp.halley

6456088 bytes available (9534696 bytes used)

----- F I L E   S Y S T E M   S T A T U S -----
Device Number = 0
DEVICE INFO BLOCK: bootflash
  Magic Number      = 6887635   File System Vers = 10000   (1.0)
  Length            = 1000000   Sector Size      = 40000
  Programming Algorithm = 39     Erased State     = FFFFFFFF
  File System Offset = 40000     Length = F40000
  MONLIB Offset     = 100       Length = C628
  Bad Sector Map Offset = 3FFF8   Length = 8
  Squeeze Log Offset = F80000    Length = 40000
  Squeeze Buffer Offset = FC0000  Length = 40000
  Num Spare Sectors  = 0
  Spares:
STATUS INFO:
  Writable
  NO File Open for Write
  Complete Stats
  No Unrecovered Errors
  No Squeeze in progress
USAGE INFO:
  Bytes Used      = 917CE8   Bytes Available = 628318
  Bad Sectors     = 0       Spared Sectors  = 0
  OK Files        = 2       Bytes = 917BE8
  Deleted Files   = 0       Bytes = 0
  Files w/Errors  = 0       Bytes = 0
Switch>
```

# show slaveslot0:

To display information about the file system on the standby supervisor engine, use the **show slaveslot0:** command.

**show slot0: [all | chips | filesys]**

Syntax Description	<b>all</b>	(Optional) Displays all Flash information including the output from the <b>show slot0: chips</b> and <b>show slot0: filesys</b> commands.
	<b>chips</b>	(Optional) Displays Flash chip register information.
	<b>filesys</b>	(Optional) Displays file system status information.

**Defaults** This command has no default settings.

**Command Modes** EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display a summary of the file system:

```
Switch# show slaveslot0:
-# - ED --type-- --crc--- -seek-- nlen -length- -----date/time----- name
1  .. image      6375DBB7  A4F144      6 10678468 Nov 09 1999 10:50:42 halley

5705404 bytes available (10678596 bytes used)
Switch>
```

This example shows how to display Flash chip information:

```
Switch# show slaveslot0: chips
***** Intel Series 2+ Status/Register Dump *****
ATTRIBUTE MEMORY REGISTERS:
  Config Option Reg (4000): 2
  Config Status Reg (4002): 0
  Card Status   Reg (4100): 1
  Write Protect Reg (4104): 4
  Voltage Cntrl Reg (410C): 0
  Rdy/Busy Mode Reg (4140): 2

COMMON MEMORY REGISTERS: Bank 0
  Intelligent ID Code   : 8989A0A0
  Compatible Status Reg: 8080
  Global      Status Reg: B0B0
  Block Status Regs:
    0  : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
    8  : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   16 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   24 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
```

```
show slaveslot0:
```

```
COMMON MEMORY REGISTERS: Bank 1
  Intelligent ID Code   : 8989A0A0
  Compatible Status Reg: 8080
  Global      Status Reg: B0B0
  Block Status Regs:
    0 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
    8 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   16 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   24 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0

COMMON MEMORY REGISTERS: Bank 2
  Intelligent ID Code   : 8989A0A0
  Compatible Status Reg: 8080
  Global      Status Reg: B0B0
  Block Status Regs:
    0 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
    8 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   16 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   24 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0

COMMON MEMORY REGISTERS: Bank 3
  Intelligent ID Code   : 8989A0A0
  Compatible Status Reg: 8080
  Global      Status Reg: B0B0
  Block Status Regs:
    0 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
    8 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   16 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   24 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0

COMMON MEMORY REGISTERS: Bank 4
  Intelligent ID Code   : FFFFFFFF
  IID Not Intel -- assuming bank not populated
```

This example shows how to display file system information:

```
Switch# show slaveslot0: filesystems
----- F I L E   S Y S T E M   S T A T U S -----
  Device Number = 0
DEVICE INFO BLOCK: slot0
  Magic Number      = 6887635   File System Vers = 10000   (1.0)
  Length            = 1000000   Sector Size      = 20000
  Programming Algorithm = 4     Erased State     = FFFFFFFF
  File System Offset  = 20000    Length = FA0000
  MONLIB Offset      = 100      Length = F568
  Bad Sector Map Offset = 1FFF0  Length = 10
  Squeeze Log Offset  = FC0000   Length = 20000
  Squeeze Buffer Offset = FE0000  Length = 20000
  Num Spare Sectors   = 0
  Spares:
STATUS INFO:
  Writable
  NO File Open for Write
  Complete Stats
  No Unrecovered Errors
  No Squeeze in progress
USAGE INFO:
  Bytes Used      = 9F365C   Bytes Available = 5AC9A4
  Bad Sectors     = 0        Spared Sectors  = 0
  OK Files        = 1        Bytes = 9F35DC
  Deleted Files   = 0        Bytes = 0
  Files w/Errors  = 0        Bytes =
Switch>
```

# show slot0:

To display information about the slot0: file system, use the **show slot0:** command.

**show slot0:** [**all** | **chips** | **filesys**]

Syntax Description	<b>all</b>	(Optional) Displays all Flash information including the output from the <b>show slot0: chips</b> and <b>show slot0: filesys</b> commands.
	<b>chips</b>	(Optional) Displays Flash chip register information.
	<b>filesys</b>	(Optional) Displays file system status information.

**Defaults** This command has no default settings.

**Command Modes** EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display a summary of the file system:

```
Switch# show slot0:
-# - ED --type-- --crc--- -seek-- nlen -length- -----date/time----- name
1  .. image      6375DBB7  A4F144      6 10678468 Nov 09 1999 10:50:42 halley

5705404 bytes available (10678596 bytes used)
Switch>
```

This example shows how to display Flash chip information:

```
Switch# show slot0: chips
***** Intel Series 2+ Status/Register Dump *****
ATTRIBUTE MEMORY REGISTERS:
  Config Option Reg (4000): 2
  Config Status Reg (4002): 0
  Card Status Reg (4100): 1
  Write Protect Reg (4104): 4
  Voltage Cntrl Reg (410C): 0
  Rdy/Busy Mode Reg (4140): 2

COMMON MEMORY REGISTERS: Bank 0
  Intelligent ID Code : 8989A0A0
  Compatible Status Reg: 8080
  Global Status Reg: B0B0
  Block Status Regs:
    0 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
    8 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   16 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   24 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
```

show slot0:

```
COMMON MEMORY REGISTERS: Bank 1
  Intelligent ID Code   : 8989A0A0
  Compatible Status Reg: 8080
  Global      Status Reg: B0B0
  Block Status Regs:
    0 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
    8 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   16 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   24 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0

COMMON MEMORY REGISTERS: Bank 2
  Intelligent ID Code   : 8989A0A0
  Compatible Status Reg: 8080
  Global      Status Reg: B0B0
  Block Status Regs:
    0 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
    8 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   16 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   24 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0

COMMON MEMORY REGISTERS: Bank 3
  Intelligent ID Code   : 8989A0A0
  Compatible Status Reg: 8080
  Global      Status Reg: B0B0
  Block Status Regs:
    0 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
    8 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   16 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0
   24 : B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0 B0B0

COMMON MEMORY REGISTERS: Bank 4
  Intelligent ID Code   : FFFFFFFF
  IID Not Intel -- assuming bank not populated
Switch>
```

This example shows how to display file system information:

```
Switch# show slot0: filesystems
----- F I L E   S Y S T E M   S T A T U S -----
  Device Number = 0
DEVICE INFO BLOCK: slot0
  Magic Number      = 6887635   File System Vers = 10000   (1.0)
  Length           = 1000000   Sector Size      = 20000
  Programming Algorithm = 4     Erased State      = FFFFFFFF
  File System Offset = 20000    Length = FA0000
  MONLIB Offset     = 100      Length = F568
  Bad Sector Map Offset = 1FFF0  Length = 10
  Squeeze Log Offset = FC0000   Length = 20000
  Squeeze Buffer Offset = FE0000 Length = 20000
  Num Spare Sectors  = 0
  Spares:
STATUS INFO:
  Writable
  NO File Open for Write
  Complete Stats
  No Unrecovered Errors
  No Squeeze in progress
USAGE INFO:
  Bytes Used      = 9F365C   Bytes Available = 5AC9A4
  Bad Sectors     = 0        Spared Sectors  = 0
  OK Files        = 1        Bytes = 9F35DC
  Deleted Files   = 0        Bytes = 0
  Files w/Errors  = 0        Bytes = 0
Switch>
```

# show spanning-tree

To display spanning-tree state information, use the **show spanning-tree** command.

**show spanning-tree** [*bridge\_group* | **active** | **backbonefast** | **bridge** [*id*] | **inconsistentports** | **interface** *type* | **root** | **summary** [**total**] | **uplinkfast** | **vlan** *vlan\_id* | **pathcost method** | **detail**]

Syntax Description	
<i>bridge_group</i>	(Optional) Specifies the bridge group number; valid values are from 1 to 255.
<b>active</b>	(Optional) Displays the spanning-tree information on active interfaces only.
<b>backbonefast</b>	(Optional) Displays the spanning-tree BackboneFast status.
<b>bridge</b>	(Optional) Displays the bridge status and configuration information.
<i>id</i>	(Optional) Name of the bridge.
<b>inconsistentports</b>	(Optional) Displays the root inconsistency state.
<b>interface</b> <i>type</i>	(Optional) Specifies the interface type and number; valid values are <b>fastethernet</b> , <b>gigabitethernet</b> , <b>tengigabitethernet</b> , <b>port-channel</b> (1 to 64), and <b>vlan</b> (1 to 4094).
<b>root</b>	(Optional) Displays the root bridge status and configuration.
<b>summary</b>	(Optional) Specifies a summary of port states.
<b>total</b>	(Optional) Displays the total lines of the spanning-tree state section.
<b>uplinkfast</b>	(Optional) Displays the spanning-tree UplinkFast status.
<b>vlan</b> <i>vlan_id</i>	(Optional) Specifies the VLAN ID; valid values are from 1 to 4094.
<b>pathcost method</b>	(Optional) Displays the default path cost calculation method used.
<b>detail</b>	(Optional) Displays a summary of interface information.

**Defaults** Interface information summary is displayed.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended addressing was added.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

**Examples** This example shows how to display spanning-tree information on the active interfaces only:

```
Switch# show spanning-tree active
UplinkFast is disabled
BackboneFast is disabled
```

```
VLAN1 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address 0050.3e8d.6401
Configured hello time 2, max age 20, forward delay 15
```

## ■ show spanning-tree

```

Current root has priority 16384, address 0060.704c.7000
Root port is 265 (FastEthernet5/9), cost of root path is 38
Topology change flag not set, detected flag not set
Number of topology changes 0 last change occurred 18:13:54 ago
Times: hold 1, topology change 24, notification 2
      hello 2, max age 14, forward delay 10
Timers: hello 0, topology change 0, notification 0

Port 265 (FastEthernet5/9) of VLAN1 is forwarding
  Port path cost 19, Port priority 128, Port Identifier 129.9.
  Designated root has priority 16384, address 0060.704c.7000
  Designated bridge has priority 32768, address 00e0.4fac.b000
  Designated port id is 128.2, designated path cost 19
  Timers: message age 3, forward delay 0, hold 0
  Number of transitions to forwarding state: 1
  BPDUs: sent 3, received 32852
Switch#

```

This example shows how to display the spanning-tree BackboneFast status:

```

Switch# show spanning-tree backbonefast
BackboneFast is enabled

```

```

BackboneFast statistics
-----
Number of transition via backboneFast (all VLANs) : 0
Number of inferior BPDUs received (all VLANs)      : 0
Number of RLQ request PDUs received (all VLANs)    : 0
Number of RLQ response PDUs received (all VLANs)   : 0
Number of RLQ request PDUs sent (all VLANs)        : 0
Number of RLQ response PDUs sent (all VLANs)       : 0
Switch#

```

This example shows how to display spanning-tree information for the bridge:

```

Switch# show spanning-tree bridge
VLAN1
  Bridge ID  Priority    32768
            Address     0050.3e8d.6401
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
VLAN2
  Bridge ID  Priority    32768
            Address     0050.3e8d.6402
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
VLAN3
  Bridge ID  Priority    32768
            Address     0050.3e8d.6403
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
Switch#

```

This example shows how to display a summary of interface information:

```

Switch# show spanning-tree

VLAN1
  Spanning tree enabled protocol ieee
  Root ID    Priority    32768
            Address     0030.94fc.0a00
            This bridge is the root
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32768
            Address     0030.94fc.0a00
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time   300

```



Interface Name	Port ID	Prio	Cost	Sts	Designated Cost Bridge ID	Port ID
FastEthernet6/15	129.79	128	19	FWD	0 32768 0030.94fc.0a00	129.79

## VLAN2

```
Spanning tree enabled protocol ieee
Root ID    Priority    32768
           Address    0030.94fc.0a01
           This bridge is the root
           Hello Time  2 sec   Max Age 20 sec   Forward Delay 15 sec
```

```
Bridge ID  Priority    32768
           Address    0030.94fc.0a01
           Hello Time  2 sec   Max Age 20 sec   Forward Delay 15 sec
           Aging Time  300
```

Interface Name	Port ID	Prio	Cost	Sts	Designated Cost Bridge ID	Port ID
FastEthernet6/16	129.80	128	19	FWD	0 32768 0030.94fc.0a01	129.80

Switch#

This example shows how to display spanning-tree information for Fast Ethernet interface 5/9:

```
Switch# show spanning-tree interface fastethernet5/9
Interface Fa0/10 (port 23) in Spanning tree 1 is ROOT-INCONSISTENT
Port path cost 100, Port priority 128
Designated root has priority 8192, address 0090.0c71.a400
Designated bridge has priority 32768, address 00e0.1e9f.8940
Designated port is 23, path cost 115
Timers: message age 0, forward delay 0, hold 0
BPDU: sent 0, received 0
The port is in the portfast mode
Switch#
```

This example shows how to display spanning-tree information for a specific VLAN:

```
Switch# show spanning-tree vlan 1
VLAN1 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address 0030.94fc.0a00
Configured hello time 2, max age 20, forward delay 15
We are the root of the spanning tree
Topology change flag not set, detected flag not set
Number of topology changes 5 last change occurred 01:50:47 ago
    from FastEthernet6/16
Times: hold 1, topology change 35, notification 2
    hello 2, max age 20, forward delay 15

Timers:hello 0, topology change 0, notification 0, aging 300

Port 335 (FastEthernet6/15) of VLAN1 is forwarding
Port path cost 19, Port priority 128, Port Identifier 129.79.
Designated root has priority 32768, address 0030.94fc.0a00
Designated bridge has priority 32768, address 0030.94fc.0a00
Designated port id is 129.79, designated path cost 0
Timers:message age 0, forward delay 0, hold 0
Number of transitions to forwarding state:1
BPDU:sent 6127, received 0
Switch#
```

## show spanning-tree

This example shows how to display spanning-tree information for a specific bridge group:

```
Switch# show spanning-tree vlan 1
UplinkFast is disabled
BackboneFast is disabled
Switch#
```

This example shows how to display a summary of port states:

```
Switch# show spanning-tree summary
Root bridge for:VLAN1, VLAN2.
PortFast BPDU Guard is disabled
EtherChannel misconfiguration guard is enabled
UplinkFast is disabled
BackboneFast is disabled
Default pathcost method used is short
```

Name	Blocking	Listening	Learning	Forwarding	STP Active
VLAN1	0	0	0	1	1
VLAN2	0	0	0	1	1
2 VLANs	0	0	0	2	2

```
Switch#
```

This example shows how to display the total lines of the spanning-tree state section:

```
Switch# show spanning-tree summary totals
Root bridge for:VLAN1, VLAN2.
PortFast BPDU Guard is disabled
EtherChannel misconfiguration guard is enabled
UplinkFast is disabled
BackboneFast is disabled
Default pathcost method used is short
```

Name	Blocking	Listening	Learning	Forwarding	STP Active
2 VLANs	0	0	0	2	2

```
Switch#
```

This example shows how to determine whether any ports are in root inconsistent state:

```
Switch# show spanning-tree inconsistentports
```

Name	Interface	Inconsistency
VLAN1	FastEthernet3/1	Root Inconsistent

```
Number of inconsistent ports (segments) in the system:1
```

```
Switch#
```

## Related Commands

- [spanning-tree backbonefast](#)
- [spanning-tree cost](#)
- [spanning-tree guard](#)
- [spanning-tree pathcost method](#)
- [spanning-tree portfast default](#)
- [spanning-tree portfast \(interface configuration mode\)](#)
- [spanning-tree port-priority](#)
- [spanning-tree uplinkfast](#)
- [spanning-tree vlan](#)

# show spanning-tree mst

To display MST protocol information, use the **show spanning-tree mst** command.

**show spanning-tree mst** [**configuration**]

**show spanning-tree mst** [*instance-id*] [**detail**]

**show spanning-tree mst** [*instance-id*] **interface** *interface* [**detail**]

Syntax Description	<b>configuration</b>	(Optional) Displays region configuration information.
	<i>instance-id</i>	(Optional) Instance identification number; valid values are from 0 to 15.
	<b>detail</b>	(Optional) Displays detailed MST protocol information.
	<b>interface</b> <i>interface</i>	(Optional) Interface type and number; valid values for type are <b>fastethernet</b> , <b>gigabitethernet</b> , <b>tengigabitethernet</b> , <b>port-channel</b> , and <b>vlan</b> . See the “Usage Guidelines” section for more information.

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

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

Usage Guidelines	<p>This command is not supported on systems that are configured with a Supervisor Engine I.</p> <p>In the output display of the <b>show spanning-tree mst configuration</b> command, a warning message might display. This message appears if you do not map secondary VLANs to the same instance as the associated primary VLAN. The display includes a list of the secondary VLANs that are not mapped to the same instance as the associated primary VLAN. The warning message is as follows:</p>
------------------	--

```
These secondary vlans are not mapped to the same instance as their primary:
-> 3
```

See the [show spanning-tree](#) command for output definitions.

**Examples**

This example shows how to display region configuration information:

```
Switch# show spanning-tree mst configuration
```

```
Name      [leo]
```

```
Revision  2702
```

```
Instance  Vlans mapped
```

```
-----  
0          1-9,11-19,21-29,31-39,41-4094  
1          10,20,30,40  
-----
```

```
Switch#
```

This example shows how to display additional MST protocol values:

```
Switch# show spanning-tree mst 3 detail
```

```
# # # # # MST03 vlans mapped: 3,3000-3999
```

```
Bridge address 0002.172c.f400 priority 32771 (32768 sysid 3)
```

```
Root this switch for MST03
```

```
GigabitEthernet1/1 of MST03 is boundary forwarding
```

```
Port info port id 128.1 priority 128
```

```
cost 20000
```

```
Designated root address 0002.172c.f400 priority 32771
```

```
cost 0
```

```
Designated bridge address 0002.172c.f400 priority 32771 port  
id 128.1
```

```
Timers: message expires in 0 sec, forward delay 0, forward transitions 1
```

```
Bpdus (MRecords) sent 4, received 0
```

```
FastEthernet4/2 of MST03 is backup blocking
```

```
Port info port id 128.194 priority 128 cost
```

```
200000
```

```
Designated root address 0002.172c.f400 priority 32771
```

```
cost 0
```

```
Designated bridge address 0002.172c.f400 priority 32771 port id  
128.193
```

```
Timers: message expires in 2 sec, forward delay 0, forward transitions 1
```

```
Bpdus (MRecords) sent 3, received 252
```

```
Switch#
```

This example shows how to display MST information for a specific interface:

```
Switch# show spanning-tree mst 0 interface fastethernet4/1 detail
```

```
Edge port: no (trunk) port guard : none
```

```
(default)
```

```
Link type: point-to-point (point-to-point) bpdu filter: disable
```

```
(default)
```

```
Boundary : internal bpdu guard : disable
```

```
(default)
```

```
FastEthernet4/1 of MST00 is designated forwarding
```

```
Vlans mapped to MST00 1-2,4-2999,4000-4094
```

```
Port info port id 128.193 priority 128 cost
```

```
200000
```

```
Designated root address 0050.3e66.d000 priority 8193
```

```
cost 20004
```

```
Designated ist master address 0002.172c.f400 priority 49152
```

```
cost 0
```

```
Designated bridge address 0002.172c.f400 priority 49152 port id  
128.193
```

```
Timers: message expires in 0 sec, forward delay 0, forward transitions 1
```

```
Bpdus sent 492, received 3
```

```
Switch#
```

---

Related Commands

[spanning-tree mst](#)  
[spanning-tree mst forward-time](#)  
[spanning-tree mst hello-time](#)  
[spanning-tree mst max-hops](#)  
[spanning-tree mst root](#)

# show storm-control

To display the broadcast storm control settings on the switch or on the specified interface, use the **show storm-control** command.

**show storm-control** [*interface-id* | **broadcast**]

## Syntax Description

<i>interface-id</i>	(Optional) Specifies the interface ID for the physical port.
<b>broadcast</b>	(Optional) Displays the broadcast storm threshold setting.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

## Usage Guidelines

When you enter an interface ID, the storm control thresholds are displayed for the specified interface. If you do not enter an interface ID, the settings are displayed for the broadcast traffic type for all ports on the switch.

## Examples

This is an example of output from the **show storm-control** command when no keywords are entered. Because no traffic type keyword was entered, the broadcast storm control settings are displayed.

```
Switch# show storm-control
Interface  Filter State  Upper    Lower    Current
-----  -
Gi2/1     Forwarding    30.00%   30.00%   N/A
Gi4/1     Forwarding    30.00%   30.00%   N/A
Gi4/3     Forwarding    30.00%   30.00%   N/A
Switch#
```

This is an example of output from the **show storm-control** command for a specified interface. Because no traffic type keyword was entered, the broadcast storm control settings are displayed.

```
Switch# show storm-control fastethernet2/17
Interface  Filter State  Level    Current
-----  -
Fa2/17     Forwarding    50.00%   0.00%
Switch#
```

This is an example of output from the **show storm-control** command for a specified interface and traffic type, where no storm control threshold has been set for that traffic type on the specified interface.

```
Switch# show storm-control gigabitethernet2/1 broadcast
Interface  Filter State  Level    Current
-----  -
Gi2/1     forwarding    100.00%  N/A
<output truncated>
```

Switch#

Table 2-24 describes the fields in the **show storm-control** display.

**Table 2-24** *show storm-control Field Descriptions*

Field	Description
Interface	Displays the ID of the interface.
Filter State	Displays the status of the filter: <ul style="list-style-type: none"><li>• Blocking—Storm control is enabled, and a storm has occurred.</li><li>• Forwarding—Storm control is enabled, and no storms have occurred.</li><li>• Inactive—Storm control is disabled.</li></ul>
Level	Displays the threshold level set on the interface for broadcast traffic.
Current	Displays the bandwidth utilization of broadcast traffic as a percentage of total available bandwidth. This field is valid only when storm control is enabled.  <b>Note</b> N/A is displayed for interfaces that do storm control in the hardware.

#### Related Commands

**storm-control**  
**show interfaces counters**  
**show running-config**

# show system mtu

To display the global MTU setting, use the **show system mtu** command.

**show system mtu**

---

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

---

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

---

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

---

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---

---

Examples	This example shows how to display the global MTU setting:
----------	---

```
Switch# show system mtu
Global Ethernet MTU is 1550 bytes.
Switch#
```

---

Related Commands	<a href="#">system mtu</a>
------------------	----------------------------



# show tech-support

To display troubleshooting information for TAC, use the **show tech-support** command.

**show tech-support** [**bridging** | **cef** | **ipmulticast** | **isis** | **password** [**page**] | **page**]

Syntax Description	<b>bridging</b>	(Optional) Specifies bridging-related information.
	<b>cef</b>	(Optional) Specifies CEF-related information.
	<b>ipmulticast</b>	(Optional) Specifies IP multicast-related information.
	<b>isis</b>	(Optional) Specifies CLNS and ISIS-related information.
	<b>password</b>	(Optional) Includes passwords and other security information in the output.
	<b>page</b>	(Optional) Displays one page of information at a time in the output.

## Defaults

The defaults are as follows:

- Outputs are displayed without page breaks.
- Passwords and other security information are removed from the output.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

Output from the **show tech-support** command may be terminated in midstream with the key combination Ctrl+Alt+6. The command output is buffered so that the command terminates when output of the current sub-command running under this command completes.

Press the **Return** key to display the next line of output, or press the **Space** bar to display the next page of information. If you do not enter the **page** keyword, the output scrolls. It does not stop for page breaks.

If you enter the **password** keyword, password encryption is enabled, but only the encrypted form appears in the output.

If you do not enter the **password** keyword, the passwords and other security-sensitive information in the output are replaced in the output with the word “removed.”

The **show tech-support** commands are a compilation of several **show** commands and the output can be quite lengthy. For a sample display of the output of the **show tech-support** command, see the individual **show** command listed.

If you enter the **show tech-support** command without arguments, the output displays the equivalent of these **show** commands:

- **show version**
- **show running-config**
- **show stacks**

- **show interfaces**
- **show controllers**
- **show process memory**
- **show process cpu**
- **show buffers**
- **show logging**
- **show module**
- **show power**
- **show environment**
- **show interfaces switchport**
- **show interfaces trunk**
- **show vlan**

If you enter the **ipmulticast** keyword, the output displays the equivalent of these **show** commands:

- **show ip pim interface**
- **show ip pim interface count**
- **show ip pim neighbor**
- **show ip pim rp**
- **show ip igmp groups**
- **show ip igmp interface**
- **show ip mroute count**
- **show ip mroute**
- **show ip mcache**
- **show ip dvmrp route**

---

### Examples

For a sample display of the **show tech-support** command output, see the commands listed in the “Usage Guidelines” section for more information.

---

### Related Commands

See the “Usage Guidelines ” section.

# show udld

To display the administrative and operational UDLD status, use the **show udld** command.

**show udld** *interface-id*

Syntax Description	<i>interface-id</i> Name of the interface.
--------------------	--

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


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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(25)EW	Added support for the 10-Gigabit Ethernet interface.

Usage Guidelines	If you do not enter an interface ID value, the administrative and operational UDLD status for all interfaces is displayed.
------------------	--

Examples	This example shows how to display the UDLD state for Gigabit Ethernet interface 2/2:
----------	--

```
Switch# show udld gigabitethernet2/2
Interface Gi2/2
---
Port enable administrative configuration setting: Follows device default
Port enable operational state: Enabled
Current bidirectional state: Bidirectional
Current operational state: Advertisement
Message interval: 60
Time out interval: 5
No multiple neighbors detected
  Entry 1
  ---
  Expiration time: 146
  Device ID: 1
  Current neighbor state: Bidirectional
  Device name: 0050e2826000
  Port ID: 2/1
  Neighbor echo 1 device: SAD03160954
  Neighbor echo 1 port: Gi1/1
  Message interval: 5
  CDP Device name: 066527791
Switch#
```

 show udd

---

**Related Commands**

**udd (global configuration mode)**  
**udd (interface configuration mode)**

# show vlan

To display VLAN information, use the **show vlan** command.

**show vlan** [**brief** | **id** *vlan\_id* | **name** *name*]

**show vlan private-vlan** [*type*]

Syntax	Description
<b>brief</b>	(Optional) Displays only a single line for each VLAN, naming the VLAN, status, and ports.
<b>id</b> <i>vlan_id</i>	(Optional) Displays information about a single VLAN identified by VLAN ID number; valid values are from 1 to 4094.
<b>name</b> <i>name</i>	(Optional) Displays information about a single VLAN identified by VLAN name; valid values are an ASCII string from 1 to 32 characters.
<b>private-vlan</b>	Displays private VLAN information.
<i>type</i>	(Optional) Private VLAN type.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(12c)EW	Added support for extended VLAN addresses.

## Examples

This example shows how to display the VLAN parameters for all VLANs within the administrative domain:

```
Switch# show vlan
VLAN Name                Status    Ports
-----
1    default                active    Fa5/9
2    VLAN0002                active    Fa5/9
3    VLAN0003                active    Fa5/9
4    VLAN0004                active    Fa5/9
5    VLAN0005                active    Fa5/9
6    VLAN0006                active    Fa5/9
10   VLAN0010                active    Fa5/9
20   VLAN0020                active    Fa5/9

<...Output truncated...>
```

## show vlan

```

850 VLAN0850          active Fa5/9
917 VLAN0917          active Fa5/9
999 VLAN0999          active Fa5/9
1002 fddi-default     active Fa5/9
1003 trcrf-default    active Fa5/9
1004 fddinet-default  active Fa5/9
1005 trbrf-default    active Fa5/9

```

VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet	100001	1500	-	-	-	-	-	0	0
2	enet	100002	1500	-	-	-	-	-	0	0
3	enet	100003	1500	-	-	-	-	-	303	0
4	enet	100004	1500	-	-	-	-	-	304	0
5	enet	100005	1500	-	-	-	-	-	305	0
6	enet	100006	1500	-	-	-	-	-	0	0
10	enet	100010	1500	-	-	-	-	-	0	0
20	enet	100020	1500	-	-	-	-	-	0	0
50	enet	100050	1500	-	-	-	-	-	0	0

<...Output truncated...>

850	enet	100850	1500	-	-	-	-	-	0	0
917	enet	100917	1500	-	-	-	-	-	0	0
999	enet	100999	1500	-	-	-	-	-	0	0
1002	fddi	101002	1500	-	0	-	-	-	0	0
1003	trcrf	101003	4472	1005	3276	-	-	srb	0	0
1004	fdnet	101004	1500	-	-	-	-	ieee	0	0
1005	trbrf	101005	4472	-	-	15	-	ibm	0	0

VLAN AREHops STEHops Backup CRF

802	0	0	off
1003	7	7	off

Switch#

This example shows how to display the VLAN name, status, and associated ports only:

Switch# **show vlan brief**

VLAN	Name	Status	Ports
1	default	active	Fa5/9
2	VLAN0002	active	Fa5/9
3	VLAN0003	active	Fa5/9
4	VLAN0004	active	Fa5/9
5	VLAN0005	active	Fa5/9
10	VLAN0010	active	Fa5/9
.			
.			
.			
999	VLAN0999	active	Fa5/9
1002	fddi-default	active	Fa5/9
1003	trcrf-default	active	Fa5/9
1004	fddinet-default	active	Fa5/9
1005	trbrf-default	active	Fa5/9

Switch#

This example shows how to display the VLAN parameters for VLAN 3 only:

```
Switch# show vlan id 3
```

```

VLAN Name                Status    Ports
-----
3    VLAN0003              active    Fa5/9

VLAN Type  SAID      MTU    Parent RingNo BridgeNo  Stp  BrdgMode Trans1 Trans2
-----
3    enet    100003   1500    -      -        -    -      -      303    0
Switch#
```

Table 2-25 describes the fields in the **show vlan** command output.

**Table 2-25** *show vlan Command Output Fields*

Field	Description
VLAN	VLAN number.
Name	Name, if configured, of the VLAN.
Status	Status of the VLAN (active or suspend).
Ports	Ports that belong to the VLAN.
Type	Media type of the VLAN.
SAID	Security Association Identifier value for the VLAN.
MTU	Maximum transmission unit size for the VLAN.
Parent	Parent VLAN, if one exists.
RingNo	Ring number for the VLAN, if applicable.
BrdgNo	Bridge number for the VLAN, if applicable.
Stp	Spanning Tree Protocol type used on the VLAN.

The following example shows how to verify that the primary vlan and secondary vlans are correctly associated with each other and the same association also exists on the PVLAN port:

```
Switch# show vlan private-vlan
```

```

Primary Secondary Type          Ports
-----
10      100      community    Fa3/1, Fa3/2
```

Now, let's say that you remove the VLAN association, as follows:

```

Switch(config)# vlan 10
Switch(config-vlan)# private-vlan association remove 100
Switch(config-vlan)# end
Switch# show vlan private
```

```

Primary Secondary Type          Ports
-----
10      100      primary
          community
```

You can use the following command to verify PVLAN configuration on the interface:

```

Switch# show interface f3/2 status
Port      Name              Status      Vlan      Duplex  Speed  Type
```

## ■ show vlan

```

Fa3/2                                connected    pvlan seco a-full  a-100 10/100BaseTX

Switch# show interface f3/1 status
Port      Name      Status      Vlan      Duplex  Speed Type
Fa3/1     Name      connected   pvlan prom a-full  a-100 10/100BaseTX
Switch#

```

**Related Commands**

[vlan database](#)  
[vlan \(VLAN Database mode\)](#)  
[vtp \(global configuration mode\)](#)



# show vlan access-map

To display the contents of a VLAN access map, use the **show vlan access-map** command.

**show vlan access-map** [*map-name*]

Syntax Description	<i>map-name</i> (Optional) Name of the VLAN access map.
--------------------	---

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

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Examples	This command shows how to display the contents of a VLAN access map:
----------	--

```
Switch# show vlan access-map mordred
Vlan access-map "mordred" 1
    match: ip address 13
    action: forward capture
Switch#
```

Related Commands	<a href="#">vlan access-map</a>
------------------	---------------------------------

# show vlan counters

To display the software-cached counter values, use the **show vlan counters** command.

**show vlan** [*id vlanid*] **counters**

Syntax Description	<b>id</b> <i>vlanid</i> (Optional) Displays the software-cached counter values for a specific VLAN.	
Defaults	This command has no default settings.	
Command Modes	Privileged EXEC	
Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switches.
Usage Guidelines	If you enter the <b>show vlan counters</b> command without specifying the VLAN ID, the software-cached counter values for all VLANs are displayed.	
Examples	<p>This example shows how to display the software-cached counter values for a specific VLAN:</p> <pre>Switch# show vlan counters * Multicast counters include broadcast packets  Vlan Id                               : 1 L2 Unicast Packets                     : 0 L2 Unicast Octets                      : 0 L3 Input Unicast Packets               : 0 L3 Input Unicast Octets                : 0 L3 Output Unicast Packets              : 0 L3 Output Unicast Octets               : 0 L3 Output Multicast Packets            : 0 L3 Output Multicast Octets             : 0 L3 Input Multicast Packets              : 0 L3 Input Multicast Octets              : 0 L2 Multicast Packets                   : 1 L2 Multicast Octets                    : 94 Switch&gt;</pre>	
Related Commands	<a href="#">clear vlan counters</a>	

# show vlan dot1q tag native

To display all the ports on the switch that are eligible for native VLAN tagging as well as their current native VLAN tagging status, use the **show vlan dot1q tag native** command.

## show vlan dot1q tag native

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Command Modes</b>	User EXEC
----------------------	-----------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(18)EW	This command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This is an example of output from the <b>show vlan dot1q tag native</b> command:
-----------------	--

```
Switch# show vlan dot1q tag native
dot1q native vlan tagging is disabled globally
```

```
Per Port Native Vlan Tagging State
```

```
-----
```

Port	Operational Mode	Native VLAN Tagging State
-----		
f3/2	trunk	enabled
f3/16	PVLAN trunk	disabled
f3/16	trunk	enabled

<b>Related Commands</b>	<a href="#">switchport mode</a> <b>vlan (global configuration)</b> (refer to Cisco IOS documentation) <b>vlan (VLAN configuration)</b> (refer to Cisco IOS documentation)
-------------------------	---

# show vlan internal usage

Use the **show vlan internal usage** command to display information about the internal VLAN allocation.

**show vlan** [*id vlan-id*] **internal usage**

Syntax Description	<i>id vlan-id</i>	(Optional) Displays internal VLAN allocation information for the specified VLAN; valid values are from 1 to 4094.
--------------------	-------------------	---

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

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

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display information about the current internal VLAN allocation:

```
Switch# show vlan internal usage
```

```
VLAN Usage
-----
1025 -
1026 -
1027 -
1028 -
1029 Port-channel6
1030 GigabitEthernet1/2
1032 FastEthernet3/20
1033 FastEthernet3/21
1129 -
```

This example shows how to display information about the internal VLAN allocation for a specific VLAN:

```
Switch# show vlan id 1030 internal usage
```

```
VLAN Usage
-----
1030 GigabitEthernet1/2
```

Related Commands	<a href="#">vlan internal allocation policy</a>
------------------	---

# show vlan mtu

To display the minimum and maximum transmission unit (MTU) sizes of each VLAN, use the **show vlan mtu** command.

## show vlan mtu

<b>Syntax Description</b>	This command has no arguments or keywords
---------------------------	---

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	EXEC
----------------------	------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>The MTU_Mismatch column in the command output indicates whether all the ports in the VLAN have the same MTU. When “yes” is displayed in the MTU_Mismatch column, it means that the VLAN has a port with different MTUs, and packets might be dropped that are switched from a port with a larger MTU to a port with a smaller MTU. If the VLAN does not have an SVI, the hyphen (-) symbol is displayed in the SVI_MTU column.</p>
-------------------------	---

For a VLAN, if the MTU-Mismatch column displays yes, the names of the port with the MinMTU and the port with the MaxMTU are displayed. For a VLAN, if the SVI\_MTU is bigger than the MinMTU, “TooBig” is displayed after the SVI\_MTU.

<b>Examples</b>	This is an example of output from the <b>show vlan mtu</b> command:
-----------------	---

```
Switch# show vlan mtu
```

VLAN	SVI_MTU	MinMTU(port)	MaxMTU(port)	MTU_Mismatch
1	1500	1500	1500	No

```
Switch>
```

<b>Related Commands</b>	<a href="#">mtu</a>
-------------------------	---------------------

# show vlan private-vlan

To display private VLAN information, use the **show vlan private-vlan** command.

**show vlan private-vlan [type]**

Syntax Description	type	(Optional) Displays the private VLAN type; valid types are isolated, primary, community, nonoperational, and normal.
--------------------	------	--

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

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(20)EW	Support for community VLAN was added.

Usage Guidelines	When the <b>show vlan private-vlan type</b> command displays a VLAN type as normal, it indicates that a regular VLAN has been used in the private VLAN configuration. When normal is displayed, this indicates that two VLANs have been associated before the type was set, and the private VLAN is not operational. This information is useful for debugging purposes.
------------------	---

Examples	This example shows how to display information about all currently configured private VLANs:
----------	---

```
Switch# show vlan private-vlan
```

Primary	Secondary	Type	Ports
2	301	community	Fa5/3, Fa5/25
2	302	community	
	10	community	
100	101	isolated	
150	151	non-operational	
	202	community	
	303	community	
401	402	non-operational	

```
Switch#
```



## Note

A blank Primary value indicates that no association exists.

This example shows how to display information about all currently configured private VLAN types:

```
Switch# show vlan private-vlan type
```

```
Vlan Type
-----
202 primary
303 community
304 community
305 community
306 community
307 community
308 normal
309 community
440 isolated
Switch#
```

Table 2-26 describes the fields in the **show vlan private-vlan** command output.

**Table 2-26** *show vlan private-vlan Command Output Fields*

Field	Description
Primary	Number of the primary VLAN.
Secondary	Number of the secondary VLAN.
Secondary-Type	Secondary VLAN type is <b>isolated or community</b> .
Ports	Indicates the ports within a VLAN.
Type	Type of VLAN; possible values are <b>primary, isolated</b> , community, nonoperational, or <b>normal</b> .

#### Related Commands

[private-vlan](#)  
[private-vlan mapping](#)

# show vlan remote-span

To display a list of Remote SPAN (RSPAN) VLANs, use the **show vlan remote-span** command.

**show vlan remote-span**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
----------------------	-----------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12)EW	This command was introduced on the Catalyst 4500 series switches.

<b>Examples</b>	This example shows how to display a list of RSPAN VLANs:
-----------------	--

```
Router# show vlan remote-span
Remote SPAN VLANs
-----
2,20
```

<b>Related Commands</b>	<a href="#">remote-span</a> <a href="#">vlan (VLAN Database mode)</a>
-------------------------	--



# show vmps

To display the VLAN Query Protocol (VQP) version, reconfirmation interval, retry count, VLAN Membership Policy Server (VMPS) IP addresses, current servers, and primary servers, use the **show vmps** command.

**show vmps [statistics]**

Syntax Description	<b>statistics</b> (Optional) Displays the client-side statistics.
--------------------	---

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

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

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This is an example of output from the **show vmps** command:

```
Switch# show vmps
VQP Client Status:
-----
VMPS VQP Version: 1
Reconfirm Interval: 60 min
Server Retry Count: 3
VMPS domain server: 172.20.50.120 (primary, current)

Reconfirmation status
-----
VMPS Action:          No Dynamic Port
Switch#
```

This is an example of output from the **show vmps statistics** command:

```
Switch# show vmps statistics
VMPS Client Statistics
-----
VQP Queries:          0
VQP Responses:        0
VMPS Changes:         0
VQP Shutdowns:       0
VQP Denied:           0
VQP Wrong Domain:     0
VQP Wrong Version:    0
VQP Insufficient Resource: 0
Switch#
```

Related Commands	<a href="#">vmps reconfirm (privileged EXEC)</a>
------------------	--

# show vtp

To display VTP statistics and domain information, use the **show vtp** command.

**show vtp {counters | status}**

Syntax Description	<b>counters</b>	Specifies the VTP statistics.
	<b>status</b>	Specifies the VTP domain status.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to display the VTP statistics:

```
Switch# show vtp counters
VTP statistics:
Summary advertisements received      : 1
Subset advertisements received      : 1
Request advertisements received     : 0
Summary advertisements transmitted  : 31
Subset advertisements transmitted   : 1
Request advertisements transmitted  : 0
Number of config revision errors    : 0
Number of config digest errors      : 0
Number of V1 summary errors         : 0

VTP pruning statistics:

Trunk          Join Transmitted Join Received  Summary advts received from
-----
Pa5/9          1555              1564              0
Switch#
```

This example shows how to display the VTP domain status:

```
Switch# show vtp status
VTP Version          : 2
Configuration Revision : 250
Maximum VLANs supported locally : 1005
Number of existing VLANs : 33
VTP Operating Mode    : Server
VTP Domain Name       : Lab_Network
VTP Pruning Mode      : Enabled
VTP V2 Mode           : Enabled
VTP Traps Generation  : Disabled
```

```

MD5 digest                               : 0xE6 0xF8 0x3E 0xDD 0xA4 0xF5 0xC2 0x0E
Configuration last modified by 172.20.52.18 at 9-22-99 11:18:20
Local updater ID is 172.20.52.18 on interface V11 (lowest numbered VLAN interface found)
Switch#

```

This example shows how to display only those lines in the **show vtp** output that contain the word **Summary**:

```

Switch# show vtp counters | include Summary
Summary advertisements received      : 1
Summary advertisements transmitted : 32
Trunk                               Join Transmitted Join Received   Summary advts received from
Switch#

```

Table 2-27 describes the fields in the **show vtp** command output.

**Table 2-27** *show vtp Command Output Fields*

Field	Description
Summary advertisements received	Total number of summary advertisements received.
Subset advertisements received	Total number of subset advertisements received.
Request advertisements received	Total number of request advertisements received.
Summary advertisements transmitted	Total number of summary advertisements transmitted.
Subset advertisements transmitted	Total number of subset advertisements transmitted.
Request advertisements transmitted	Total number of request advertisements transmitted.
Number of config revision errors	Number of config revision errors.
Number of config digest errors	Number of config revision digest errors.
Number of V1 summary errors	Number of V1 summary errors.
Trunk	Trunk port participating in VTP pruning.
Join Transmitted	Number of VTP-Pruning Joins transmitted.
Join Received	Number of VTP-Pruning Joins received.
Summary advts received from non-pruning-capable device	Number of Summary advertisements received from nonpruning-capable devices.
Number of existing VLANs	Total number of VLANs in the domain.
Configuration Revision	VTP revision number used to exchange VLAN information.
Maximum VLANs supported locally	Maximum number of VLANs allowed on the device.
Number of existing VLANs	Number of existing VLANs.
VTP Operating Mode	Indicates whether VTP is enabled or disabled.
VTP Domain Name	Name of the VTP domain.
VTP Pruning Mode	Indicates whether VTP pruning is enabled or disabled.
VTP V2 Mode	Indicates the VTP V2 mode as server, client, or transparent.
VTP Traps Generation	Indicates whether VTP trap generation mode is enabled or disabled.
MD5 digest	Checksum values.

 show vtp

---

**Related Commands**

- vtp (global configuration mode)**
- vtp client**
- vtp domain**
- vtp password**
- vtp pruning**
- vtp server**
- vtp transparent**
- vtp v2-mode**

# snmp ifindex clear

To clear any previously configured **snmp ifindex** commands that were entered for a specific interface, use the **snmp ifindex clear** command.

## snmp ifindex clear

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

**Defaults** This command has no default settings.

**Command Modes** Interface configuration mode

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switches.

**Usage Guidelines** Interface index persistence occurs when ifIndex values in the interface MIB (IF-MIB) persist across reboots and allow for consistent identification of specific interfaces using SNMP.

Use the **snmp ifindex clear** command on a specific interface when you want that interface to use the global configuration setting for ifIndex persistence. This command clears any ifIndex configuration commands previously entered for that specific interface.

**Examples** This example shows how to enable ifIndex persistence for all interfaces:

```
Router(config)# snmp-server ifindex persist
```

This example shows how to disable IfIndex persistence for FastEthernet 1/1 only:

```
Router(config)# interface fastethernet 1/1
Router(config-if)# no snmp ifindex persist
Router(config-if)# exit
```

This example shows how to clear the ifIndex configuration from the FastEthernet 1/1 configuration:

```
Router(config)# interface fastethernet 1/1
Router(config-if)# snmp ifindex clear
Router(config-if)# exit
```

As a result of this sequence of commands, ifIndex persistence is enabled for all interfaces that are specified by the **snmp-server ifindex persist** global configuration command.

**Related Commands** [snmp ifindex persist](#)  
[snmp-server ifindex persist](#)

# snmp ifindex persist

To enable ifIndex values in the Interfaces MIB (IF-MIB) that persist across reboots (ifIndex persistence) on a specific interface, use the **snmp ifindex persist** command. To disable ifIndex persistence only on a specific interface, use the **no** form of this command.

**snmp ifindex persist**

**no snmp ifindex persist**

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

**Defaults** Disabled.

**Command Modes** Interface configuration mode

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switches.

**Usage Guidelines**

Interface index persistence occurs when ifIndex values in the IF-MIB persist across reboots and allow for consistent identification of specific interfaces using SNMP.

The **snmp ifindex persist** interface configuration command enables and disables ifIndex persistence for individual entries (that correspond to individual interfaces) in the ifIndex table of the IF-MIB.

The **snmp-server ifindex persist** global configuration command enables and disables ifIndex persistence for all interfaces on the routing device. This action applies only to interfaces that have ifDescr and ifIndex entries in the ifIndex table of the IF-MIB.

**Examples** This example shows how to enable ifIndex persistence for interface FastEthernet 1/1 only:

```
Router(config)# interface fastethernet 1/1
Router(config-if)# snmp ifindex persist
Router(config-if)# exit
```

This example shows how to enable ifIndex persistence for all interfaces, and then disable ifIndex persistence for interface FastEthernet 1/1 only:

```
Router(config)# snmp-server ifindex persist
Router(config)# interface fastethernet 1/1
Router(config-if)# no snmp ifindex persist
Router(config-if)# exit
```

**Related Commands**

[snmp ifindex clear](#)  
[snmp-server ifindex persist](#)

# snmp-server enable traps

To enable SNMP notifications (traps or informs), use the **snmp-server enable traps** command. To disable all SNMP notifications, use the **no** form of this command.

**snmp-server enable traps** [**flash** [**insertion** | **removal**] | **fru-ctrl** | **port-security** [**trap-rate** *trap-rate*] | **removal** | **stpx** | **vlancreate** | **vlandelete** | **vtp**] [**mac-notification** [**change** | **move** | **threshold**]

**no snmp-server enable traps** [**flash** [**insertion** | **removal**] | **fru-ctrl** | **port-security** [**trap-rate** *trap-rate*] | **removal** | **stpx** | **vlancreate** | **vlandelete** | **vtp**] [**mac-notification**]

Syntax Description	
<b>flash</b>	(Optional) Controls the SNMP FLASH trap notifications.
<b>insertion</b>	(Optional) Controls the SNMP Flash insertion trap notifications.
<b>removal</b>	(Optional) Controls the SNMP Flash removal trap notifications.
<b>fru-ctrl</b>	(Optional) Controls the SNMP entity FRU control trap notifications.
<b>port-security</b>	(Optional) Controls the SNMP trap generation.
<b>trap-rate</b> <i>trap-rate</i>	(Optional) Sets the number of traps per second.
<b>stpx</b>	(Optional) Controls all the traps defined in CISCO-STP-EXTENSIONS-MIB notifications.
<b>vlancreate</b>	(Optional) Controls the SNMP VLAN created trap notifications.
<b>vlandelete</b>	(Optional) Controls the SNMP VLAN deleted trap notifications.
<b>vtp</b>	(Optional) Controls the SNMP VTP trap notifications.
<b>mac-notification</b>	(Optional) Controls the SNMP MAC trap notifications.
<b>change</b>	(Optional) Controls the SNMP MAC change trap notifications
<b>move</b>	(Optional) Controls the SNMP MAC move trap notifications
<b>threshold</b>	(Optional) Controls the SNMP MAC threshold trap notifications

**Defaults** SNMP notifications are disabled.

**Command Modes** Global configuration

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(31)SG	Support for MAC notification was added.

**Usage Guidelines** If you enter this command without an option, all notification types controlled by this command are enabled.

SNMP notifications can be sent as traps or inform requests. This command enables both traps and inform requests for the specified notification types. To specify whether the notifications should be sent as traps or informs, use the **snmp-server host [traps | informs]** command.

The **snmp-server enable traps** command is used in conjunction with the **snmp-server host** command. Use the **snmp-server host** command to specify which host or hosts receive SNMP notifications. To send notifications, you must configure at least one **snmp-server host** command.

This list of the MIBs is used for the traps:

- **flash**—Controls SNMP FLASH traps from the CISCO-FLASH-MIB.
  - **insertion**—Controls the SNMP Flash insertion trap notifications.
  - **removal**—Controls the SNMP Flash removal trap notifications.
- **fru-ctrl**—Controls the FRU control traps from the CISCO-ENTITY-FRU-CONTROL-MIB.
- **port-security**—Controls the port-security traps from the CISCO-PORT-SECURITY-MIB.
- **stp**—Controls all the traps from the CISCO-STP-EXTENSIONS-MIB.
- **vlancreate**—Controls SNMP VLAN created trap notifications.
- **vlandelete**—Controls SNMP VLAN deleted trap notifications.
- **vtp**—Controls the VTP traps from the CISCO-VTP-MIB.

## Examples

This example shows how to send all traps to the host is specified by the name myhost.cisco.com using the community string defined as public:

```
Switch(config)# snmp-server enable traps
Switch(config)# snmp-server host myhost.cisco.com public
Switch(config)#
```

This example shows how to enable the MAC address change MIB notification:

```
Switch(config)# snmp-server enable traps mac-notification change
Switch(config)#
```

SNMP traps can be enabled with a rate-limit to detect port-security violations due to restrict mode. The following example shows how to enable traps for port-security with a rate of 5 traps per second:

```
Switch(config)# snmp-server enable traps port-security trap-rate 5
Switch(config)#
```

## Related Commands

[clear mac-address-table](#)  
[mac-address-table notification](#)  
[show mac-address-table notification](#)  
[snmp-server enable traps](#)  
[snmp trap mac-notification change](#)

Refer to Cisco IOS documentation for additional **snmp-server enable traps** commands.



# snmp-server ifindex persist

To globally enable ifIndex values that will remain constant across reboots for use by SNMP, use the **snmp-server ifindex persist** command. To globally disable ifIndex persistence, use the **no** form of this command.

**snmp-server ifindex persist**

**no snmp-server ifindex persist**

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

**Defaults** Disabled.

**Command Modes** Global configuration mode

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switches.

**Usage Guidelines** Interface index persistence occurs when ifIndex values in the IF-MIB persist across reboots and allow for consistent identification of specific interfaces using SNMP.

The **snmp-server ifindex persist** global configuration command does not override the interface-specific configuration. To override the interface-specific configuration of ifIndex persistence, enter the **no snmp ifindex persist** and **snmp ifindex clear** interface configuration commands.

Entering the **no snmp-server ifindex persist** global configuration command enables and disables ifIndex persistence for all interfaces on the routing device using ifDescr and ifIndex entries in the ifIndex table of the IF-MIB.

**Examples** This example shows how to enable ifIndex persistence for all interfaces:

```
Router(config)# snmp-server ifindex persist
```

**Related Commands** [snmp ifindex clear](#)  
[snmp ifindex persist](#)

# snmp-server ifindex persist compress

To configure the format of the ifIndex table in a compressed format, use the **snmp-server ifindex persist compress** command. To place the table in a decompressed format, use the **no** form of this command.

**snmp-server ifindex persist compress**

**no snmp-server ifindex persist compress**

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

**Defaults** Disabled

**Command Modes** Global configuration mode.

Command History	Release	Modification
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switches.

**Usage Guidelines** This command is hidden on Supervisor Engine V and later supervisor engines because the ifIndex table is always in a compressed format on those supervisor engines.

At bootup, if the nvram:ifIndex-table.gz file (the ifIndex table in a compressed format) is present on a Supervisor Engine II+, Supervisor Engine III, or Supervisor Engine IV, the **snmp-server ifindex persist compress** command is automatically run even if the startup-config file does not have this configuration.

**Examples** This example shows how to enable compression of the ifIndex table:

```
Router(config)# snmp-server ifindex persist compress
```

This example shows how to disable compression of the ifIndex table:

```
Router(config)# no snmp-server ifindex persist compress
```

**Related Commands**

- [snmp ifindex clear](#)
- [snmp ifindex persist](#)
- [snmp-server ifindex persist](#)

# snmp trap mac-notification change

To enable SNMP MAC address notifications, use the **snmp trap mac-notification** command. To return to the default setting, use the **no** form of this command.

**snmp trap mac-notification change { added | removed }**

**no snmp trap mac-notification change { added | removed }**

Syntax Description	<b>added</b>	Specifies enabling the MAC address notification trap whenever a MAC address is added to an interface.
	<b>removed</b>	Specifies enabling the MAC address notification trap whenever a MAC address is removed from an interface.

Defaults	MAC address addition and removal are disabled.
----------	--

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

Command History	Release	Modification
	12.2(31)SG	Support for this command was introduced on the Catalyst 4500 series switch

Usage Guidelines	Even though you enable the change notification trap for a specific interface by using the <b>snmp trap mac-notification change</b> command, the trap is generated only when you enable the <b>snmp-server enable traps mac-notification change</b> and the <b>mac address-table notification change</b> global configuration commands.
------------------	--

Examples	This example shows how to enable the MAC notification trap when a MAC address is added to a port:
----------	---

```
Switch(config)# interface gigabitethernet1/1
Switch(config-if)# snmp trap mac-notification change added
```

You can verify your settings by entering the **show mac address-table notification change interface** privileged EXEC command.

Related Commands	<a href="#">clear mac-address-table</a> <a href="#">mac-address-table notification</a> <a href="#">show mac-address-table notification</a> <a href="#">snmp-server enable traps</a>
------------------	--

Refer to Cisco IOS documentation for additional **snmp-server enable traps** commands.

# spanning-tree backbonefast

To enable BackboneFast on a spanning-tree VLAN, use the **spanning-tree backbonefast** command. To disable BackboneFast, use the **no** form of this command.

**spanning-tree backbonefast**

**no spanning-tree backbonefast**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	BackboneFast is disabled.
-----------------	---------------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	BackboneFast should be enabled on all Catalyst 4006 family switches to allow the detection of indirect link failures. Enabling BackboneFast starts the spanning-tree reconfiguration more quickly.
-------------------------	--

<b>Examples</b>	This example shows how to enable BackboneFast on all VLANs:
-----------------	---

```
Switch(config)# spanning-tree backbonefast
Switch(config)#
```

<b>Related Commands</b>	<a href="#">spanning-tree cost</a> <a href="#">spanning-tree port-priority</a> <a href="#">spanning-tree portfast default</a> <a href="#">spanning-tree portfast (interface configuration mode)</a> <a href="#">spanning-tree uplinkfast</a> <a href="#">spanning-tree vlan</a> <a href="#">show spanning-tree</a>
-------------------------	--

# spanning-tree bpdupfilter

To enable BPDU filtering on an interface, use the **spanning-tree bpdupfilter** command. To return to the default settings, use the **no** form of this command.

**spanning-tree bpdupfilter { enable | disable }**

**no spanning-tree bpdupfilter**

Syntax Description	enable	Enables BPDU filtering on this interface.
	disable	Disables BPDU filtering on this interface.

Defaults	Disabled
----------	----------

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines



### Caution

Use care when entering the **spanning-tree bpdupfilter enable** command. Enabling BPDU filtering on an interface is approximately equivalent to disabling the spanning tree for this interface. It is possible to create bridging loops if this command is not correctly used.

When configuring Layer 2 protocol tunneling on all the service provider edge switches, you must enable spanning-tree BPDU filtering on the 802.1Q tunnel ports by entering the **spanning-tree bpdupfilter enable** command.

BPDU filtering allows you to prevent a port from sending and receiving BPDUs. The configuration is applicable to the whole interface, whether it is trunking or not. This command has three states:

- **spanning-tree bpdupfilter enable**—This state unconditionally enables the BPDU filter feature on the interface.
- **spanning-tree bpdupfilter disable**—This state unconditionally disables the BPDU filter feature on the interface.
- **no spanning-tree bpdupfilter**—This state enables the BPDU filter feature on the interface if the interface is in operational PortFast state and if the **spanning-tree portfast bpdupfilter default** command is configured.

---

**Examples**

This example shows how to enable the BPDU filter feature on this interface:

```
Switch(config-if)# spanning-tree bpdupfilter enable  
Switch(config-if)#
```

---

**Related Commands**

**show spanning-tree**  
**spanning-tree portfast bpdupfilter default**

# spanning-tree bpduguard

To enable BPDU guard on an interface, use the **spanning-tree bpduguard** command. To return to the default settings, use the **no** form of this command.

**spanning-tree bpduguard { enable | disable }**

**no spanning-tree bpduguard**

Syntax Description	enable	Enables BPDU guard on this interface.
	disable	Disables BPDU guard on this interface.

Defaults	BPDU guard is disabled.
----------	-------------------------

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>BPDU guard is a feature that prevents a port from receiving BPDUs. This feature is typically used in a service provider environment where the administrator wants to prevent an access port from participating in the spanning tree. If the port still receives a BPDU, it is put in the ErrDisable state as a protective measure. This command has three states:</p>
------------------	--

- **spanning-tree bpduguard enable**—This state unconditionally enables BPDU guard on the interface.
- **spanning-tree bpduguard disable**—This state unconditionally disables BPDU guard on the interface.
- **no spanning-tree bpduguard**—This state enables BPDU guard on the interface if it is in the operational PortFast state and if the **spanning-tree portfast bpduguard default** command is configured.

Examples	This example shows how to enable BPDU guard on this interface:
----------	--

```
Switch(config-if)# spanning-tree bpduguard enable
Switch(config-if)#
```

Related Commands	<a href="#">show spanning-tree</a> <a href="#">spanning-tree portfast bpduguard default</a>
------------------	--

# spanning-tree cost

To calculate the path cost of STP on an interface, use the **spanning-tree cost** command. To revert to the default, use the **no** form of this command.

**spanning-tree cost** *cost*

**no spanning-tree cost** *cost*

Syntax Description	<i>cost</i> Path cost; valid values are from 1 to 200,000,000.				
Defaults	<p>The default settings are as follows:</p> <ul style="list-style-type: none"> <li>FastEthernet—19</li> <li>GigabitEthernet—1</li> </ul>				
Command Modes	Interface configuration				
Command History	<table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>12.1(8a)EW</td><td>Support for this command was introduced on the Catalyst 4500 series switch.</td></tr> </table>	Release	Modification	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Release	Modification				
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.				
Usage Guidelines	When you configure the cost, the higher values indicate higher costs. The range applies regardless of the protocol type that is specified. The path cost is calculated, based on the interface bandwidth.				
Examples	<p>This example shows how to access an interface and set a path cost value of 250 for the spanning-tree VLAN that is associated with that interface:</p> <pre>Switch(config)# interface fastethernet 2/1 Switch(config-if)# spanning-tree cost 250 Switch(config-if)#</pre>				
Related Commands	<p> <a href="#">spanning-tree port-priority</a>  <a href="#">spanning-tree portfast default</a>  <a href="#">spanning-tree portfast (interface configuration mode)</a>  <a href="#">spanning-tree uplinkfast</a>  <a href="#">spanning-tree vlan</a>  <a href="#">show spanning-tree</a> </p>				



# spanning-tree etherchannel guard misconfig

To display an error message when a loop due to a channel misconfiguration is detected, use the **spanning-tree etherchannel guard misconfig** command. To disable the feature, use the **no** form of this command.

**spanning-tree etherchannel guard misconfig**

**no spanning-tree etherchannel guard misconfig**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Spanning-tree EtherChannel guard is enabled.
-----------------	--

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>When an EtherChannel guard misconfiguration is detected, this message is displayed:</p> <pre>%SPANTREE-2-CHNL_MISCFG:Detected loop due to etherchannel misconfig of interface Port-Channel1</pre> <p>To determine which local ports are involved in the misconfiguration, enter the <b>show interfaces status err-disabled</b> command. To check the EtherChannel configuration on the remote device, enter the <b>show etherchannel summary</b> command on the remote device.</p> <p>After you correct the configuration, enter the <b>shutdown</b> and the <b>no shutdown</b> commands on the associated port-channel interface.</p>
-------------------------	---

<b>Examples</b>	This example shows how to enable the EtherChannel guard misconfiguration feature:
-----------------	---

```
Switch(config)# spanning-tree etherchannel guard misconfig
Switch(config)#
```

<b>Related Commands</b>	<p><b>show etherchannel</b></p> <p><b>show interfaces status</b></p> <p><b>shutdown</b> (refer to Cisco IOS documentation)</p>
-------------------------	--

# spanning-tree extend system-id

To enable the extended system ID feature on a chassis that supports 1024 MAC addresses, use the **spanning-tree extend system-id** command. To disable the feature, use the **no** form of this command.

**spanning-tree extend system-id**

**no spanning-tree extend system-id**

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

**Defaults** Enabled on systems that do not provide 1024 MAC addresses.

**Command Modes** Global configuration

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** Releases 12.1(13)E and later support chassis with 64 or 1024 MAC addresses. For chassis with 64 MAC addresses, STP uses the extended system ID plus a MAC address to make the bridge ID unique for each VLAN.

You cannot disable the extended system ID on chassis that support 64 MAC addresses.

Enabling or disabling the extended system ID updates the bridge IDs of all active STP instances, which might change the spanning-tree topology.

**Examples** This example shows how to enable the extended system ID:

```
Switch(config)# spanning-tree extend system-id
Switch(config)#
```

**Related Commands** [show spanning-tree](#)

# spanning-tree guard

To enable root guard, use the **spanning-tree guard** command. To disable root guard, use the **no** form of this command.

**spanning-tree guard {loop | root | none}**

**no spanning-tree guard**

## Syntax Description

<b>loop</b>	Enables the loop guard mode on the interface.
<b>root</b>	Enables root guard mode on the interface.
<b>none</b>	Sets the guard mode to none.

## Defaults

Root guard is disabled.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(12c)EW	Loop guard support was added.

## Examples

This example shows how to enable root guard:

```
Switch(config-if)# spanning-tree guard root
Switch(config-if)#
```

## Related Commands

[show spanning-tree](#)

# spanning-tree link-type

To configure a link type for a port, use the **spanning-tree link-type** command. To return to the default settings, use the **no** form of this command.

**spanning-tree link-type { point-to-point | shared }**

**no spanning-tree link-type**

Syntax Description	<b>point-to-point</b>	Specifies that the interface is a point-to-point link.
	<b>shared</b>	Specifies that the interface is a shared medium.

Defaults	Link type is derived from the duplex mode.
----------	--

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines**

RSTP+ fast transition works only on point-to-point links between two bridges.

By default, the switch derives the link type of a port from the duplex mode. A full-duplex port is considered as a point-to-point link while a half-duplex configuration is assumed to be on a shared link.

If you designate a port as a shared link, RSTP+ fast transition is forbidden, regardless of the duplex setting.

**Examples**

This example shows how to configure the port as a shared link:

```
Switch(config-if) # spanning-tree link-type shared
Switch(config-if) #
```

Related Commands	<a href="#">show spanning-tree interface</a>
------------------	--

# spanning-tree loopguard default

To enable loop guard as the default on all ports of a specific bridge, use the **spanning-tree loopguard default** command. To disable loop guard, use the **no** form of this command.

**spanning-tree loopguard default**

**no spanning-tree loopguard default**

<b>Syntax Description</b>	This command has no keywords or arguments.
---------------------------	--

<b>Defaults</b>	Loop guard is disabled.
-----------------	-------------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>Loop guard provides an additional security in the bridge network. Loop guard prevents alternate or root ports from becoming the designated port because of a failure leading to a unidirectional link.</p> <p>Loop guard operates only on ports that are considered point-to-point by the spanning tree.</p> <p>Individual loop-guard port configuration overrides this global default.</p>
-------------------------	--

<b>Examples</b>	<p>This example shows how to enable loop guard:</p> <pre>Switch(config)# spanning-tree loopguard default Switch(config)#</pre>
-----------------	--

<b>Related Commands</b>	<p><a href="#">show spanning-tree</a></p> <p><a href="#">spanning-tree guard</a></p>
-------------------------	--

# spanning-tree mode

To switch between PVST+ and MST modes, use the **spanning-tree mode** command. To return to the default settings, use the **no** form of this command.

**spanning-tree mode** {pvst | mst | rapid-pvst}

**no spanning-tree mode** {pvst | mst | rapid-pvst}

Syntax Description	<b>pvst</b>	Specifies PVST+ mode.
	<b>mst</b>	Specifies MST mode.
	<b>rapid-pvst</b>	Specifies Rapid PVST mode.

Defaults	PVST+ mode
----------	------------

Command Modes	Configuration
---------------	---------------

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(19)EW	Support for the <b>rapid-pvst</b> keyword.

## Usage Guidelines



### Caution

Be careful when using the **spanning-tree mode** command to switch between PVST+ and MST modes. When you enter the command, all spanning-tree instances are stopped for the previous mode and restarted in the new mode. Using this command may cause disruption of user traffic.

## Examples

This example shows how to switch to MST mode:

```
Switch(config)# spanning-tree mode mst
Switch(config)#
```

This example shows how to return to the default mode (PVST):

```
Switch(config)# no spanning-tree mode
Switch(config)#
```

Related Commands	<a href="#">show spanning-tree mst</a>
------------------	--

# spanning-tree mst

To set the path cost and port-priority parameters for any MST instance (including the CIST with instance ID 0), use the **spanning-tree mst** command. To return to the default settings, use the **no** form of this command.

**spanning-tree mst** *instance-id* [**cost** *cost*] | [**port-priority** *prio*]

**no spanning-tree mst** *instance-id* {**cost** | **port-priority**}

## Syntax Description

<i>instance-id</i>	Instance ID number; valid values are from 0 to 15.
<b>cost</b> <i>cost</i>	(Optional) Specifies the path cost for an instance; valid values are from 1 to 200000000.
<b>port-priority</b> <i>prio</i>	(Optional) Specifies the port priority for an instance; valid values are from 0 to 240 in increments of 16.

## Defaults

Port priority is **128**.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The higher **cost** *cost* values indicate higher costs. When entering the *cost* value, do not include a comma in the entry; for example, enter **1000**, not **1,000**.

The higher **port-priority** *prio* values indicate smaller priorities.

By default, the cost depends on the port speed; faster interface speeds indicate smaller costs. MST always uses long path costs.

## Examples

This example shows how to set the interface path cost:

```
Switch(config-if)# spanning-tree mst 0 cost 17031970
Switch(config-if)#
```

This example shows how to set the interface priority:

```
Switch(config-if)# spanning-tree mst 0 port-priority 64
Switch(config-if)#
```

## Related Commands

[show spanning-tree mst](#)  
[spanning-tree port-priority](#)

# spanning-tree mst configuration

To enter the MST configuration submode, use the **spanning-tree mst configuration** command. To return to the default MST configuration, use the **no** form of this command.

**spanning-tree mst configuration**

**no spanning-tree mst configuration**

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

**Defaults** The default settings are as follows:

- No VLANs are mapped to any MST instance.
- All VLANs are mapped to the CIST instance.
- The region name is an empty string.
- The revision number is 0.

**Command Modes** Global configuration

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The MST configuration consists of three main parameters:

- Instance VLAN mapping (see the **instance** command)
- Region name (see the **name** command)
- Configuration revision number (see the **revision** command)

By default, the value for the MST configuration is the default value for all its parameters.

The **abort** and **exit** commands allow you to exit the MST configuration submode. The difference between the two commands depends on whether you want to save your changes or not.

The **exit** command commits all the changes before leaving MST configuration submode. If you do not map the secondary VLANs to the same instance as the associated primary VLAN, when you exit the MST configuration submode, a message displays and lists the secondary VLANs that are not mapped to the same instance as the associated primary VLAN. The message is as follows:

```
These secondary vlans are not mapped to the same instance as their primary:
->3
```

The **abort** command leaves the MST configuration submode without committing any changes.



Whenever you change an MST configuration submode parameter, it can cause a loss of connectivity. To reduce the number of service disruptions, when you enter the MST configuration submode, you are changing a copy of the current MST configuration. When you are done editing the configuration, you can apply all the changes at once by using the **exit** keyword, or you can exit the submode without committing any change to the configuration by using the **abort** keyword.

In the unlikely event that two users enter a new configuration at exactly at the same time, this message is displayed:

```
Switch(config-mst)# exit
% MST CFG:Configuration change lost because of concurrent access
Switch(config-mst)#
```

---

## Examples

This example shows how to enter the MST configuration submode:

```
Switch(config)# spanning-tree mst configuration
Switch(config-mst)#
```

This example shows how to reset the MST configuration to the default settings:

```
Switch(config)# no spanning-tree mst configuration
Switch(config)#
```

---

## Related Commands

**instance**  
**name**  
**revision**  
**show spanning-tree mst**

# spanning-tree mst forward-time

To set the forward delay timer for all the instances, use the **spanning-tree mst forward-time** command. To return to the default settings, use the **no** form of this command.

**spanning-tree mst forward-time** *seconds*

**no spanning-tree mst forward-time**

Syntax Description	<i>seconds</i> Number of seconds to set the forward delay timer for all the instances on the Catalyst 4500 series switch; valid values are from 4 to 30 seconds.					
Defaults	The forward delay timer is set for 15 seconds.					
Command Modes	Global configuration					
Command History	<table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.1(12c)EW</td><td>Support for this command was introduced on the Catalyst 4500 series switch.</td></tr></table>		Release	Modification	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Release	Modification					
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.					
Examples	<p>This example shows how to set the forward-delay timer:</p> <pre>Switch(config)# <b>spanning-tree mst forward-time 20</b> Switch(config)#</pre>					
Related Commands	<a href="#">show spanning-tree mst</a>					

# spanning-tree mst hello-time

To set the hello-time delay timer for all the instances, use the **spanning-tree mst hello-time** command. To return to the default settings, use the **no** form of this command.

**spanning-tree mst hello-time** *seconds*

**no spanning-tree mst hello-time**

Syntax Description	<i>seconds</i>	Number of seconds to set the hello-time delay timer for all the instances on the Catalyst 4500 series switch; valid values are from 1 to 10 seconds.
Defaults	The hello-time delay timer is set for 2 seconds.	
Command Modes	Global configuration	
Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	If you do not specify the <i>hello-time</i> value, the value is calculated from the network diameter.	
Examples	This example shows how to set the hello-time delay timer:  Switch(config)# <b>spanning-tree mst hello-time 3</b> Switch(config)#	
Related Commands	<a href="#">show spanning-tree mst</a>	

# spanning-tree mst max-age

To set the max-age timer for all the instances, use the **spanning-tree mst max-age** command. To return to the default settings, use the **no** form of this command.

**spanning-tree mst max-age** *seconds*

**no spanning-tree mst max-age**

<b>Syntax Description</b>	<i>seconds</i>	Number of seconds to set the max-age timer for all the instances on the Catalyst 4500 series switch; valid values are from 6 to 40 seconds.
---------------------------	----------------	---

<b>Defaults</b>	The max-age timer is set for 20 seconds.
-----------------	--

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Examples</b>	This example shows how to set the max-age timer:
	Switch(config)# <b>spanning-tree mst max-age 40</b>
	Switch(config)#

<b>Related Commands</b>	<a href="#">show spanning-tree mst</a>
-------------------------	--

# spanning-tree mst max-hops

To specify the number of possible hops in the region before a BPDU is discarded, use the **spanning-tree mst max-hops** command. To return to the default settings, use the **no** form of this command.

**spanning-tree mst max-hops** *hopnumber*

**no spanning-tree mst max-hops**

Syntax Description	<i>hopnumber</i> Number of possible hops in the region before a BPDU is discarded; valid values are from 1 to 40 hops.	
Defaults	Number of hops is 20.	
Command Modes	Global configuration	
Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Examples	<p>This example shows how to set the number of possible hops in the region before a BPDU is discarded to 25:</p> <pre>Switch(config)# <b>spanning-tree mst max-hops 25</b> Switch(config)#</pre>	
Related Commands	<a href="#">show spanning-tree mst</a>	

# spanning-tree mst root

To designate the primary root, secondary root, bridge priority, and timer value for an instance, use the **spanning-tree mst root** command. To return to the default settings, use the **no** form of this command.

```
spanning-tree mst instance-id root {primary | secondary} [{priority prio} [diameter dia
[hello-time hello]]
```

```
no spanning-tree mst root
```

Syntax Description	
<i>instance-id</i>	Instance identification number; valid values are from 1 to 15.
<b>root</b>	Configures switch as the root switch.
<b>primary</b>	Sets a high enough priority (low value) to make the bridge root of the spanning-tree instance.
<b>secondary</b>	Designates this switch as a secondary root if the primary root fails.
<b>priority <i>prio</i></b>	Sets the bridge priority; see the “Usage Guidelines” section for valid values and additional information.
<b>diameter <i>dia</i></b>	(Optional) Sets the timer values for the bridge based on the network diameter; valid values are from 2 to 7.
<b>hello-time <i>hello</i></b>	(Optional) Specifies the duration between the generation of configuration messages by the root switch.

**Defaults** Bridge priority is 32768.

**Command Modes** Global configuration

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The bridge priority can be set in increments of 4096 only. When you set the priority, valid values are 0, 4096, 8192, 12288, 16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152, 53248, 57344, and 61440.

You can set the priority to 0 to make the switch root.

The **spanning-tree root secondary** bridge priority value is 16384.

The **diameter *dia*** and **hello-time *hello*** options are available for instance 0 only.

If you do not specify the *hello\_time* value, the value is calculated from the network diameter.

---

**Examples**

This example shows how to set the priority and timer values for the bridge:

```
Switch(config)# spanning-tree mst 0 root primary diameter 7 hello-time 2
Switch(config)# spanning-tree mst 5 root primary
Switch(config)#
```

---

**Related Commands**

[show spanning-tree mst](#)

# spanning-tree pathcost method

To set the path cost calculation method, use the **spanning-tree pathcost method** command. To revert to the default setting, use the **no** form of this command.

**spanning-tree pathcost method {long | short}**

**no spanning-tree pathcost method**

Syntax Description	<b>long</b>	Specifies 32-bit-based values for port path costs.
	<b>short</b>	Specifies 16-bit-based values for port path costs.

Defaults	Port path cost has 32-bit-based values.
----------	---

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

This command applies to all the spanning-tree instances on the switch.

The **long** path cost calculation method uses all the 32 bits for path cost calculation and yields values in the range of 1 through 200,000,000.

The **short** path cost calculation method (16 bits) yields values in the range of 1 through 65,535.

**Examples** This example shows how to set the path cost calculation method to long:

```
Switch(config) spanning-tree pathcost method long
Switch(config)
```

This example shows how to set the path cost calculation method to short:

```
Switch(config) spanning-tree pathcost method short
Switch(config)
```

Related Commands	<a href="#">show spanning-tree</a>
------------------	------------------------------------



## spanning-tree portfast (interface configuration mode)

To enable PortFast mode, where the interface is immediately put into the forwarding state upon linkup without waiting for the timer to expire, use the **spanning-tree portfast** command. To return to the default setting, use the **no** form of this command.

**spanning-tree portfast {disable | trunk}**

**no spanning-tree portfast**

### Syntax Description

<b>disable</b>	Disables PortFast on the interface.
<b>trunk</b>	Enables PortFast on the interface even while in the trunk mode.

### Defaults

PortFast mode is disabled.

### Command Modes

Interface configuration

### Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(12c)EW	The <b>disable</b> and <b>trunk</b> options were added.

### Usage Guidelines

You should use this feature only with interfaces that connect to end stations; otherwise, an accidental topology loop could cause a data packet loop and disrupt the Catalyst 4500 series switch and network operation.

An interface with PortFast mode enabled is moved directly to the spanning-tree forwarding state when linkup occurs without waiting for the standard forward-time delay.

Be careful when using the **no spanning-tree portfast** command. This command does not disable PortFast if the **spanning-tree portfast default** command is enabled.

This command has four states:

- **spanning-tree portfast**—This command enables PortFast unconditionally on the given port.
- **spanning-tree portfast disable**—This command explicitly disables PortFast for the given port. The configuration line shows up in the running-configuration as it is not the default.
- **spanning-tree portfast trunk**—This command allows you to configure PortFast on trunk ports.



#### Note

If you enter the **spanning-tree portfast trunk** command, the port is configured for PortFast even when in the access mode.

- **no spanning-tree portfast**—This command implicitly enables PortFast if the **spanning-tree portfast default** command is defined in global configuration and if the port is not a trunk port. If you do not configure PortFast globally, the **no spanning-tree portfast** command is equivalent to the **spanning-tree portfast disable** command.

---

**Examples**

This example shows how to enable PortFast mode:

```
Switch(config-if) # spanning-tree portfast  
Switch(config)
```

---

**Related Commands**

**spanning-tree cost**  
**spanning-tree port-priority**  
**spanning-tree portfast default**  
**spanning-tree uplinkfast**  
**spanning-tree vlan**  
**show spanning-tree**

# spanning-tree portfast bpdupfilter default

To enable the BPDU filtering by default on all PortFast ports, use the **spanning-tree portfast bpdupfilter default** command. To return to the default settings, use the **no** form of this command.

**spanning-tree portfast bpdupfilter default**

**no spanning-tree portfast bpdupfilter default**

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

**Defaults** BPDU filtering is disabled.

**Command Modes** Global configuration

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The **spanning-tree portfast bpdupfilter default** command enables BPDU filtering globally on the Catalyst 4500 series switch. BPDU filtering prevents a port from sending or receiving any BPDUs. You can override the effects of the **spanning-tree portfast bpdupfilter default** command by configuring BPDU filtering at the interface level.



## Note

Be careful when enabling BPDU filtering. Functionality is different when enabling on a per-port basis or globally. When enabled globally, BPDU filtering is applied only on ports that are in an operational PortFast state. Ports still send a few BPDUs at linkup before they effectively filter outbound BPDUs. If a BPDU is received on an edge port, it immediately loses its operational PortFast status and BPDU filtering is disabled.

When enabled locally on a port, BPDU filtering prevents the Catalyst 4500 series switch from receiving or sending BPDUs on this port.



## Caution

Be careful when using this command. This command can cause bridging loops if not used correctly.

**Examples** This example shows how to enable BPDU filtering by default:

```
Switch(config)# spanning-tree portfast bpdupfilter default
Switch(config)#
```

■ spanning-tree portfast bpdupfilter default

---

**Related Commands**

[show spanning-tree mst](#)  
[spanning-tree bpdupfilter](#)

# spanning-tree portfast bpduguard default

To enable BPDU guard by default on all the PortFast ports, use the **spanning-tree portfast bpduguard default** command. To return to the default settings, use the **no** form of this command.

**spanning-tree portfast bpduguard default**

**no spanning-tree portfast bpduguard default**

<b>Syntax Description</b>	This command has no keywords or arguments.
---------------------------	--

<b>Defaults</b>	BPDU guard is disabled.
-----------------	-------------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines



### Caution

Be careful when using this command. You should use this command only with the interfaces that connect to the end stations; otherwise, an accidental topology loop could cause a data packet loop and disrupt the Catalyst 4500 series switch and network operation.

BPDU guard disables a port if it receives a BPDU. BPDU guard is applied only on ports that are PortFast enabled and are in an operational PortFast state.

<b>Examples</b>	This example shows how to enable BPDU guard by default:
-----------------	---

```
Switch(config)# spanning-tree portfast bpduguard default
Switch(config)#
```

<b>Related Commands</b>	<a href="#">show spanning-tree mst</a> <a href="#">spanning-tree bpduguard</a>
-------------------------	---

# spanning-tree portfast default

To globally enable PortFast by default on all access ports, use the **spanning-tree portfast default** command. To disable PortFast as default on all access ports, use the **no** form of this command.

**spanning-tree portfast default**

**no spanning-tree portfast default**

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

**Defaults** PortFast is disabled.

**Command Modes** Global configuration

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines



### Caution

Be careful when using this command. You should use this command only with the interfaces that connect to end stations; otherwise, an accidental topology loop could cause a data packet loop and disrupt the Catalyst 4500 series switch and network operation.

An interface with PortFast mode enabled is moved directly to the spanning-tree forwarding state when linkup occurs without waiting for the standard forward-time delay.

You can enable PortFast mode on individual interfaces using the **spanning-tree portfast (interface configuration mode)** command.

## Examples

This example shows how to globally enable PortFast by default on all access ports:

```
Switch(config)# spanning-tree portfast default
Switch(config)#
```

## Related Commands

**show spanning-tree**  
**spanning-tree portfast (interface configuration mode)**

# spanning-tree port-priority

To prioritize an interface when two bridges compete for position as the root bridge, use the **spanning-tree port-priority** command. The priority you set breaks the tie. To revert to the default setting, use the **no** form of this command.

**spanning-tree port-priority** *port\_priority*

**no spanning-tree port-priority**

Syntax Description	<i>port_priority</i> Port priority; valid values are from 0 to 240 in increments of 16.	
Defaults	Port priority value is set to 128.	
Command Modes	Interface configuration	
Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Examples	<p>This example shows how to increase the possibility that the spanning-tree instance 20 will be chosen as the root-bridge on interface FastEthernet 2/1:</p> <pre>Switch(config-if)# <b>spanning-tree port-priority 0</b> Switch(config-if)#</pre>	
Related Commands	<a href="#">spanning-tree cost</a> <a href="#">spanning-tree portfast default</a> <a href="#">spanning-tree portfast (interface configuration mode)</a> <a href="#">spanning-tree uplinkfast</a> <a href="#">spanning-tree vlan</a> <a href="#">show spanning-tree</a>	

# spanning-tree uplinkfast

To enable the UplinkFast feature, use the **spanning-tree uplinkfast** command. To disable UplinkFast, use the **no** form of this command.

**spanning-tree uplinkfast** [**max-update-rate** *packets-per-second*]

**no spanning-tree uplinkfast** [**max-update-rate**]

<b>Syntax Description</b>	<b>max-update-rate</b> (Optional) Specifies the maximum rate (in packets per second) at which update packets are sent; valid values are from 0 to 65535. <i>packets_per_second</i>
---------------------------	---

<b>Defaults</b>	The default settings are as follows: <ul style="list-style-type: none"> <li>Disabled.</li> <li>Maximum update rate is 150.</li> </ul>
-----------------	---

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b> <b>Modification</b>
	12.1(8a)EW      Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>This command should be used only on access switches.</p> <p>When UplinkFast is configured, the bridge priority is changed to 49,152 so that this switch will not be selected as root. All interface path costs of all spanning-tree interfaces belonging to the specified spanning-tree instances are also increased by 3000.</p> <p>When spanning tree detects that the root interface has failed, the UplinkFast feature causes an immediate switchover to an alternate root interface, transitioning the new root interface directly to the forwarding state. During this time, a topology change notification is sent. To minimize the disruption caused by the topology change, a multicast packet is sent to 01-00-0C-CD-CD-CD for each station address in the forwarding bridge except for those associated with the old root interface.</p> <p>Use the <b>spanning-tree uplinkfast max-update-rate</b> command to enable UplinkFast (if not already enabled) and change the rate at which the update packets are sent. Use the <b>no</b> form of this command to return the default rate of 150 packets per second.</p>
-------------------------	--

<b>Examples</b>	<p>This example shows how to enable UplinkFast and set the maximum rate to 200 packets per second:</p> <pre>Switch(config)# spanning-tree uplinkfast Switch(config)# spanning-tree uplinkfast max-update-rate 200</pre>
-----------------	---



---

Related Commands

[spanning-tree cost](#)  
[spanning-tree port-priority](#)  
[spanning-tree portfast default](#)  
[spanning-tree portfast \(interface configuration mode\)](#)  
[spanning-tree vlan](#)

# spanning-tree vlan

To configure STP on a per-VLAN basis, use the **spanning-tree vlan** command. To return to the default value, use the **no** form of this command.

**spanning-tree vlan** *vlan\_id* [**forward-time** *seconds* | **hello-time** *seconds* | **max-age** *seconds* | **priority** *priority* | **protocol** *protocol* | **root** {**primary** | **secondary**} [**diameter** *net-diameter* [**hello-time** *seconds*]]]

**no spanning-tree vlan** *vlan\_id* [**forward-time** | **hello-time** | **max-age** | **priority** | **root**]

Syntax Description		
<i>vlan_id</i>		VLAN identification number; valid values are from 1 to 4094.
<b>forward-time</b> <i>seconds</i>		(Optional) Sets the STP forward delay time; valid values are from 4 to 30 seconds.
<b>hello-time</b> <i>seconds</i>		(Optional) Specifies, in seconds, the time between configuration messages generated by the root switch; valid values are from 1 to 10 seconds.
<b>max-age</b> <i>seconds</i>		(Optional) Sets the maximum time, in seconds, that the information in a BPDU is valid; valid values are from 6 to 40 seconds.
<b>priority</b> <i>priority</i>		(Optional) Sets the STP bridge priority; valid values are from 0 to 65535.
<b>protocol</b> <i>protocol</i>		(Optional) Specifies the protocol.
<b>root primary</b>		(Optional) Forces this switch to be the root bridge.
<b>root secondary</b>		(Optional) Specifies this switch act as the root switch should the primary root fail.
<b>diameter</b> <i>net-diameter</i>		(Optional) Specifies the maximum number of bridges between two end stations; valid values are from 2 to 7.

## Defaults

The default settings are as follows:

- Forward-time—15 seconds
- Hello-time—2 seconds
- Max-age—20 seconds
- Priority—32768 with STP enabled; 128 with MST enabled
- Root—No STP root

## Command Modes

Global configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(12c)EW	Support for extended addressing was added.

---

**Usage Guidelines**

When you are setting the **max-age** *seconds* value, if a bridge does not hear BPDUs from the root bridge within the specified interval, it assumes that the network has changed and recomputes the spanning-tree topology.

The **spanning-tree root primary** command alters the switch bridge priority to 8192. If you enter the **spanning-tree root primary** command and the switch does not become root, then the bridge priority is changed to 100 less than the bridge priority of the current bridge. If the switch does not become root, an error will result.

The **spanning-tree root secondary** command alters the switch bridge priority to 16384. If the root switch fails, this switch becomes the next root switch.

Use the **spanning-tree root** commands on backbone switches only.

---

**Examples**

This example shows how to enable spanning tree on VLAN 200:

```
Switch(config)# spanning-tree vlan 200
Switch(config)#
```

This example shows how to configure the switch as the root switch for VLAN 10 with a network diameter of 4:

```
Switch(config)# spanning-tree vlan 10 root primary diameter 4
Switch(config)#
```

This example shows how to configure the switch as the secondary root switch for VLAN 10 with a network diameter of 4:

```
Switch(config)# spanning-tree vlan 10 root secondary diameter 4
Switch(config)#
```

---

**Related Commands**

[spanning-tree cost](#)  
[spanning-tree port-priority](#)  
[spanning-tree portfast default](#)  
[spanning-tree portfast \(interface configuration mode\)](#)  
[spanning-tree uplinkfast](#)  
[show spanning-tree](#)

# speed

To configure the interface speed, use the **speed** command. To disable a speed setting, use the **no** form of this command.

**speed { 10 | 100 | 1000 | auto [10 | 100 | 1000] | nonegotiate }**

**no speed**

## Syntax Description

<b>10</b>	(Optional) Configures the interface to transmit at 10 Mbps.
<b>100</b>	(Optional) Configures the interface to transmit at 100 Mbps.
<b>1000</b>	(Optional) Configures the interface to transmit at 1000 Mbps.
<b>auto [10   100   1000]</b>	(Optional) Enables the interface to autonegotiate the speed and specify the exact values to advertise when autonegotiating.
<b>nonegotiate</b>	(Optional) Enables the interface to not negotiate the speed.

## Defaults

The default values are shown in the following table:

Interface Type	Supported Syntax	Default Setting
10/100-Mbps module	<b>speed [10   100   auto [10   100]]</b>	Auto
100-Mbps fiber modules	Not applicable	Not applicable
Gigabit Ethernet Interface	<b>speed nonegotiate</b>	Nonegotiate
10/100/1000	<b>speed [10   100   1000   auto [10   100   1000]]</b>	Auto
1000	Not applicable	Not applicable

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.2(20)EWA	Support for auto negotiating specific speeds added.

## Usage Guidelines

[Table 2-28](#) lists the supported command options by interface.

**Table 2-28** Supported speed Command Options

Interface Type	Supported Syntax	Default Setting	Guidelines
10/100-Mbps module	<b>speed</b> [10   100   <b>auto</b> ]	<b>auto</b>	If the speed is set to 10 or 100 and you do not configure the duplex setting, the duplex is set to half.
100-Mbps fiber modules	Not applicable.	Not applicable.	Not applicable.
Gigabit Ethernet Interface	<b>speed nonegotiate</b>	<b>nonegotiate</b> is enabled.	This is only applicable to Gigabit Ethernet ports.
10/100/1000	<b>speed</b> [10   100   1000   <b>auto</b> ]	<b>auto</b>	If the speed is set to 10 or 100 and you do not configure the duplex setting, the duplex is set to half.  If the speed is set to 1000 or auto with any subset containing 1000 (e.g. <b>speed auto 10 1000</b> or <b>speed auto</b> on a 10/100/1000 port), you will not able to set half duplex.
1000	Not applicable.	Not applicable.	The speed is always 1000.  The duplex is half.

If you configure the interface speed and duplex commands manually and enter a value other than **speed auto** (for example, 10 or 100 Mbps), make sure that you configure the connecting interface speed command to a matching speed but do not use the auto parameter.

When manually configuring the interface speed to either 10 or 100 Mbps, the switch prompts you to also configure duplex mode on the interface.

**Note**

Catalyst 4006 switches cannot automatically negotiate the interface speed and the duplex mode if either connecting interface is configured to a value other than **auto**.

**Caution**

Changing the interface speed and the duplex mode configuration might shut down and reenables the interface during the reconfiguration.

Table 2-29 describes the system's performance for different combinations of the duplex and speed modes. The specified **duplex** command that is configured with the specified **speed** command produces the resulting system action.

**Table 2-29** System Action Using duplex and speed Commands

duplex Command	speed Command	Resulting System Action
<b>duplex auto</b>	<b>speed auto</b>	Autonegotiates both speed and duplex modes
<b>duplex half</b>	<b>speed 10</b>	Forces 10 Mbps and half duplex
<b>duplex full</b>	<b>speed 10</b>	Forces 10 Mbps and full duplex

**Table 2-29** System Action Using duplex and speed Commands (continued)

duplex Command	speed Command	Resulting System Action
<b>duplex half</b>	<b>speed 100</b>	Forces 100 Mbps and half duplex
<b>duplex full</b>	<b>speed 100</b>	Forces 100 Mbps and full duplex
<b>duplex full</b>	<b>speed 1000</b>	Forces 1000 Mbps and full duplex

**Examples**

This example shows how to set the interface speed to 100 Mbps on the Fast Ethernet interface 5/4:

```
Switch(config)# interface fastethernet 5/4
Switch(config-if)# speed 100
```

This example shows how to allow Fast Ethernet interface 5/4 to autonegotiate the speed and duplex mode:

```
Switch(config)# interface fastethernet 5/4
Switch(config-if)# speed auto
```

**Note**

The **speed auto 10 100** command is similar to the **speed auto** command on a Fast Ethernet interface.

This example shows how to limit the interface speed to 10 and 100 Mbps on the Gigabit Ethernet interface 1/1 in auto-negotiation mode:

```
Switch(config)# interface gigabitethernet 1/1
Switch(config-if)# speed auto 10 100
```

This example shows how to limit the speed negotiation to 100 Mbps on the Gigabit Ethernet interface 1/1:

```
Switch(config)# interface gigabitethernet 1/1
Switch(config-if)# speed auto 100
```

**Related Commands****duplex**

**interface** (refer to Cisco IOS documentation)

**show controllers** (refer to Cisco IOS documentation)

**show interfaces** (refer to Cisco IOS documentation)

# storm-control

To enable broadcast storm control on a port and to specify what to do when a storm occurs on a port, use the **storm-control** interface configuration command. To disable storm control for the broadcast traffic and to disable a specified storm-control action, use the **no** form of this command.

**storm-control** { **broadcast level** *high level* [*lower level*] } | **action** { **shutdown** | **trap** } }

**no storm-control** { **broadcast level** *level* [*lower level*] } | **action** { **shutdown** | **trap** } }

Syntax Description		
<b>broadcast</b>		Enables the broadcast storm control on the port.
<b>level</b> <i>high-level lower-level</i>		Defines the rising and falling suppression levels: <ul style="list-style-type: none"> <li><i>high-level</i>—Rising suppression level as a percent of total bandwidth, up to two decimal places; valid values are from 0 to 100 percent. Blocks the flooding of storm packets when the value specified for <i>level</i> is reached.</li> <li><i>lower-level</i>—(Optional) Falling suppression level as a percent of total bandwidth, up to two decimal places; valid values are from 0 to 100. This value must be less than the rising suppression value.</li> </ul>
<b>action</b>		Directs the switch to take action when a storm occurs on a port.
<b>shutdown</b>		Disables the port during a storm.
<b>trap</b>		Sends an SNMP trap when a storm occurs. This keyword is available but not supported in 12.1(19)EW.

**Defaults** Broadcast storm control is disabled. All packets are passed.

**Command Modes** Interface configuration

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** Enter the **storm-control broadcast level** command to enable traffic storm control on the interface, configure the traffic storm control level, and apply the traffic storm control level to the broadcast traffic on the interface.

The Catalyst 4500 series switch supports broadcast traffic storm control on all LAN ports.

The period is required when you enter the fractional suppression level.

The suppression level is entered as a percentage of the total bandwidth. A threshold value of 100 percent indicates that no limit is placed on traffic. A value of 0.0 means that all specified traffic on that port is blocked.

Enter the **show interfaces counters storm-control** command to display the discard count.

Enter the **show running-config** command to display the enabled suppression mode and level setting.

To turn off suppression for the specified traffic type, you can do one of the following:

- Set the *high-level* value to 100 percent for the specified traffic type.
- Use the **no** form of this command.

The lower level is ignored for the interfaces that perform storm control in the hardware.

---

## Examples

This example shows how to enable broadcast storm control on a port with a 75.67 percent rising suppression level:

```
Switch(config-if)# storm-control broadcast level 75.67
```

This example shows how to disable the port during a storm:

```
Switch(config-if)# storm-control action shutdown
```

This example shows how to disable storm control on a port:

```
Switch(config-if)# no storm-control broadcast level
```

This example shows how to disable storm control by setting the high level to 100 percent:

```
Switch(config-if)# storm-control broadcast level 100
```

---

## Related Commands

[show interfaces counters](#)  
[show running-config](#)



# storm-control broadcast include multicast

To enable multicast storm control on a port, use the **storm-control broadcast include multicast** command. To disable multicast storm control, use the **no** form of this command.

**storm-control broadcast include multicast**

**no storm-control broadcast include multicast**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Multicast storm control is disabled.
-----------------	--------------------------------------

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	This command prompts the hardware to filter multicast packets if it is already filtering broadcast packets.
-------------------------	---

<b>Examples</b>	This example shows how to enable multicast storm control globally:
-----------------	--

```
Switch(config)# storm-control broadcast include multicast
Switch(config)#
```

<b>Related Commands</b>	<a href="#">storm-control</a>
-------------------------	-------------------------------

# switchport

To modify the switching characteristics of a Layer 2 switch interface, use the **switchport** command. To return the interface to the routed-interface status and cause all further Layer 2 configuration to be erased, use the **no** form of this command without parameters.

**switchport** [**access vlan** *vlan\_num*] | [**nonegotiate**] | [**voice vlan** {*vlan\_id* | **dot1p** | **none** | **untagged**}]

**no switchport** [**access** | **nonegotiate** | **voice vlan**]

## Syntax Description

<b>access vlan</b> <i>vlan_num</i>	(Optional) Sets the VLAN when the interface is in access mode; valid values are from 1 to 1005.
<b>nonegotiate</b>	(Optional) Specifies that the DISL/DTP negotiation packets will not be sent on the interface.
<b>voice vlan</b> <i>vlan_id</i>	(Optional) Specifies the number of the VLAN; valid values are from 1 to 1005.
<b>dot1p</b>	(Optional) Specifies that the PVID packets are tagged as priority.
<b>none</b>	(Optional) Specifies that the telephone and voice VLAN do not communicate.
<b>untagged</b>	(Optional) Specifies the untagged PVID packets.

## Defaults

The default settings are as follows:

- Switchport trunking mode is enabled.
- Dynamic negotiation parameter is set to auto.
- Access VLANs and trunk interface native VLANs are a default VLAN corresponding to the platform or interface hardware.
- All VLAN lists include all VLANs.
- No voice VLAN is enabled.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(11)EW	Support for voice VLAN was added.

## Usage Guidelines

The **no switchport** command shuts the port down and then reenables it, which may generate messages on the device to which the port is connected.

The **no** form of the **switchport access** command resets the access mode VLAN to the appropriate default VLAN for the device. The **no** form of the **switchport nonegotiate** command removes the **nonegotiate** status.

When you are using the **nonegotiate** keyword, DISL/DTP negotiation packets will not be sent on the interface. The device will trunk or not trunk according to the **mode** parameter given: **access** or **trunk**. This command will return an error if you attempt to execute it in **dynamic (auto or desirable)** mode.

The voice VLAN is automatically set to VLAN 1 unless you use one of the optional keywords.

If you use the **switch port voice vlan** command for an interface, the interface cannot join a port channel.

When you use the **switchport voice vlan** command, the output for the **show running-config** command changes to show the voice VLAN set.

---

### Examples

This example shows how to cause the port interface to stop operating as a Cisco-routed port and convert to a Layer 2-switched interface:

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

This example shows how to cause a port interface in access mode, which is configured as a switched interface, to operate in VLAN 2:

```
Switch(config-if)# switchport access vlan 2
Switch(config-if)#
```

This example shows how to cause a port interface, which is configured as a switched interface, to refrain from negotiating in trunking mode and act as a trunk or access port (depending on the **mode** set):

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

This example shows how to set the voice VLAN for the interface to VLAN 2:

```
Switch(config-if)# switchport voice vlan 2
switchport voice vlan 2
Switch(config-if)#
```

---

### Related Commands

[show interfaces switchport](#)

# switchport access vlan

To set the VLAN when an interface is in access mode, use the **switchport access vlan** command. To reset the access mode VLAN to the appropriate default VLAN for the device, use the **no** form of this command.

**switchport access** [**vlan** {*vlan-id* | **dynamic**}]

**no switchport access vlan**

Syntax Description	<i>vlan-id</i>	(Optional) Number of the VLAN on the interface in access mode; valid values are from 1 to 4094.
	<b>dynamic</b>	(Optional) Enables VMPS control of the VLAN.

## Defaults

The default settings are as follows:

- The access VLAN and trunk interface native VLAN are default VLANs that correspond to the platform or the interface hardware.
- All VLAN lists include all VLANs.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(13)EW	Support for VPMS was added.

## Usage Guidelines

You must enter the **switchport** command without any keywords to configure the LAN interface as a Layer 2 interface before you can enter the **switchport access vlan** command. This action is required only if you have not already entered the **switchport** command for the interface.

Entering the **no switchport** command shuts the port down and then reenables it, which could generate messages on the device to which the port is connected.

The **no** form of the **switchport access vlan** command resets the access mode VLAN to the appropriate default VLAN for the device.

If your system is configured with a Supervisor Engine I, valid values for *vlan-id* are from 1 to 1005. If your system is configured with a Supervisor Engine II, valid values for *vlan-id* are from 1 to 4094. Extended-range VLANs are not supported on systems configured with a Supervisor Engine I.

## Examples

This example shows how to cause the port interface to stop operating as a Cisco-routed port and convert to a Layer 2-switched interface:

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

**Note**

This command is not used on platforms that do not support Cisco-routed ports. All physical ports on such platforms are assumed to be Layer 2-switched interfaces.

This example shows how to cause a port interface that has already been configured as a switched interface to operate in VLAN 2 instead of the platform's default VLAN when in access mode:

```
Switch(config-if)# switchport access vlan 2  
Switch(config-if)#
```

**Related Commands**

[\*\*show interfaces switchport\*\*](#)

# switchport block

To prevent the unknown multicast or unicast packets from being forwarded, use the **switchport block** interface configuration command. To allow the unknown multicast or unicast packets to be forwarded, use the **no** form of this command.

**switchport block {multicast | unicast}**

**no switchport block {multicast | unicast}**

## Syntax Description

<b>multicast</b>	Specifies that the unknown multicast traffic should be blocked.
<b>unicast</b>	Specifies that the unknown unicast traffic should be blocked.

## Defaults

Unknown multicast and unicast traffic are not blocked.  
All traffic with unknown MAC addresses is sent to all ports.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

You can block the unknown multicast or unicast traffic on the switch ports.  
Blocking the unknown multicast or unicast traffic is not automatically enabled on the switch ports; you must explicitly configure it.



### Note

For more information about blocking the packets, refer to the software configuration guide for this release.

## Examples

This example shows how to block the unknown multicast traffic on an interface:

```
Switch(config-if)# switchport block multicast
```

You can verify your setting by entering the **show interfaces *interface-id* switchport** privileged EXEC command.

## Related Commands

[show interfaces switchport](#)

# switchport mode

To set the interface type, use the **switchport mode** command. To reset the mode to the appropriate default mode for the device, use the **no** form of this command.

**switchport mode** { **access** | **dot1q-tunnel** | **trunk** | **dynamic** { **auto** | **desirable** } }

**switchport mode private-vlan** { **host** | **promiscuous** | **trunk promiscuous** | **trunk** [**secondary**] }

**no switchport mode dot1q-tunnel**

**no switchport mode private-vlan**

Syntax Description		
<b>access</b>		Specifies a nontrunking, nontagged single VLAN Layer 2 interface.
<b>dot1q-tunnel</b>		Specifies an 802.1Q tunnel port.
<b>trunk</b>		Specifies a trunking VLAN Layer 2 interface.
<b>dynamic auto</b>		Specifies that the interface convert the link to a trunk link.
<b>dynamic desirable</b>		Specifies that the interface actively attempt to convert the link to a trunk link.
<b>private-vlan host</b>		Specifies that the ports with a valid PVLAN trunk association become active host private VLAN trunk ports.
<b>private-vlan promiscuous</b>		Specifies that the ports with a valid PVLAN mapping become active promiscuous ports.
<b>private-vlan trunk promiscuous</b>		Specifies that the ports with valid PVLAN trunk mapping become active promiscuous trunk ports.
<b>private-vlan trunk secondary</b>		Specifies that the ports with a valid PVLAN trunk association become active host private VLAN trunk ports.

Defaults	Link converts to a trunk link. dot1q tunnel ports are disabled.
----------	--

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(18)EW	Support was added for configuring dot1q tunnel ports.
	12.2(31)SG	Support was added for trunk promiscuous ports.

Usage Guidelines	<p>If you enter <b>access</b> mode, the interface goes into permanent nontrunking mode and negotiates to convert the link into a nontrunk link even if the neighboring interface does not approve the change.</p> <p>If you enter <b>trunk</b> mode, the interface goes into permanent trunking mode and negotiates to convert the link into a trunk link even if the neighboring interface does not approve the change.</p>
------------------	--

If you enter **dynamic auto** mode, the interface converts the link to a trunk link if the neighboring interface is set to **trunk** or **desirable** mode.

If you enter **dynamic desirable** mode, the interface becomes a trunk interface if the neighboring interface is set to **trunk**, **desirable**, or **auto** mode.

If you specify the **dot1q-tunnel** keyword, the port is set unconditionally as an 802.1Q tunnel port.

The port becomes inactive if you configure it as a private VLAN trunk port and one of the following applies:

- The port does not have a valid PVLAN association.
- The port does not have valid allowed normal VLANs.

If a private port PVLAN association or mapping is deleted, or if a private port is configured as a SPAN destination, it becomes inactive.

## Examples

This example shows how to set the interface to dynamic desirable mode:

```
Switch(config-if)# switchport mode dynamic desirable
Switch(config-if)#
```

This example shows how to set a port to PVLAN host mode:

```
Switch(config-if)# switchport mode private-vlan host
Switch(config-if)#
```

This example shows how to set a port to private VLAN trunk:

```
Switch(config-if)# switchport mode private-vlan trunk
Switch(config-if)#
```

This example shows how to configure a port for an 802.1Q tunnel port:

```
Switch(config-if)# switchport mode dot1q-tunnel
Switch(config-if)#
```

This example shows how to configure a promiscuous trunk port:

```
Switch(config-if)# switchport mode private-vlan trunk promiscuous
Switch(config-if)#
```

This example shows how to configure an isolated trunk port:

```
Switch(config-if)# switchport mode private-vlan trunk
OR
Switch(config-if)# switchport mode private-vlan trunk secondary
Switch(config-if)#
```

You can verify your settings by entering the **show interfaces switchport** command and examining information in the Administrative Mode and Operational Mode rows.

This example shows how to configure interface FastEthernet 5/2 as a PVLAN promiscuous port, map it to a PVLAN, and verify the configuration:

```
Switch# configure terminal
Switch(config)# interface fastethernet 5/2
Switch(config-if)# switchport mode private-vlan promiscuous
Switch(config-if)# switchport private-vlan mapping 200 2
Switch(config-if)# end
```



```

Switch# show interfaces fastethernet 5/2 switchport
Name:Fa5/2
Switchport:Enabled
Administrative Mode:private-vlan promiscuous
Operational Mode:private-vlan promiscuous
Administrative Trunking Encapsulation:negotiate
Operational Trunking Encapsulation:native
Negotiation of Trunking:Off
Access Mode VLAN:1 (default)
Trunking Native Mode VLAN:1 (default)
Voice VLAN:none
Administrative Private VLAN Host Association:none
Administrative Private VLAN Promiscuous Mapping:200 (VLAN0200) 2 (VLAN0002)
Private VLAN Trunk Native VLAN:none
Administrative Private VLAN Trunk Encapsulation:dot1q
Administrative Private VLAN Trunk Normal VLANs:none
Administrative Private VLAN Trunk Private VLANs:none
Operational Private VLANs:
    200 (VLAN0200) 2 (VLAN0002)
Trunking VLANs Enabled:ALL
Pruning VLANs Enabled:2-1001
Capture Mode Disabled
Capture VLANs Allowed:ALL

```

This example shows how to configure interface FastEthernet 5/1 as a PVLAN host port and verify the configuration:

```

Switch# configure terminal
Switch(config)# interface fastethernet 5/1
Switch(config-if)# switchport mode private-vlan host
Switch(config-if)# switchport private-vlan host-association 202 440
Switch(config-if)# end

Switch# show interfaces fastethernet 5/1 switchport
Name: Fa5/1
Switchport: Enabled
Administrative Mode: private-vlan host
Operational Mode: private-vlan host
Administrative Trunking Encapsulation: negotiate
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Appliance trust: none
Administrative Private Vlan
    Host Association: 202 (VLAN0202) 440 (VLAN0440)
    Promiscuous Mapping: none
    Trunk encapsulation : dot1q
    Trunk vlans:
Operational private-vlan(s):
    202 (VLAN0202) 440 (VLAN0440)
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL

```

This example shows how to configure interface FastEthernet 5/2 as a secondary trunk port, and verify the configuration:

```

Switch# configure terminal
Switch(config)# interface fastethernet 5/2
Switch(config-if)# switchport mode private-vlan trunk secondary
Switch(config-if)# switchport private-vlan trunk native vlan 10

```

```

Switch(config-if)# switchport private-vlan trunk allowed vlan 10, 3-4
Switch(config-if)# switchport private-vlan association trunk 3 301
Switch(config-if)# end
Switch# show interfaces fastethernet 5/2 switchport
Name: Fa5/2
  Switchport: Enabled
  Administrative Mode: private-vlan trunk secondary
  Operational Mode: private-vlan trunk secondary
  Administrative Trunking Encapsulation: negotiate
  Operational Trunking Encapsulation: dot1q
  Negotiation of Trunking: On
  Access Mode VLAN: 1 (default)
  Trunking Native Mode VLAN: 1 (default)
  Administrative Native VLAN tagging: enabled
  Voice VLAN: none
  Administrative private-vlan host-association: none A
  Administrative private-vlan mapping: none
  Administrative private-vlan trunk native VLAN: 10
  Administrative private-vlan trunk Native VLAN tagging: enabled
  Administrative private-vlan trunk encapsulation: dot1q
  Administrative private-vlan trunk normal VLANs: none
  Administrative private-vlan trunk associations:
    3 (VLAN0003) 301 (VLAN0301)
  Administrative private-vlan trunk mappings: none
  Operational private-vlan: none
  Operational Normal VLANs: none
  Trunking VLANs Enabled: ALL
  Pruning VLANs Enabled: 2-1001
  Capture Mode Disabled Capture VLANs Allowed: ALL

  Unknown unicast blocked: disabled
  Unknown multicast blocked: disabled
  Appliance trust: none
Switch(config-if)#

```

This example shows how to configure interface FastEthernet 5/2 as a promiscuous trunk port and to verify the configuration:

```

Switch# configure terminal
Switch(config)# interface fastethernet 5/2
Switch(config-if)# switchport mode private-vlan trunk promiscuous
Switch(config-if)# switchport private-vlan trunk native vlan 10
Switch(config-if)# switchport private-vlan trunk allowed vlan 10, 3-4
Switch(config-if)# switchport private-vlan mapping trunk 3 301, 302
Switch(config-if)# end
Switch# show interfaces fastethernet 5/2 switchport
Name: Fa5/2
  Switchport: Enabled
  Administrative Mode: private-vlan trunk promiscuous
  Operational Mode: private-vlan trunk promiscuous
  Administrative Trunking Encapsulation: negotiate
  Operational Trunking Encapsulation: dot1q
  Negotiation of Trunking: On
  Access Mode VLAN: 1 (default)
  Trunking Native Mode VLAN: 1 (default)
  Administrative Native VLAN tagging: enabled
  Voice VLAN: none
  Administrative private-vlan host-association: none
  Administrative private-vlan mapping: none
  Administrative private-vlan trunk native VLAN: 10
  Administrative private-vlan trunk Native VLAN tagging: enabled
  Administrative private-vlan trunk encapsulation: dot1q

```

```
Administrative private-vlan trunk normal VLANs: 3-4,10
Administrative private-vlan trunk associations: none
Administrative private-vlan trunk mappings:
    3 (VLAN0003) 301 (VLAN0301) 302 (VLAN0302)
Operational private-vlan:
    3 (VLAN0003) 301 (VLAN0301) 302 (VLAN0302)
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL

Unknown unicast blocked: disabled
Unknown multicast blocked: disabled
Appliance trust: none
Switch(config-if)#
```

---

**Related Commands**

**show interfaces switchport**  
**switchport**  
**switchport private-vlan host-association**  
**switchport private-vlan mapping**

# switchport port-security

To enable port security on an interface, use the **switchport port-security** command. To disable port security and set parameters to their default states, use the **no** form of this command.

```
switchport port-security [aging {static | time time | type {absolute | inactivity}}] |
limit rate invalid-source-mac [N | none] | mac-address mac-address [vlan {access | voice} |
mac-address sticky [mac-address] [vlan access | voice] | maximum value [vlan {access |
voice} | violation {restrict | shutdown}]
```

```
no switchport port-security [aging {static | time time | type {absolute | inactivity}}] |
limit rate invalid-source-mac [N | none] | mac-address mac-address [vlan {access | voice} |
mac-address sticky [mac-address] [vlan access | voice] | maximum value [vlan {access |
voice} | violation {restrict | shutdown}]
```

Syntax Description	
<b>aging</b>	(Optional) Specifies aging for port security.
<b>static</b>	(Optional) Enables aging for statically configured secure addresses on this port.
<b>time</b> <i>time</i>	(Optional) Specifies the aging time for this port. The valid values are from 0 to 1440 minutes. If the time is 0, aging is disabled for this port.
<b>type absolute</b>	(Optional) Sets the aging type as absolute aging. All the secure addresses on this port age out exactly after the time (minutes) specified and are removed from the secure address list.
<b>type inactivity</b>	(Optional) Sets the aging type as inactivity aging. The secure addresses on this port age out only if there is no data traffic from the secure source address for the specified time period.
<b>limit rate invalid-source-mac</b>	(Optional) Sets the rate limit for bad packets. This rate limit also applies to the port where DHCP snooping security mode is enabled as filtering the IP and MAC address.
<b>N none</b>	(Optional) Supplies a rate limit ( <b>N</b> ) or indicates none ( <b>none</b> ).
<b>mac-address</b> <i>mac-address</i>	(Optional) Specifies a secure MAC address for the interface; a 48-bit MAC address. You can add additional secure MAC addresses up to the maximum value that is configured.
<b>sticky</b>	(Optional) Configures the dynamic addresses as sticky on the interface.
<b>vlan access</b>	(Optional) Deletes the secure MAC addresses from access VLANs.
<b>vlan voice</b>	(Optional) Deletes the secure MAC addresses from voice VLANs.
<b>maximum</b> <i>value</i>	(Optional) Sets the maximum number of secure MAC addresses for the interface. Valid values are from 1 to 3072. The default setting is 1.
<b>violation</b>	(Optional) Sets the security violation mode and action to be taken if port security is violated.
<b>restrict</b>	(Optional) Sets the security violation restrict mode. In this mode, a port security violation restricts data and causes the security violation counter to increment.
<b>shutdown</b>	(Optional) Sets the security violation shutdown mode. In this mode, a port security violation causes the interface to immediately become error disabled.

## Defaults

The default settings are as follows:

- Port security is disabled.
- When port security is enabled and no keywords are entered, the default maximum number of secure MAC addresses is 1.
- Aging is disabled.
- Aging time is 0 minutes.
- All secure addresses on this port age out immediately after they are removed from the secure address list.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(19)EW	Extended to include DHCP snooping security enhancement.
12.2(18)EW	Add support for sticky interfaces.
12.2(31)SG	Add support for sticky port security.

## Usage Guidelines

After you set the maximum number of secure MAC addresses that are allowed on a port, you can add secure addresses to the address table by manually configuring them, by allowing the port to dynamically configure them, or by configuring some MAC addresses and allowing the rest to be dynamically configured.

The packets are dropped into the hardware when the maximum number of secure MAC addresses are in the address table and a station that does not have a MAC address in the address table attempts to access the interface.

If you enable port security on a voice VLAN port and if there is a PC connected to the IP phone, you set the maximum allowed secure addresses on the port to more than 1.

You cannot configure static secure MAC addresses in the voice VLAN.

A secure port has the following limitations:

- A secure port cannot be a dynamic access port or a trunk port.
- A secure port cannot be a routed port.
- A secure port cannot be a protected port.
- A secure port cannot be a destination port for Switched Port Analyzer (SPAN).
- A secure port cannot belong to a Fast EtherChannel or Gigabit EtherChannel port group.
- A secure port cannot be an 802.1X port.
- If you try to enable 802.1X on a secure port, an error message appears, and 802.1X is not enabled. If you try to change an 802.1X-enabled port to a secure port, an error message appears, and the security settings are not changed.

When a secure port is in the error-disabled state, you can remove it from this state by entering the **errdisable recovery cause psecure-violation** global configuration command, or you can manually reenble it by entering the **shutdown** and **no shut down** interface configuration commands.

To enable secure address aging for a particular port, set the aging time to a value other than 0 for that port.

To allow limited time access to particular secure addresses, set the aging type as **absolute**. When the aging time lapses, the secure addresses are deleted.

To allow continuous access to a limited number of secure addresses, set the aging type as **inactivity**. This action removes the secure address when it becomes inactive, and other addresses can become secure.

To allow unlimited access to a secure address, configure it as a secure address, and disable aging for the statically configured secure address by using the **no switchport port-security aging static** interface configuration command.

If the sticky command is executed without a MAC address specified, all MAC addresses that are learned on that port will be made sticky. You can also specify a specific MAC address to be a sticky address by entering the **sticky** keyword next to it.

You can configure the sticky feature even when port security is not enabled on the interface. The feature becomes operational when you enable port security on the interface.

You can use the **no** form of the **sticky** command only if the sticky feature is already enabled on the interface.

## Examples

This example shows how to set the aging time to 2 hours (120 minutes) for the secure addresses on the Fast Ethernet port 12:

```
Switch(config)# interface fastethernet 0/12
Switch(config-if)# switchport port-security aging time 120
Switch(config-if)#
```

This example shows how to set the aging timer type to Inactivity for the secure addresses on the Fast Ethernet port 12:

```
Switch(config)# interface fastethernet 0/12
Switch(config-if)# switch port-security aging type inactivity
Switch(config-if)#
```

The following example shows how to configure rate limit for invalid source packets on Fast Ethernet port 12:

```
Switch(config)# interface fastethernet 0/12
Switch(config-if)# switchport port-security limit rate invalid-source-mac 100
Switch(config-if)#
```

The following example shows how to configure rate limit for invalid source packets on Fast Ethernet port 12:

```
Switch(config)# interface fastethernet 0/12
Switch(config-if)# switchport port-security limit rate invalid-source-mac none
Switch(config-if)#
```

You can verify the settings for all secure ports or the specified port by using the **show port-security** privileged EXEC command.

This example shows how to remove all sticky and static addresses that are configured on the interface:

```
Switch(config)# interface fastethernet 2/12
Switch(config-if)# no switchport port-security mac-address
Switch(config-if)#
```

This example shows how to configure a secure MAC address on Fast Ethernet port 12:

```
Switch(config)# interface fastethernet 0/12
Switch(config-if)# switchport mode access
Switch(config-if)# switchport port-security
Switch(config-if)# switchport port-security mac-address 1000.2000.3000
Switch(config-if)
```

This example shows how to make all MAC addresses learned on Fast Ethernet port 12 sticky:

```
Switch(config)# interface fastethernet 2/12
Switch(config-if)# switchport port-security mac-address sticky
Switch(config-if)
```

This example shows how to make MAC address 1000.2000.3000 sticky on Fast Ethernet port 12:

```
Switch(config)# interface fastethernet 2/12
Switch(config-if)# switchport port-security mac-address sticky 1000.2000.3000
Switch(config-if)
```

This example shows how to disable the sticky feature on Fast Ethernet port 12:

```
Switch(config)# interface fastethernet 2/12
Switch(config-if)# no switchport port-security mac-address sticky
Switch(config-if)
```



#### Note

This command makes all sticky addresses on this interface normal learned entries. It does not delete the entries from the secure MAC address table.



#### Note

The following examples show how to configure sticky secure MAC addresses in access and voice VLANs on interfaces with voice VLAN configured. If you do not have voice VLAN configured the **vlan [access | voice]** keywords are not supported.

This example shows how to configure sticky MAC addresses for voice and data VLANs on Fast Ethernet interface 5/1 and to verify the configuration:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fa5/1
Switch(config-if)# switchport mode access
Switch(config-if)# switchport port-security
Switch(config-if)# switchport port-security mac-address sticky 0000.0000.obob vlan voice
Switch(config-if)# switchport port-security mac-address sticky 0000.0000.0005 vlan access
Switch(config-if)# end
```

This example shows how to designate a maximum of one MAC address for a voice VLAN (for a Cisco IP Phone, let's say) and one MAC address for the data VLAN (for a PC, let's say) on Fast Ethernet interface 5/1 and to verify the configuration:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# interface fa5/1
Switch(config-if)# switchport mode access
Switch(config-if)# switchport port-security
Switch(config-if)# switchport port-security mac-address sticky
Switch(config-if)# switchport port-security maximum 1 vlan voice
Switch(config-if)# switchport port-security maximum 1 vlan access
Switch(config-if)# end
```

**Note**

Sending traffic to the ports causes the system to configure the port with sticky secure addresses.

You can verify your settings by using the **show port-security address** privileged EXEC command.

**Related Commands**

[show interfaces switchport](#)  
[show port-security](#)  
[switchport block](#)



# switchport private-vlan association trunk

To configure the association between a secondary VLAN and a VLAN on a private VLAN trunk port, use the **switchport private-vlan association trunk** command. To remove the private VLAN mapping from the port, use the **no** form of this command.

**switchport private-vlan association trunk** {*primary-vlan-id*} {*secondary-vlan-id*}

**no switchport private-vlan association trunk** {*primary-vlan-id*}

## Syntax Description

<i>primary-vlan-id</i>	Number of the primary VLAN of the private VLAN relationship.
<i>secondary-vlan-id</i>	Number of the secondary VLAN of the private VLAN relationship.

## Defaults

Private VLAN mapping is disabled.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.2(20)EW	Support for community VLAN was added.

## Usage Guidelines

Multiple private VLAN pairs can be specified so that a private VLAN trunk port can carry multiple secondary VLANs. If an association is specified for the existing primary VLAN, the existing association is replaced.

Only isolated secondary VLANs can be carried over a private VLAN trunk.



### Note

Community secondary VLANs on a private VLAN trunk are not supported in this release.

If there is no trunk association, any packets received on the secondary VLANs are dropped.

## Examples

This example shows how to configure a port with a primary VLAN (VLAN 18) and secondary VLAN (VLAN 20):

```
Switch(config-if)# switchport private-vlan association trunk 18 20
Switch(config-if)#
```

This example shows how to remove the private VLAN association from the port:

```
Switch(config-if)# no switchport private-vlan association trunk 18
Switch(config-if)#
```

This example shows how to configure interface FastEthernet 5/2 as a secondary trunk port, and verify the configuration:

```
Switch# configure terminal
Switch(config)# interface fastethernet 5/2
Switch(config-if)# switchport mode private-vlan trunk secondary
Switch(config-if)# switchport private-vlan trunk native vlan 10
Switch(config-if)# switchport private-vlan trunk allowed vlan 10. 3-4
Switch(config-if)# switchport private-vlan association trunk 3 301
Switch(config-if)# end
Switch# show interfaces fastethernet 5/2 switchport
Name: Fa5/2
  Switchport: Enabled
  Administrative Mode: private-vlan trunk secondary
  Operational Mode: private-vlan trunk secondary
  Administrative Trunking Encapsulation: negotiate
  Operational Trunking Encapsulation: dot1q
  Negotiation of Trunking: On
  Access Mode VLAN: 1 (default)
  Trunking Native Mode VLAN: 1 (default)
  Administrative Native VLAN tagging: enabled
  Voice VLAN: none
  Administrative private-vlan host-association: none A
  Administrative private-vlan mapping: none
  Administrative private-vlan trunk native VLAN: 10
  Administrative private-vlan trunk Native VLAN tagging: enabled
  Administrative private-vlan trunk encapsulation: dot1q
  Administrative private-vlan trunk normal VLANs: none
  Administrative private-vlan trunk associations:
    3 (VLAN0003) 301 (VLAN0301)
  Administrative private-vlan trunk mappings: none
  Operational private-vlan: none
  Operational Normal VLANs: none
  Trunking VLANs Enabled: ALL
  Pruning VLANs Enabled: 2-1001
  Capture Mode Disabled Capture VLANs Allowed: ALL

  Unknown unicast blocked: disabled
  Unknown multicast blocked: disabled
  Appliance trust: none
Switch(config-if)#
```

#### Related Commands

[show interfaces switchport](#)  
[switchport mode](#)

# switchport private-vlan host-association

To define a PVLAN association for an isolated or community port, use the **switchport private-vlan host-association** command. To remove the PVLAN mapping from the port, use the **no** form of this command.

**switchport private-vlan host-association** {*primary-vlan-id*} {*secondary-vlan-id*}

**no switchport private-vlan host-association**

Syntax Description	<i>primary-vlan-id</i>	Number of the primary VLAN of the PVLAN relationship; valid values are from 1 to 4094.
	<i>secondary-vlan-id</i>	Number of the secondary VLAN of the private VLAN relationship; valid values are from 1 to 4094.

**Defaults** Private VLAN mapping is disabled.

**Command Modes** Interface configuration

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended addressing was added.

**Usage Guidelines** There is no runtime effect on the port unless it is in PVLAN host mode. If the port is in PVLAN host mode but all VLANs do not exist, the command is allowed, but the port is made inactive.

The secondary VLAN may be an isolated or community VLAN.

**Examples** This example shows how to configure a port with a primary VLAN (VLAN 18) and secondary VLAN (VLAN 20):

```
Switch(config-if)# switchport private-vlan host-association 18 20
Switch(config-if)#
```

This example shows how to remove the PVLAN association from the port:

```
Switch(config-if)# no switchport private-vlan host-association
Switch(config-if)#
```

This example shows how to configure interface FastEthernet 5/1 as a PVLAN host port and verify the configuration:

```
Switch# configure terminal
Switch(config)# interface fastethernet 5/1
Switch(config-if)# switchport mode private-vlan host
Switch(config-if)# switchport private-vlan host-association 202 440
Switch(config-if)# end
```

```
Switch# show interfaces fastethernet 5/1 switchport
Name: Fa5/1
Switchport: Enabled
Administrative Mode: private-vlan host
Operational Mode: private-vlan host
Administrative Trunking Encapsulation: negotiate
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Appliance trust: none
Administrative Private Vlan
  Host Association: 202 (VLAN0202) 440 (VLAN0440)
  Promiscuous Mapping: none
  Trunk encapsulation : dot1q
  Trunk vlans:
Operational private-vlan(s):
  202 (VLAN0202) 440 (VLAN0440)
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
```

---

**Related Commands**

[show interfaces switchport](#)  
[switchport mode](#)

# switchport private-vlan mapping

To define private VLAN mapping for a promiscuous port, use the **switchport private-vlan mapping** command. To clear all mapping from the primary VLAN, use the **no** form of this command.

```
switchport private-vlan mapping {primary-vlan-id} {secondary-vlan-list} |  
{add secondary-vlan-list} | {remove secondary-vlan-list}
```

```
switchport private-vlan mapping trunk {primary-vlan-id} [add | remove] secondary-vlan-list
```

```
no switchport private-vlan mapping [trunk]
```

Syntax Description	<i>primary-vlan-id</i>	Number of the primary VLAN of the private VLAN relationship; valid values are from 2 to 4094 (excluding 1002 to 1005).
	<i>secondary-vlan-list</i>	Number of the secondary VLANs to map to the primary VLAN; valid values are from 2 to 4094.
	<b>add</b>	Maps the secondary VLANs to the primary VLAN.
	<b>remove</b>	Clears mapping between the secondary VLANs and the primary VLAN.
	<b>trunk</b>	Maps the trunks secondary VLANs to the primary VLAN.

**Defaults** Private VLAN mapping is disabled.

**Command Modes** Interface configuration

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.1(12c)EW	Support for extended addressing was added.
	12.2(20)EW	Support for community VLAN was added.
	12.2(31)SG	Support for trunk VLAN was added.

**Usage Guidelines** There is no run-time effect on the port unless it is in private VLAN promiscuous mode. If the port is in private VLAN promiscuous mode but the VLANs do not exist, the command is allowed, but the port is made inactive.

The secondary VLAN may be an isolated or community VLAN.



## Note

The maximum number of unique private VLAN pairs supported by the **switchport private-vlan mapping trunk** command above is 500. For example, one thousand secondary VLANs could map to one primary VLAN, or one thousand secondary VLANs could map one to one to one thousand primary VLANs.

**Examples**

This example shows how to configure the mapping of primary VLAN 18 to the secondary isolated VLAN 20 on a port:

```
Switch(config-if)# switchport private-vlan mapping 18 20
Switch(config-if)#
```

This example shows how to add a VLAN to the mapping:

```
Switch(config-if)# switchport private-vlan mapping 18 add 21
Switch(config-if)#
```

This example shows how to add a range of secondary VLANs to the mapping:

```
Switch(config-if)# switchport private-vlan mapping 18 add 22-24
Switch(config-if)#
```

This example shows how to add a range of secondary VLANs to the trunk mapping:

```
Switch(config-if)# switchport private-vlan mapping trunk 18 add 22-24
Switch(config-if)#
```

This example shows how to configure interface FastEthernet 5/2 as a PVLAN promiscuous port, map it to a PVLAN, and verify the configuration:

```
Switch# configure terminal
Switch(config)# interface fastethernet 5/2
Switch(config-if)# switchport mode private-vlan promiscuous
Switch(config-if)# switchport private-vlan mapping 200 2
Switch(config-if)# end
Switch# show interfaces fastethernet 5/2 switchport
Name:Fa5/2
Switchport:Enabled
Administrative Mode:private-vlan promiscuous
Operational Mode:private-vlan promiscuous
Administrative Trunking Encapsulation:negotiate
Operational Trunking Encapsulation:native
Negotiation of Trunking:Off
Access Mode VLAN:1 (default)
Trunking Native Mode VLAN:1 (default)
Voice VLAN:none
Administrative Private VLAN Host Association:none
Administrative Private VLAN Promiscuous Mapping:200 (VLAN0200) 2 (VLAN0002)
Private VLAN Trunk Native VLAN:none
Administrative Private VLAN Trunk Encapsulation:dot1q
Administrative Private VLAN Trunk Normal VLANs:none
Administrative Private VLAN Trunk Private VLANs:none
Operational Private VLANs:
    200 (VLAN0200) 2 (VLAN0002)
Trunking VLANs Enabled:ALL
Pruning VLANs Enabled:2-1001
Capture Mode Disabled
Capture VLANs Allowed:ALL
```

This example shows how to configure interface FastEthernet 5/2 as a promiscuous trunk port and to verify the configuration:

```
Switch# configure terminal
Switch(config)# interface fastethernet 5/2
Switch(config-if)# switchport mode private-vlan trunk promiscuous
Switch(config-if)# switchport private-vlan trunk native vlan 10
Switch(config-if)# switchport private-vlan trunk allowed vlan 10, 3-4
Switch(config-if)# switchport private-vlan mapping trunk 3 301, 302
Switch(config-if)# end
```

```
Switch# show interfaces fastethernet 5/2 switchport
Name: Fa5/2
Switchport: Enabled
Administrative Mode: private-vlan trunk promiscuous
Operational Mode: private-vlan trunk promiscuous
Administrative Trunking Encapsulation: negotiate
Operational Trunking Encapsulation: dot1q
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Administrative Native VLAN tagging: enabled
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: 10
Administrative private-vlan trunk Native VLAN tagging: enabled
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: 3-4,10
Administrative private-vlan trunk associations: none
Administrative private-vlan trunk mappings:
    3 (VLAN0003) 301 (VLAN0301) 302 (VLAN0302)
Operational private-vlan:
    3 (VLAN0003) 301 (VLAN0301) 302 (VLAN0302)
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL

Unknown unicast blocked: disabled
Unknown multicast blocked: disabled
Appliance trust: none
Switch(config-if)#
```

---

Related Commands[show interfaces private-vlan mapping](#)

# switchport private-vlan trunk allowed vlan

To configure a list of the allowed normal VLANs on a private VLAN trunk port, use the **switchport private-vlan trunk allowed vlan** command. To remove all the allowed normal VLANs from a private VLAN trunk port, use the **no** form of this command.

**switchport private-vlan trunk allowed vlan** {*vlan-list*} **all** | **none** | [**add** | **remove** | **except**]  
*vlan\_atom* [,*vlan\_atom*...]

**no switchport private-vlan trunk allowed vlan**

Syntax Description		
	<i>vlan_list</i>	Sets the list of allowed VLANs; see the “Usage Guidelines” section for formatting guidelines for <i>vlan_list</i> .
	<b>all</b>	Specifies all VLANs from 1 to 4094. This keyword is not supported on commands that do not permit all VLANs in the list to be set at the same time.
	<b>none</b>	Indicates an empty list. This keyword is not supported on commands that require certain VLANs to be set or at least one VLAN to be set.
	<b>add</b>	(Optional) Adds the defined list of VLANs to those currently set instead of replacing the list.
	<b>remove</b>	(Optional) Removes the defined list of VLANs from those currently set instead of replacing the list.
	<b>except</b>	(Optional) Lists the VLANs that should be calculated by inverting the defined list of VLANs.
	<i>vlan_atom</i>	Either a single VLAN number from 1 to 4094 or a continuous range of VLANs described by two VLAN numbers, the lesser one first, separated by a hyphen.

**Defaults** All allowed normal VLANs are removed from a private VLAN trunk port.

**Command Modes** Interface configuration

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines**

By default, no normal VLANs are allowed unless you explicitly configure the VLANs to be allowed. Use this command only for normal VLANs on a private VLAN trunk port.

Use the **switchport private-vlan association trunk** command to configure a port that can carry private VLANs on a private VLAN trunk port.



**Examples**

This example shows how to configure the private VLAN trunk port that carries normal VLANs 1 to10:

```
Switch(config-if)# switchport private-vlan trunk allowed vlan 1-10
Switch(config-if)#
```

This example shows how to remove all the allowed normal VLANs from a private VLAN trunk port:

```
Switch(config-if)# no switchport private-vlan trunk allowed vlan
Switch(config-if)#
```

This example shows how to configure interface FastEthernet 5/2 as a secondary trunk port, and verify the configuration:

```
Switch# configure terminal
Switch(config)# interface fastethernet 5/2
Switch(config-if)# switchport mode private-vlan trunk secondary
Switch(config-if)# switchport private-vlan trunk native vlan 10
Switch(config-if)# switchport private-vlan trunk allowed vlan 10, 3-4
Switch(config-if)# switchport private-vlan association trunk 3 301
Switch(config-if)# end
Switch# show interfaces fastethernet 5/2 switchport
Name: Fa5/2
  Switchport: Enabled
  Administrative Mode: private-vlan trunk secondary
  Operational Mode: private-vlan trunk secondary
  Administrative Trunking Encapsulation: negotiate
  Operational Trunking Encapsulation: dot1q
  Negotiation of Trunking: On
  Access Mode VLAN: 1 (default)
  Trunking Native Mode VLAN: 1 (default)
  Administrative Native VLAN tagging: enabled
  Voice VLAN: none
  Administrative private-vlan host-association: none A
  Administrative private-vlan mapping: none
  Administrative private-vlan trunk native VLAN: 10
  Administrative private-vlan trunk Native VLAN tagging: enabled
  Administrative private-vlan trunk encapsulation: dot1q
  Administrative private-vlan trunk normal VLANs: none
  Administrative private-vlan trunk associations:
    3 (VLAN0003) 301 (VLAN0301)
  Administrative private-vlan trunk mappings: none
  Operational private-vlan: none
  Operational Normal VLANs: none
  Trunking VLANs Enabled: ALL
  Pruning VLANs Enabled: 2-1001
  Capture Mode Disabled Capture VLANs Allowed: ALL

  Unknown unicast blocked: disabled
  Unknown multicast blocked: disabled
  Appliance trust: none
Switch(config-if)#
```

This example shows how to configure interface FastEthernet 5/2 as a promiscuous trunk port and to verify the configuration:

```
Switch# configure terminal
Switch(config)# interface fastethernet 5/2
Switch(config-if)# switchport mode private-vlan trunk promiscuous
Switch(config-if)# switchport private-vlan trunk native vlan 10
Switch(config-if)# switchport private-vlan trunk allowed vlan 10, 3-4
Switch(config-if)# switchport private-vlan mapping trunk 3 301, 302
Switch(config-if)# end
Switch# show interfaces fastethernet 5/2 switchport
Name: Fa5/2
```

## ■ switchport private-vlan trunk allowed vlan

```

Switchport: Enabled
Administrative Mode: private-vlan trunk promiscuous
Operational Mode: private-vlan trunk promiscuous
Administrative Trunking Encapsulation: negotiate
Operational Trunking Encapsulation: dot1q
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Administrative Native VLAN tagging: enabled
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: 10
Administrative private-vlan trunk Native VLAN tagging: enabled
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: 3-4,10
Administrative private-vlan trunk associations: none
Administrative private-vlan trunk mappings:
    3 (VLAN0003) 301 (VLAN0301) 302 (VLAN0302)
Operational private-vlan:
    3 (VLAN0003) 301 (VLAN0301) 302 (VLAN0302)
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL

Unknown unicast blocked: disabled
Unknown multicast blocked: disabled
Appliance trust: none
Switch(config-if)#

```

**Related Commands**

**show interfaces switchport**  
**switchport mode**

# switchport private-vlan trunk native vlan tag

To control the tagging of the native VLAN traffic on 802.1Q private VLAN trunks, use the **switchport private-vlan trunk native vlan tag** command. To remove the control of tagging (and default to the global setting), use the **no** form of this command.

**switchport private-vlan trunk native vlan tag**

**no switchport private-vlan trunk native vlan tag**

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

**Defaults** The default setting is global; the settings on the port are determined by the global setting.

**Command Modes** Interface configuration

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.
	12.2(18)EW	Removed <b>vlan-id</b> keyword.

**Usage Guidelines** The configuration created with this command only applies to ports that are configured as private VLAN trunks.

**Examples** This example shows how to enable 802.1Q native VLAN tagging on a PVLAN trunk:

```
Switch(config-if)# switchport private-vlan trunk native vlan tag
Switch(config-if)#
```

**Related Commands** [show interfaces switchport](#)  
[switchport mode](#)

# switchport trunk

To set the trunk characteristics when an interface is in trunking mode, use the **switchport trunk** command. To reset all of the trunking characteristics back to the original defaults, use the **no** form of this command.

**switchport trunk encapsulation** {isl | dot1q | negotiate}

**no switchport trunk encapsulation**

**switchport trunk native vlan** {tag | *vlan\_id*}

**no switchport trunk native vlan** {tag | *vlan\_id*}

**switchport trunk allowed vlan** *vlan\_list*

**no switchport trunk allowed vlan** *vlan\_list*

**switchport trunk pruning vlan** *vlan\_list*

**no switchport trunk pruning vlan** *vlan\_list*

## Syntax Description

<b>encapsulation isl</b>	Sets the trunk encapsulation format to ISL.
<b>encapsulation dot1q</b>	Sets the trunk encapsulation format to 802.1Q.
<b>encapsulation negotiate</b>	Specifies that if DISL and DTP negotiation do not resolve the encapsulation format, ISL will be the selected format.
<b>native vlan tag</b>	Specifies the tagging of native VLAN traffic on 802.1Q trunks.
<b>native vlan <i>vlan_id</i></b>	Sets the native VLAN for the trunk in 802.1Q trunking mode.
<b>allowed vlan <i>vlan_list</i></b>	Sets the list of allowed VLANs that transmit this interface in tagged format when in trunking mode. See the “Usage Guidelines” section for formatting guidelines for <i>vlan_list</i> .
<b>pruning vlan <i>vlan_list</i></b>	Sets the list of VLANs that are enabled for VTP pruning when the switch is in trunking mode. See the “Usage Guidelines” section for formatting guidelines for <i>vlan_list</i> .

## Defaults

The default settings are as follows:

- The encapsulation type is dependent on the platform or interface hardware.
- The access VLANs and trunk interface native VLANs are a default VLAN that corresponds to the platform or the interface hardware.
- All VLAN lists include all VLANs.
- Native VLAN tagging is enabled on the port if enabled globally.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.
12.1(12c)EW	Support for extended addressing was added.
12.2(18)EW	Support for native VLAN tagging was added.

## Usage Guidelines

The *vlan\_list* format is **all** | **none** | [**add** | **remove** | **except**] *vlan\_atom*[,*vlan\_atom*...], where:

- **all** specifies all VLANs from 1 to 4094. This keyword is not supported on commands that do not permit all VLANs in the list to be set at the same time.
- **none** indicates an empty list. This keyword is not supported on commands that require certain VLANs to be set or at least one VLAN to be set.
- **add** adds the defined list of VLANs to those currently set, instead of replacing the list.
- **remove** removes the defined list of VLANs from those currently set, instead of replacing the list.
- **except** lists the VLANs that should be calculated by inverting the defined list of VLANs.
- *vlan\_atom* is either a single VLAN number from 1 to 4094 or a continuous range of VLANs described by two VLAN numbers (the lesser one first, separated by a hyphen).

The **switchport trunk encapsulation** command is supported only for platforms and interface hardware that can support both ISL and 802.1Q formats.

If you enter the **negotiate** keywords, and DISL and DTP negotiation do not resolve the encapsulation format, ISL is the selected format. The **no** form of this command resets the trunk encapsulation format back to the default.

The **no** form of the **native vlan** command resets the native mode VLAN to the appropriate default VLAN for the device.

The **no** form of the **allowed vlan** command resets the list to the default list, which allows all VLANs.

The **no** form of the **pruning vlan** command resets the list to the default list, which enables all VLANs for VTP pruning.

These configuration guidelines and restrictions apply when using 802.1Q trunks and impose some limitations on the trunking strategy for a network:

- When connecting Cisco switches through an 802.1Q trunk, make sure that the native VLAN for an 802.1Q trunk is the same on both ends of the trunk link. If the native VLAN on one end of the trunk is different from the native VLAN on the other end, spanning-tree loops might result.
- Disabling spanning tree on the native VLAN of an 802.1Q trunk without disabling spanning tree on every VLAN in the network can cause spanning-tree loops. We recommend that you leave spanning tree enabled on the native VLAN of an 802.1Q trunk. If this is not possible, disable spanning tree on every VLAN in the network. Make sure that your network is free of physical loops before disabling spanning tree.
- When you connect two Cisco switches through 802.1Q trunks, the switches exchange spanning-tree BPDUs on each VLAN that is allowed on the trunks. The BPDUs on the native VLAN of the trunk are sent untagged to the reserved 802.1d spanning-tree multicast MAC address (01-80-C2-00-00-00). The BPDUs on all other VLANs on the trunk are sent tagged to the reserved SSTP multicast MAC address (01-00-0c-cc-cc-cd).

- Non-Cisco 802.1Q switches maintain only a single instance of spanning tree (MST) that defines the spanning-tree topology for all VLANs. When you connect a Cisco switch to a non-Cisco switch through an 802.1Q trunk, the MST of the non-Cisco switch and the native VLAN spanning tree of the Cisco switch combine to form a single spanning-tree topology known as the CST.
- Because Cisco switches transmit BPDUs to the SSTP multicast MAC address on the VLANs other than the native VLAN of the trunk, non-Cisco switches do not recognize these frames as BPDUs and flood them on all ports in the corresponding VLAN. Cisco switches connected to the non-Cisco 802.1Q network receive these flooded BPDUs. Because Cisco switches receive the flooded BPDUs, the switches can maintain a per-VLAN spanning-tree topology across a network of non-Cisco 802.1Q switches. The non-Cisco 802.1Q network separating the Cisco switches is treated as a single broadcast segment between all switches that are connected to the non-Cisco 802.1Q network through the 802.1Q trunks.
- Ensure that the native VLAN is the same on *all* of the 802.1Q trunks connecting the Cisco switches to the non-Cisco 802.1Q network.
- If you are connecting multiple Cisco switches to a non-Cisco 802.1Q network, all of the connections must be through the 802.1Q trunks. You cannot connect Cisco switches to a non-Cisco 802.1Q network through the ISL trunks or through the access ports. This action causes the switch to place the ISL trunk port or access port into the spanning-tree “port inconsistent” state and no traffic will pass through the port.

Follow these guidelines for native VLAN tagging:

- The **no switchport trunk native vlan tag** command disables the native VLAN tagging operation on a port. This overrides the global tagging configuration.
- The **switchport trunk native vlan tag** command can be used to reenabling tagging on a disabled port.
- The **no** option is saved to NVRAM so that the user does not have to manually select the ports to disable the tagging operation each time that the switch reboots.
- When the **switchport trunk native vlan tag** command is enabled and active, all packets on the native VLAN are tagged, and incoming untagged data packets are dropped. Untagged control packets are accepted.

## Examples

This example shows how to cause a port interface that is configured as a switched interface to encapsulate in 802.1Q trunking format regardless of its default trunking format in trunking mode:

```
Switch(config-if)# switchport trunk encapsulation dot1q
Switch(config-if)#
```

This example shows how to enable 802.1Q tagging on a port:

```
Switch(config-if)# switchport trunk native vlan tag
Switch(config-if)#
```

This example shows how to configure a secure MAC-address and a maximum limit of secure MAC addresses on Gigabit Ethernet port 1 for all VLANs:

```
Switch(config)# interface gigabitethernet1/1
Switch(config-if)# switchport trunk encapsulation dot1q
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport port-security
Switch(config-if)# switchport port-security maximum 3
```

This example shows how to configure a secure MAC-address on Gigabit Ethernet port 1 in a specific VLAN or range of VLANs:

```
Switch(config)# interface gigabitethernet1/1
Switch(config-if)# switchport trunk encapsulation dot1q
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport port-security
Switch(config-if)# vlan-range 2-6
Switch(config-if-vlan-range)# port-security maximum 3
```

This example shows how to configure a secure MAC-address in a VLAN on Gigabit Ethernet port 1:

```
Switch(config)# interface gigabitethernet1/1
Switch(config-if)# switchport trunk encapsulation dot1q
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport port-security
Switch(config-if)# switchport port-security mac-address sticky
Switch(config-if)# vlan-range 2-6
Switch(config-if-vlan-range)# port-security mac-address 1.1.1
Switch(config-if-vlan-range)# port-security mac-address sticky 1.1.2
Switch(config-if-vlan-range)# port-security mac-address sticky 1.1.3
```

You can verify your settings by using the **show port-security interface vlan** privileged EXEC command.

---

Related Commands    [show interfaces switchport](#)

# system mtu

To set the maximum Layer 2 or Layer 3 payload size, use the **system mtu** command. To revert to the default MTU setting, use the **no** form of this command.

**system mtu** *datagram-size*

**no system mtu**

Syntax Description	<i>datagram-size</i> Layer 2 payload size; valid values from 1500 to 1552 bytes.
--------------------	--

Defaults	The default MTU setting is 1500 bytes.
----------	--

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>The <i>datagram-size</i> parameter specifies the Ethernet payload size, not the total Ethernet frame size, and the Layer 3 MTU is changed as a result of changing the <b>system mtu</b> command.</p> <p>For ports from 3 to 18 on model WS-X4418-GB and ports from 1 to 12 on model WS-X4412-2GB-TX, only the standard IEEE Ethernet payload size of 1500 bytes is supported.</p> <p>For other modules, an Ethernet payload size of up to 1552 bytes is supported with a total Ethernet frame size of up to 1600 bytes.</p>
------------------	--

Examples	This example shows how to set the MTU size to 1550 bytes:
----------	---

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# system mtu 1550
Switch(config)# end
Switch#
```

This example shows how to revert to the default MTU setting:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# no system mtu
Switch(config)# end
Switch#
```

Related Commands	<a href="#">show interfaces</a> <a href="#">show system mtu</a>
------------------	--



# test cable-diagnostics tdr

To test the condition of copper cables on 48-port 10/100/1000 BASE-T modules, use the **test cable-diagnostics tdr** command.

**test cable-diagnostics tdr** {**interface** *interface interface-number*}



## Note

This command will be deprecated in future Cisco IOS releases. Please use the **diagnostic start** command.

## Syntax Description

**interface** *interface* Interface type; valid values are **fastethernet** and **gigabitethernet**.  
*interface-number* Module and port number.

## Defaults

This command has no default settings.

## Command Modes

Privileged EXEC

## Command History

Release	Modification
12.2(25)SG	Support for this command on the Catalyst 4500 series switch.

## Usage Guidelines

The TDR test is supported on Catalyst 4500 series switches running Cisco IOS Release 12.2(25)SG for the following line cards only:

- WS-X4548-GB-RJ45
- WS-X4548-GB-RJ45V
- WS-X4524-GB-RJ45V
- WS-X4013+TS
- WS-C4948
- WS-C4948-10GE

The valid values for **interface** *interface* are **fastethernet** and **gigabitethernet**.

Do not start the test at the same time on both ends of the cable. Starting the test at both ends of the cable at the same time can lead to false test results.

Do not change the port configuration during any cable diagnostics test. This action may result in incorrect test results.

The interface must be operating before starting the TDR test. If the port is down, the results of the test will be invalid. Issue the **no shutdown** command on the port.

---

**Examples**

This example shows how to start the TDR test on port 1 on module 2:

```
Switch# test cable-diagnostics tdr int gi2/1
Switch#
```

This example shows the message that displays when the TDR test is not supported on a module:

```
Switch# test cable-diagnostics tdr int gi2/1
00:03:15:%C4K_IOSDIAGMAN-4-TESTNOTSUPPORTEDONMODULE: Online cable
diag tdr test is not supported on this module
Switch#
```

**Note**

---

The **show cable-diagnostic tdr** command is used to display the results of a TDR test. The test results will not be available until approximately 1 minute after the test starts. If you enter the **show cable-diagnostic tdr** command within 1 minute of the test starting, you may see a “TDR test is in progress on interface...” message.

---

---

**Related Commands**

[show cable-diagnostics tdr](#)

# traceroute mac

To display the Layer 2 path taken by the packets from the specified source MAC address to the specified destination MAC address, use the **traceroute mac** command.

**traceroute mac** [**interface** *interface-id*] {*source-mac-address*} [**interface** *interface-id*] {*destination-mac-address*} [**vlan** *vlan-id*] [**detail**]

Syntax Description	<b>interface</b> <i>interface-id</i>	(Optional) Specifies the source or destination switch interface.
	<i>source-mac-address</i>	MAC address of the source switch in hexadecimal format.
	<i>destination-mac-address</i>	MAC address of the destination switch in hexadecimal format.
	<b>vlan</b> <i>vlan-id</i>	(Optional) Specifies the VLAN on which to trace the Layer 2 path that the packets take from the source switch to the destination switch; valid VLAN IDs are from 1 to 4094. Do not enter leading zeros.
	<b>detail</b>	(Optional) Displays detail information.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(15)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** Do not use leading zeros when entering a VLAN ID.

The Layer 2 traceroute feature is available on these switches:

- Catalyst 2950 switches running Release 12.1(12c)EA1 or later
- Catalyst 3550 switches running Release 12.1(12c)EA1 or later
- Catalyst 4500 series switches running Catalyst operating system Release 6.2 or later for the supervisor engine
- Catalyst 4500 series switches running Release 12.1(15)EW or later
- Catalyst 5000 family switches running Catalyst operating system Release 6.1 or later for the supervisor engine
- Catalyst 6500 series switches running Catalyst operating system Release 6.1 or later for the supervisor engine

For Layer 2 traceroute to function properly, Cisco Discovery Protocol (CDP) must be enabled on all of the switches in the network. Do not disable CDP.

When the switch detects a device in the Layer 2 path that does not support Layer 2 traceroute, the switch continues to send Layer 2 trace queries and lets them time out.

The maximum number of hops identified in the path is ten.

Layer 2 traceroute supports only unicast traffic. If you specify a multicast source or destination MAC address, the physical path is not identified, and a message appears.

The **traceroute mac** command output shows the Layer 2 path when the specified source and destination addresses belong to the same VLAN. If you specify source and destination addresses that belong to different VLANs, the Layer 2 path is not identified, and a message appears.

If the source or destination MAC address belongs to multiple VLANs, you must specify the VLAN to which both the source and destination MAC addresses belong. If the VLAN is not specified, the path is not identified, and a message appears.

Layer 2 traceroute is not supported when multiple devices are attached to one port through hubs (for example, multiple CDP neighbors are detected on a port). When more than one CDP neighbor is detected on a port, the Layer 2 path is not identified, and a message appears.

This feature is not supported in Token Ring VLANs.

## Examples

This example shows how to display the Layer 2 path by specifying the source and destination MAC addresses:

```
Switch# traceroute mac 0000.0201.0601 0000.0201.0201

Source 0000.0201.0601 found on con6[WS-C2950G-24-EI] (2.2.6.6)
con6 (2.2.6.6) :Fa0/1 =>Fa0/3
con5          (2.2.5.5       ) : Fa0/3 =>Gi0/1
con1          (2.2.1.1       ) : Gi0/1 =>Gi0/2
con2          (2.2.2.2       ) : Gi0/2 =>Fa0/1
Destination 0000.0201.0201 found on con2[WS-C3550-24] (2.2.2.2)
Layer 2 trace completed
Switch#
```

This example shows how to display the detailed Layer 2 path:

```
Switch# traceroute mac 0000.0201.0601 0000.0201.0201 detail
Source 0000.0201.0601 found on con6[WS-C2950G-24-EI] (2.2.6.6)
con6 / WS-C2950G-24-EI / 2.2.6.6 :
      Fa0/1 [auto, auto] =>Fa0/3 [auto, auto]
con5 / WS-C2950G-24-EI / 2.2.5.5 :
      Fa0/3 [auto, auto] =>Gi0/1 [auto, auto]
con1 / WS-C3550-12G / 2.2.1.1 :
      Gi0/1 [auto, auto] =>Gi0/2 [auto, auto]
con2 / WS-C3550-24 / 2.2.2.2 :
      Gi0/2 [auto, auto] =>Fa0/1 [auto, auto]
Destination 0000.0201.0201 found on con2[WS-C3550-24] (2.2.2.2)
Layer 2 trace completed.
Switch#
```

This example shows the Layer 2 path when the switch is not connected to the source switch:

```
Switch# traceroute mac 0000.0201.0501 0000.0201.0201 detail
Source not directly connected, tracing source .....
Source 0000.0201.0501 found on con5[WS-C2950G-24-EI] (2.2.5.5)
con5 / WS-C2950G-24-EI / 2.2.5.5 :
      Fa0/1 [auto, auto] =>Gi0/1 [auto, auto]
con1 / WS-C3550-12G / 2.2.1.1 :
      Gi0/1 [auto, auto] =>Gi0/2 [auto, auto]
con2 / WS-C3550-24 / 2.2.2.2 :
      Gi0/2 [auto, auto] =>Fa0/1 [auto, auto]
Destination 0000.0201.0201 found on con2[WS-C3550-24] (2.2.2.2)
Layer 2 trace completed.
Switch#
```

This example shows the Layer 2 path when the switch cannot find the destination port for the source MAC address:

```
Switch# traceroute mac 0000.0011.1111 0000.0201.0201
Error:Source Mac address not found.
Layer2 trace aborted.
Switch#
```

This example shows the Layer 2 path when the source and destination devices are in different VLANs:

```
Switch# traceroute mac 0000.0201.0601 0000.0301.0201
Error:Source and destination macs are on different vlans.
Layer2 trace aborted.
Switch#
```

This example shows the Layer 2 path when the destination MAC address is a multicast address:

```
Switch# traceroute mac 0000.0201.0601 0100.0201.0201
Invalid destination mac address
Switch#
```

This example shows the Layer 2 path when the source and destination switches belong to multiple VLANs:

```
Switch# traceroute mac 0000.0201.0601 0000.0201.0201
Error:Mac found on multiple vlans.
Layer2 trace aborted.
Switch#
```

This example shows how to display the Layer 2 path by specifying the interfaces on the source and destination switches:

```
Switch# traceroute mac interface fastethernet0/1 0000.0201.0601 interface fastethernet0/3 0000.0201.0201
Source 0000.0201.0601 found on con6[WS-C2950G-24-EI] (2.2.6.6)
con6 (2.2.6.6) :Fa0/1 =>Fa0/3
con5          (2.2.5.5)   ) : Fa0/3 =>Gi0/1
con1          (2.2.1.1)   ) : Gi0/1 =>Gi0/2
con2          (2.2.2.2)   ) : Gi0/2 =>Fa0/1
Destination 0000.0201.0201 found on con2[WS-C3550-24] (2.2.2.2)
Layer 2 trace completed
Switch#
```

## Related Commands

[traceroute mac ip](#)

# traceroute mac ip

To display the Layer 2 path that is taken by the packets from the specified source IP address or hostname to the specified destination IP address or hostname, use the **traceroute mac** command.

**traceroute mac ip** { *source-ip-address* | *source-hostname* } { *destination-ip-address* | *destination-hostname* } [**detail**]

Syntax Description	<i>source-ip-address</i>	IP address of the source switch as a 32-bit quantity in dotted-decimal format.
	<i>destination-ip-address</i>	IP address of the destination switch as a 32-bit quantity in dotted-decimal format.
	<i>source-hostname</i>	IP hostname of the source switch.
	<i>destination-hostname</i>	IP hostname of the destination switch.
	<b>detail</b>	(Optional) Displays detailed traceroute MAC IP information.

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** The Layer 2 traceroute feature is available on these switches:

- Catalyst 2950 switches running Release 12.1(12c)EA1 or later
- Catalyst 3550 switches running Release 12.1(12c)EA1 or later
- Catalyst 4500 series switches running Catalyst operating system Release 6.2 or later for the supervisor engine
- Catalyst 4500 series switches running Release 12.1(15)EW or later
- Catalyst 5000 family switches running Catalyst operating system Release 6.1 or later for the supervisor engine
- Catalyst 6500 series switches running Catalyst operating system Release 6.1 or later for the supervisor engine

For Layer 2 traceroute to function properly, Cisco Discovery Protocol (CDP) must be enabled on all the switches in the network. Do not disable CDP.

When the switch detects a device in the Layer 2 path that does not support Layer 2 traceroute, the switch continues to send Layer 2 trace queries and lets them time out.

The maximum number of hops identified in the path is ten.

The **traceroute mac ip** command output shows the Layer 2 path when the specified source and destination IP addresses are in the same subnet. When you specify the IP addresses, the switch uses Address Resolution Protocol (ARP) to associate the IP addresses with the corresponding MAC addresses and the VLAN IDs.

- If an ARP entry exists for the specified IP address, the switch uses the associated MAC address and identifies the physical path.
- If an ARP entry does not exist, the switch sends an ARP query and tries to resolve the IP address. The IP addresses must be in the same subnet. If the IP address is not resolved, the path is not identified, and a message appears.

Layer 2 traceroute is not supported when multiple devices are attached to one port through hubs (for example, multiple CDP neighbors are detected on a port). When more than one CDP neighbor is detected on a port, the Layer 2 path is not identified, and an error message appears.

This feature is not supported in Token Ring VLANs.

## Examples

This example shows how to display the Layer 2 path by specifying the source and destination IP addresses and by using the **detail** keyword:

```
Switch# traceroute mac ip 2.2.66.66 2.2.22.22 detail
Translating IP to mac.....
2.2.66.66 =>0000.0201.0601
2.2.22.22 =>0000.0201.0201

Source 0000.0201.0601 found on con6 [WS-C2950G-24-EI] (2.2.6.6)
con6 / WS-C2950G-24-EI / 2.2.6.6 :
      Fa0/1 [auto, auto] =>Fa0/3 [auto, auto]
con5 / WS-C2950G-24-EI / 2.2.5.5 :
      Fa0/3 [auto, auto] =>Gi0/1 [auto, auto]
con1 / WS-C3550-12G / 2.2.1.1 :
      Gi0/1 [auto, auto] =>Gi0/2 [auto, auto]
con2 / WS-C3550-24 / 2.2.2.2 :
      Gi0/2 [auto, auto] =>Fa0/1 [auto, auto]
Destination 0000.0201.0201 found on con2 [WS-C3550-24] (2.2.2.2)
Layer 2 trace completed.
Switch#
```

This example shows how to display the Layer 2 path by specifying the source and destination hostnames:

```
Switch# traceroute mac ip con6 con2
Translating IP to mac .....
2.2.66.66 =>0000.0201.0601
2.2.22.22 =>0000.0201.0201

Source 0000.0201.0601 found on con6
con6 (2.2.6.6) :Fa0/1 =>Fa0/3
con5          (2.2.5.5)      ) : Fa0/3 =>Gi0/1
con1          (2.2.1.1)      ) : Gi0/1 =>Gi0/2
con2          (2.2.2.2)      ) : Gi0/2 =>Fa0/1
Destination 0000.0201.0201 found on con2
Layer 2 trace completed
Switch#
```

This example shows the Layer 2 path when Address Resolution Protocol (ARP) cannot associate the source IP address with the corresponding MAC address:

```
Switch# traceroute mac ip 2.2.66.66 2.2.77.77
Arp failed for destination 2.2.77.77.
Layer2 trace aborted.
Switch#
```

■ traceroute mac ip

Related Commands [traceroute mac](#)



# tx-queue

To configure the transmit queue parameters for an interface, use the **tx-queue** command. To return to the default value, use the **no** form of this command.

**tx-queue** [*queue-id*] { **bandwidth** *bandwidth-rate* | **priority high** | **shape** *shape-rate* }

**no tx-queue**

Syntax Description	
<i>queue-id</i>	(Optional) Number of the queue; valid values are from 1 to 4.
<b>bandwidth</b> <i>bandwidth-rate</i>	Specifies traffic bandwidth; valid values are from 16000 to 1000000000 bits per second.
<b>priority high</b>	Specifies high priority.
<b>shape</b> <i>shape-rate</i>	Specifies the maximum rate that packets are passed through a transmit queue; valid values are from 16000 to 1000000000 bits per second.

## Defaults

The default settings are as follows:

- Encapsulation type is dependent on the platform or interface hardware.
- QoS enabled bandwidth rate is 4:255.
- QoS disabled bandwidth rate is 255:1.

## Command Modes

Interface configuration

## Command History

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

## Usage Guidelines

The bandwidth and shape rates cannot exceed the maximum speed of the interface.

The bandwidth can be configured only on the following:

- Uplink ports on Supervisor Engine III (WS-X4014)
- Ports on the WS-X4306-GB module
- The two 1000BASE-X ports on the WS-X4232-GB-RJ module
- The first two ports on the WS-X4418-GB module
- The two 1000BASE-X ports on the WS-X4412-2GB-TX module

Only transmit queue 3 can be configured to be a high-priority transmit queue.

---

**Examples**

This example shows how to allocate bandwidth on queue 1 to 100 Mbps:

```
Switch(config-if)# tx-queue 1  
Switch(config-if-tx-queue)# bandwidth 1000000000  
Switch(config-if-tx-queue)#
```

This example shows how to configure transmit queue 3 to the high priority:

```
Switch(config-if)# tx-queue 3  
Switch(config-if-tx-queue)# priority high  
Switch(config-if-tx-queue)#
```

This example shows how to configure the traffic shaping rate of 64 kbps to transmit queue 1:

```
Switch(config-if)# tx-queue 1  
Switch(config-if-tx-queue)# shape 64000  
Switch(config-if-tx-queue)#
```

---

**Related Commands**

[show qos interface](#)

## udld (global configuration mode)

To enable aggressive or normal mode in the UDLD protocol and to set the configurable message timer time, use the **udld** command. Use the **no** form of this command to do the following:

- Disable normal mode UDLD on all the fiber ports by default
- Disable aggressive mode UDLD on all the fiber ports by default
- Disable the message timer

**udld enable** | **aggressive**

**no udld enable** | **aggressive**

**udld message time** *message-timer-time*

**no udld message time**

Syntax Description	<b>enable</b>	Enables UDLD in normal mode by default on all the fiber interfaces.
	<b>aggressive</b>	Enables UDLD in aggressive mode by default on all the fiber interfaces.
	<b>message time</b> <i>message-timer-time</i>	Sets the period of time between the UDLD probe messages on the ports that are in advertisement mode and are currently determined to be bidirectional; valid values are from 7 to 90 seconds.

**Defaults** All fiber interfaces are disabled and the message timer time equals 15 seconds.

**Command Modes** Global configuration

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** If you enable aggressive mode, once all the neighbors of a port have aged out either in the advertisement or in the detection phase, UDLD restarts the linkup sequence to try to resynchronize with any potentially out-of-sync neighbor and shuts down the port if the message train from the link is still undetermined.

This command affects the fiber interfaces only. Use the **udld (interface configuration mode)** command to enable UDLD on the other interface types.

**Examples** This example shows how to enable UDLD on all the fiber interfaces:

```
Switch (config)# udld enable
Switch (config)#
```

■ uddl (global configuration mode)

---

**Related Commands**

[show uddl](#)

[uddl \(interface configuration mode\)](#)

## udld (interface configuration mode)

To enable UDLD on an individual interface or to prevent a fiber interface from being enabled by the **udld (global configuration mode)** command, use the **udld** command. To return to the **udld (global configuration mode)** command setting, or if the port is a nonfiber port to disable UDLD, use the **no** form of this command.

**udld {enable | aggressive | disable}**

**no udld {enable | aggressive | disable}**

Syntax Description	<b>enable</b>	Enables UDLD on this interface.
	<b>aggressive</b>	Enables UDLD in aggressive mode on this interface.
	<b>disable</b>	Disables UDLD on this interface.

Defaults	The fiber interfaces are enabled per the state of the global <b>udld (enable or aggressive)</b> command, and the nonfiber interfaces are enabled with UDLD disabled.
----------	--

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>If you enable aggressive mode, once all the neighbors of a port have aged out either in the advertisement or in the detection phase, UDLD restarts the linkup sequence to try to resynchronize with any potentially out-of-sync neighbor and shuts down the port if the message train from the link is still undetermined.</p> <p>Use the <b>no udld enable</b> command on the fiber ports to return control of UDLD to the global <b>udld enable</b> command or to disable UDLD on the nonfiber ports.</p> <p>Use the <b>udld aggressive</b> command on the fiber ports to override the setting of the global <b>udld (enable or aggressive)</b> command. Use the <b>no</b> form on the fiber ports to remove this setting, return control of UDLD enabling back to the global <b>udld</b> command or to disable UDLD on the nonfiber ports.</p> <p>The <b>disable</b> keyword is supported on the fiber ports only. Use the <b>no</b> form of this command to remove this setting and return control of UDLD to the <b>udld (global configuration mode)</b> command.</p> <p>If the port changes from fiber to nonfiber or vice versa, all configurations will be maintained because of a change of module or a GBIC change detected by the platform software.</p>
------------------	--

Examples	This example shows how to cause any port interface to enable UDLD, despite the current global <b>udld (global configuration mode)</b> setting:
----------	--

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

**■ uddl (interface configuration mode)**

This example shows how to cause any port interface to enable UDLD in aggressive mode, despite the current global **uddl (enable or aggressive)** setting:

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

This example shows how to cause a fiber port interface to disable UDLD, despite the current global **uddl (global configuration mode)** setting:

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

---

**Related Commands**

**show uddl**  
**uddl (global configuration mode)**

# udld reset

To reset all the UDLD ports in the shutdown state, use the **udld reset** command.

## udld reset

<b>Syntax Description</b>	This command has no keywords or variables.
---------------------------	--

<b>Defaults</b>	This command has no default settings.
-----------------	---------------------------------------

<b>Command Modes</b>	Privileged EXEC
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>If the interface configuration is still enabled for UDLD, these ports will begin to run UDLD again and may shut down if the reason for the shutdown has not been corrected.</p> <p>The <b>udld reset</b> command permits the traffic to flow on the ports again; other features, such as spanning tree, PAgP, and DTP, operate normally if enabled.</p>
-------------------------	--

<b>Examples</b>	This example shows how to reset all the ports that are shut down by UDLD:
-----------------	---

```
Switch# udld reset
Switch#
```

<b>Related Commands</b>	<a href="#">show udld</a>
-------------------------	---------------------------

# unidirectional

To configure the nonblocking Gigabit Ethernet ports to unidirectionally send or receive traffic on an interface, use the **unidirectional** command. To disable unidirectional communication, use the **no** form of this command.

**unidirectional { receive-only | send-only }**

**no unidirectional { receive-only | send-only }**

Syntax Description	<table> <tr> <td><b>receive-only</b></td><td>Specifies the unidirectional reception.</td></tr> <tr> <td><b>send-only</b></td><td>Specifies the unidirectional transmission.</td></tr> </table>	<b>receive-only</b>	Specifies the unidirectional reception.	<b>send-only</b>	Specifies the unidirectional transmission.
<b>receive-only</b>	Specifies the unidirectional reception.				
<b>send-only</b>	Specifies the unidirectional transmission.				
Defaults	Disabled				
Command Modes	Interface configuration				
Command History	<table> <tr> <th>Release</th><th>Modification</th></tr> <tr> <td>12.1(13)EW</td><td>Support for this command was introduced on the Catalyst 4500 series switch.</td></tr> </table>	Release	Modification	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Release	Modification				
12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.				
Usage Guidelines	Enabling port unidirectional mode automatically disables port UDLD. You must manually ensure that the unidirectional link does not create a spanning-tree loop in the network.				
Examples	<p>This example shows how to set Gigabit Ethernet interface 1/1 to receive traffic unidirectionally:</p> <pre>Switch# <b>config terminal</b> Enter configuration commands, one per line. End with CNTL/Z. Switch(config)# <b>interface gigabitethernet 1/1</b> Switch(config-if)# <b>unidirectional receive-only</b> Switch(config-if)# <b>end</b> Switch#</pre>				
Related Commands	<a href="#">show interfaces switchport</a>				



# username

To establish a username-based authentication system, use the **username** command.

**username** *name* **secret** { **0** | **5** } *password*

Syntax Description	
<i>name</i>	User ID of the user.
<b>secret</b> <b>0</b>   <b>5</b>	Specifies the authentication system for the user; valid values are <b>0</b> (text immediately following is not encrypted) and <b>5</b> (text immediately following is encrypted using an MD5-type encryption method).
<i>password</i>	Password of the user.

Defaults	No username-based authentication system is established.
----------	---

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>Use this command to enable enhanced password security for the specified username. This command enables MD5 encryption on the password. MD5 encryption is a strong encryption method that is not retrievable. You cannot use MD5 encryption with protocols that require clear-text passwords, such as CHAP.</p>
------------------	---

You can use this command for defining usernames that get special treatment. For example, you can define an “info” username that does not require a password but that connects the user to a general-purpose information service.

The **username** command provides both username and **secret** authentication for login purposes only.

The *name* argument can be only one word. White spaces and quotation marks are not allowed.

You can use multiple **username** commands to specify options for a single user.

For information about additional **username** commands, refer to the *Cisco IOS Command Reference*.

Examples	This example shows how to specify an MD5 encryption on a password (warrior) for a username (xena):
----------	--

```
Switch(config)# username xena secret 5 warrior
Switch(config)#
```

Related Commands	<p><b>enable password</b> (refer to Cisco IOS documentation)</p> <p><b>enable secret</b> (refer to Cisco IOS documentation)</p> <p><b>username</b> (refer to Cisco IOS documentation)</p>
------------------	---

# verify

To verify the checksum of a file on a Flash memory file system, use the **verify** command.

**verify** [/md5] [flash-filesystem:] [filename] [expected-md5-signature]

Syntax Description	<b>/md5</b>	(Optional) Verifies the MD5 signatures.
	<i>flash-filesystem:</i>	(Optional) Device where the Flash resides; valid values are <b>bootflash:</b> , <b>slot0:</b> , <b>flash:</b> , or <b>sup-bootflash:</b> .
	<i>filename</i>	(Optional) Name of the Cisco IOS image.
	<i>expected-md5-signature</i>	(Optional) MD5 signature.

**Defaults** The current working device is specified.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** Each software image that is distributed on the disk uses a single checksum for the entire image. This checksum is displayed only when the image is copied into the Flash memory.

The Readme file, which is included with the image on the disk, lists the name, file size, and checksum of the image. Review the contents of the Readme file before loading or duplicating the new image so that you can verify the checksum when you copy it into the Flash memory or on to a server.

Use the **verify /md5** command to verify the MD5 signature of a file before using it. This command validates the integrity of a copied file by comparing a precomputed MD5 signature with the signature that is computed by this command. If the two MD5 signatures match, the copied file is identical to the original file.

You can find the MD5 signature posted on the Cisco.com page with the image.

You can use the **verify /md5** command in one of the following ways:

- Verify the MD5 signatures manually by entering the **verify /md5 filename** command.  
Check the displayed signature against the MD5 signature posted on the Cisco.com page.
- Allow the system to compare the MD5 signatures by entering the **verify /md5 {flash-filesystem:filename} {expected-md5-signature}** command.

After completing the comparison, the system returns with a verified message. If an error is detected, the output is similar to the following:

```
Switch# verify /md5 slot0:c4-jsv-mz 0f
.....
.....
.....
.....
```

```

.....
.....Done!
%Error verifying slot0:c4-jsv-mz
Computed signature   = 0f369ed9e98756f179d4f29d6e7755d3
Submitted signature = 0f

```

To display the contents of the Flash memory, enter the **show flash** command. The Flash contents listing does not include the checksum of the individual files. To recompute and verify the image checksum after the image has been copied into the Flash memory, enter the **verify** command.

A colon (:) is required after the specified device.

## Examples

This example shows how to use the **verify** command:

```

Switch# verify cat6k_r47_1.cbi
.....
File cat6k_r47_1.cbi verified OK.
Switch#

```

This example shows how to manually check the MD5 signature:

```

Switch# verify /md5 c4-jsv-mz
.....
.....Done!
verify /md5 (slot0:c4-jsv-mz) = 0f369ed9e98756f179d4f29d6e7755d3
Switch#

```

This example shows how to allow the system to compare the MD5 signatures:

```

Switch# verify /md5 slot0:c4-jsv-mz 0f369ed9e98756f179d4f29d6e7755d3
.....
.....Done!
verified /md5 (slot0:c6sup12-jsv-mz) = 0f369ed9e98756f179d4f29d6e7755d3
Switch#

```

## Related Commands

**show file system (Flash file system)** (refer to Cisco IOS documentation)  
**show flash** (refer to Cisco IOS documentation)

## vlan (VLAN Database mode)

To configure a specific VLAN, use the **vlan** command. To delete a VLAN, use the **no** form of this command.

```
vlan vlan_id [are hops] [backupcrf mode] [bridge type / bridge-num] [media type] [mtu mtu-size]
[name vlan-name] [parent parent-vlan-id] [ring ring-number] [said said-value] [state
{suspend | active}] [stp type type] [tb-vlan1 tb-vlan1-id] [tb-vlan2 tb-vlan2-id]
```

```
no vlan vlan
```

Syntax Description		
<i>vlan_id</i>		Number of the VLAN; valid values are from 1 to 4094.
<b>are</b> <i>hops</i>		(Optional) Specifies the maximum number of All Route Explorer hops for this VLAN; valid values are from 0 to 13. Zero is assumed if no value is specified.
<b>backupcrf</b> <i>mode</i>		(Optional) Enables or disables the backup CRF mode of the VLAN; valid values are <b>enable</b> and <b>disable</b> .
<b>bridge</b> <i>type</i>		(Optional) Specifies the bridging characteristics of the VLAN or identification number of the bridge; valid <i>type</i> values are <b>srb</b> and <b>srt</b> .
<i>bridge_num</i>		(Optional) Valid <i>bridge_num</i> values are from 0 to 15.
<b>media</b> <i>type</i>		(Optional) Specifies the media type of the VLAN; valid values are <b>fast ethernet</b> , <b>fd-net</b> , <b>fddi</b> , <b>trcrf</b> , and <b>trbrf</b> .
<b>mtu</b> <i>mtu-size</i>		(Optional) Specifies the maximum transmission unit (packet size, in bytes) that the VLAN can use; valid values are from 576 to 18190.
<b>name</b> <i>vlan-name</i>		(Optional) Defines a text string used as the name of the VLAN (1 to 32 characters).
<b>parent</b> <i>parent-vlan-id</i>		(Optional) Specifies the ID number of the parent VLAN of FDDI or Token Ring-type VLANs; valid values are from 2 to 1001.
<b>ring</b> <i>ring-number</i>		(Optional) Specifies the ring number of FDDI or Token Ring-type VLANs; valid values are from 2 to 1001.
<b>said</b> <i>said-value</i>		(Optional) Specifies the security association identifier; valid values are from 1 to 4294967294.
<b>state</b>		(Optional) Specifies the state of the VLAN.
<b>suspend</b>		Specifies that the state of the VLAN is suspended. VLANs in the suspended state do not pass packets.
<b>active</b>		Specifies that the state of the VLAN is active.
<b>stp</b> <i>type type</i>		(Optional) Specifies the STP type; valid values are <b>ieee</b> , <b>ibm</b> , and <b>auto</b> .
<b>tb-vlan1</b> <i>tb-vlan1-id</i>		(Optional) Specifies the ID number of the first translational VLAN for this VLAN; valid values are from 2 to 1001. Zero is assumed if no value is specified.
<b>tb-vlan2</b> <i>tb-vlan2-id</i>		(Optional) Specifies the ID number of the second translational VLAN for this VLAN; valid values are from 2 to 1001. Zero is assumed if no value is specified.

**Defaults**

The defaults are as follows:

- The *vlan-name* is “VLANxxxx” where “xxxx” represents four numeric digits (including leading zeroes) equal to the VLAN ID number.
- The media type is Fast Ethernet.
- The state is active.
- The *said-value* is 100,000 plus the VLAN ID number.
- The *mtu-size* default is dependent upon the VLAN type:
  - *fddi*—1500
  - *trcrf*—1500 if V2 is not enabled; 4472 if it is enabled
  - *fd-net*—1500
  - *trbrf*—1500 if V2 is not enabled; 4472 if it is enabled
- No ring number is specified.
- No bridge number is specified.
- No parent VLAN is specified.
- No STP type is specified.
- No translational bridge VLAN is specified.

**Command Modes**

VLAN configuration

**Command History**

Release	Modification
12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines**

VLAN 1 parameters are factory configured and cannot be changed.

When you define *vlan-name*, the name must be unique within the administrative domain.

The SAID is documented in 802.10. When the **no** form is used, the VLANs SAID is returned to the default.

When you define the *said-value*, the name must be unique within the administrative domain.

The **bridge** *bridge-number* argument is used only for Token Ring-net and FDDI-net VLANs and is ignored in other types of VLANs. When the **no** form is used, the VLANs source-route bridging number returns to the default.

The parent VLAN resets to the default if the parent VLAN is deleted or the **media** keyword changes the VLAN type or the VLAN type of the parent VLAN.

The *tb-vlan1* and *tb-vlan2* are used to configure translational bridge VLANs of a specified type of VLAN and are not allowed in other types of VLANs. The translational bridge VLANs must be a different VLAN type than the affected VLAN; if two VLANs are specified, the two must be different VLAN types.

A translational bridge VLAN will reset to the default if the translational bridge VLAN is deleted or the **media** keyword changes the VLAN type or the VLAN type of the corresponding translational bridge VLAN.

---

**Examples**

This example shows how to add a new VLAN with all the default parameters to the new VLAN database:

```
Switch(vlan)# vlan 2
```

**Note**

If the VLAN already exists, no action occurs.

---

This example shows how to cause the device to add a new VLAN, specify the media type and parent VLAN ID number 3, and set all the other parameters to the defaults:

```
Switch(vlan)# vlan 2 media fastethernet parent 3  
VLAN 2 modified:  
  Media type FASTETHERNET  
  Parent VLAN 3
```

This example shows how to delete VLAN 2:

```
Switch(vlan)# no vlan 2  
Switch(vlan)#
```

This example shows how to return the MTU to the default for its type and the translational bridging VLANs to the default:

```
Switch(vlan)# no vlan 2 mtu tb-vlan1 tb-vlan2  
Switch(vlan)#
```

---

**Related Commands**

[\*\*show vlan\*\*](#)

# vlan access-map

To enter VLAN access-map command mode to create a VLAN access map, use the **vlan access-map** command. To remove a mapping sequence or the entire map, use the **no** form of this command.

**vlan access-map** *name* [*seq#* ]

**no vlan access-map** *name* [*seq#* ]

Syntax Description	<i>name</i>	VLAN access-map tag.
	<i>seq#</i>	(Optional) Map sequence number; valid values are from 0 to 65535.

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

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	<p>If you enter the sequence number of an existing map sequence, you enter VLAN access-map mode. If you do not specify a sequence number, a number is automatically assigned. You can enter one match clause and one action clause per map sequence. If you enter the <b>no vlan access-map name [seq# ]</b> command without entering a sequence number, the whole map is removed. Once you enter VLAN access-map mode, the following commands are available:</p>
------------------	---

- **action**—Sets the action to be taken (forward or drop).
- **default**—Returns a command to its default settings.
- **end**—Exits from configuration mode.
- **exit**—Exits from VLAN access-map configuration mode.
- **match**—Sets the values to match (IP address or MAC address).
- **no**—Negates a command or reset its defaults.

Examples	This example shows how to enter VLAN access-map mode:
----------	---

```
Switch(config)# vlan access-map cisco  
Switch(config-access-map)#
```

Related Commands	<b>match</b> <b>show vlan access-map</b>
------------------	---

# vlan database

To enter VLAN configuration mode, use the **vlan database** command.

## **vlan database**

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

**Defaults** This command has no default settings.

**Command Modes** Privileged EXEC

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines** From VLAN configuration mode, you can access the VLAN database editing buffer manipulation commands, including:

- **abort**—Exits mode without applying the changes.
- **apply**—Applies the current changes and bumps the revision number.
- **exit**—Applies the changes, bumps the revision number, and exits VLAN configuration mode.
- **no**—Negates a command or sets its defaults; valid values are **vlan** and **vtp**.
- **reset**—Abandons the current changes and rereads the current database.
- **show**—Displays the database information.
- **vlan**—Accesses the subcommands to add, delete, or modify values that are associated with a single VLAN. For information about the **vlan** subcommands, see the [vlan \(VLAN Database mode\)](#) command.
- **vtp**—Accesses the subcommands to perform VTP administrative functions. For information about the **vtp** subcommands, see the [vtp client](#) command.

**Examples** This example shows how to enter VLAN configuration mode:

```
Switch# vlan database
Switch(vlan)#
```

This example shows how to exit VLAN configuration mode without applying changes after you are in VLAN configuration mode:

```
Switch(vlan)# abort
Aborting...
Switch#
```



This example shows how to delete a VLAN after you are in VLAN configuration mode:

```
Switch(vlan)# no vlan 100
Deleting VLAN 100...
Switch(vlan)#
```

This example shows how to turn off pruning after you are in VLAN configuration mode:

```
Switch(vlan)# no vtp pruning
Pruning switched OFF
Switch(vlan)#
```

---

**Related Commands**    [show vlan](#)

# vlan dot1q tag native

To enable tagging of the native VLAN frames on all 802.1Q trunk ports, use the **vlan dot1q tag native** command. To disable tagging of native VLAN frames, use the **no** form of this command.

**vlan dot1q tag native**

**no vlan dot1q tag native**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	802.1Q native VLAN tagging is disabled.
-----------------	---

<b>Command Modes</b>	Global configuration
----------------------	----------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.2(18)EW	This command was first introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>When enabled, the native VLAN packets exiting all 802.1Q trunk ports are tagged unless the port is explicitly configured to disable native VLAN tagging.</p> <p>When disabled, the native VLAN packets exiting all 802.1Q trunk ports are not tagged.</p> <p>You can use this command with 802.1Q tunneling. This feature operates on an edge switch of a service-provider network and expands VLAN space by using a VLAN-in-VLAN hierarchy and by tagging the tagged packets. You must use the 802.1Q trunk ports for sending out the packets to the service-provider network. However, the packets going through the core of the service-provider network might also be carried on the 802.1Q trunks. If the native VLANs of an 802.1Q trunk match the native VLAN of a tunneling port on the same switch, the traffic on the native VLAN is not tagged on the sending trunk port. This command ensures that the native VLAN packets on all 802.1Q trunk ports are tagged.</p>
-------------------------	---

<b>Examples</b>	<p>This example shows how to enable 802.1Q tagging on the native VLAN frames and verify the configuration:</p>
-----------------	--

```
Switch# config terminal
Switch (config)# vlan dot1q tag native
Switch (config)# end
Switch# show vlan dot1q tag native
dot1q native vlan tagging is enabled
```

<b>Related Commands</b>	<p><a href="#">switchport private-vlan trunk native vlan tag</a></p> <p><a href="#">switchport trunk</a></p>
-------------------------	--

# vlan filter

To apply a VLAN access map, use the **vlan filter** command. To clear the VLAN access maps from VLANs or interfaces, use the **no** form of this command.

**vlan filter** *map-name* { **vlan-list** *vlan-list* }

**no vlan filter** *map-name* { **vlan-list** [*vlan-list*] }

Syntax Description	<i>map-name</i>	VLAN access-map tag.
	<b>vlan-list</b> <i>vlan-list</i>	Specifies the VLAN list; see the “Usage Guidelines” section for valid values.

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

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

Command History	Release	Modification
	12.1(12c)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	When configuring an action clause in a VLAN access map, note the following:
	<ul style="list-style-type: none"><li>You can apply the VLAN access map to one or more VLANs.</li><li>The <i>vlan-list</i> parameter can be a single VLAN ID, a list of VLAN IDs, or VLAN ID ranges (<i>vlan-id-vlan-id</i>). Multiple entries are separated by (-), (hyphen), or (,) (comma).</li><li>You can apply only one VLAN access map to each VLAN.</li></ul> <p>When entering the <b>no</b> form of this command, the <i>vlan-list</i> parameter is optional (but the keyword <b>vlan-list</b> is required). If you do not enter the <i>vlan-list</i> parameter, the VACL is removed from all the VLANs where the <i>map-name</i> is applied.</p>

Examples	This example shows how to apply a VLAN access map on VLANs 7 through 9:
----------	---

```
Switch(config)# vlan filter ganymede vlan-list 7-9
Switch(config)#
```

# vlan internal allocation policy

Use the **vlan internal allocation policy** command to configure the internal VLAN allocation scheme. To return to the default setting, use the **no** form of this command.

**vlan internal allocation policy {ascending | descending}**

**no vlan internal allocation policy**

Syntax Description	<b>ascending</b>	Specifies to allocate internal VLANs from 1006 to 4094.
	<b>descending</b>	Specifies to allocate internal VLANs from 4094 to 1006.

Defaults	The default is the ascending allocation scheme.
----------	---

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

Command History	Release	Modification
	12.1(19)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines**

You can configure internal VLAN allocation to be from 1006 and up or from 4094 and down. The internal VLANs and user-configured VLANs share the 1006 to 4094 VLAN spaces. A “first come, first served” policy is used in allocating these spaces.

The **vlan internal allocation policy** command allows you to configure the allocation direction of the internal VLAN.

During system bootup, the internal VLANs that are required for features in the startup-config file are allocated first. The user-configured VLANs in the startup-config file are configured next. If you configure a VLAN that conflicts with an existing internal VLAN, the VLAN that you configured is put into a nonoperational status until the internal VLAN is freed and becomes available.

After you enter the **write mem** command and the system reloads, the reconfigured allocation scheme is used by the port manager.

**Examples**

This example shows how to configure the VLANs in a descending order as the internal VLAN allocation policy:

```
Switch(config)# vlan internal allocation policy descending
Switch(config)#
```

Related Commands	<a href="#">show vlan internal usage</a>
------------------	--

## vmpls reconfirm (global configuration)

To change the reconfirmation interval for the VLAN Query Protocol (VQP) client, use the **vmpls reconfirm** command. To return to the default setting, use the **no** form of this command.

**vmpls reconfirm** *interval*

**no vmpls reconfirm**

Syntax Description	<i>interval</i> Queries to the VLAN Membership Policy Server (VMPS) to reconfirm dynamic VLAN assignments; valid values are from 1 to 120 minutes.	
Defaults	The reconfirmation interval is 60 minutes.	
Command Modes	Global configuration	
Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Examples	<p>This example shows how to set the VQP client to reconfirm dynamic VLAN entries every 20 minutes:</p> <pre>Switch(config)# <b>vmpls reconfirm 20</b> Switch(config)#</pre> <p>You can verify your setting by entering the <b>show vmpls</b> command and examining information in the Reconfirm Interval row.</p>	
Related Commands	<a href="#">show vmpls</a> <a href="#">vmpls reconfirm (privileged EXEC)</a>	

## vmps reconfirm (privileged EXEC)

To immediately send VLAN Query Protocol (VQP) queries to reconfirm all the dynamic VLAN assignments with the VLAN Membership Policy Server (VMPS), use the **vmps reconfirm** command.

### **vmps reconfirm**

---

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

---

**Defaults** This command has no default settings.

---

**Command Modes** Privileged EXEC

---

Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.

---



---

**Usage Guidelines** You can verify your setting by entering the **show vmps** command and examining the VMPS Action row of the Reconfirmation Status section. The **show vmps** command shows the result of the last time that the assignments were reconfirmed either because the reconfirmation timer expired or because the **vmps reconfirm** command was entered.

---

**Examples** This example shows how to immediately send VQP queries to the VMPS:

```
Switch# vmps reconfirm
Switch#
```

---

**Related Commands** [show vmps](#)  
[vmps reconfirm \(global configuration\)](#)

## vmps retry

To configure the per-server retry count for the VLAN Query Protocol (VQP) client, use the **vmps retry** command. To return to the default setting, use the **no** form of this command.

**vmps retry** *count*

**no vmps retry**

Syntax Description	<i>count</i> Number of attempts to contact the VLAN Membership Policy Server (VMPS) by the client before querying the next server in the list; valid values are from 1 to 10.	
Defaults	The retry count is 3.	
Command Modes	Global configuration	
Command History	Release	Modification
	12.1(13)EW	Support for this command was introduced on the Catalyst 4500 series switch.
Usage Guidelines	You can verify your setting by entering the <b>show vmps</b> command and examining information in the Server Retry Count row.	
Examples	This example shows how to set the retry count to 7: <pre>Switch(config)# vmps retry 7</pre>	
Related Commands	<a href="#">show vmps</a>	

## vmps server

To configure the primary VLAN Membership Policy Server (VMPS) and up to three secondary servers, use the **vmps server** command. To remove a VMPS server, use the **no** form of this command.

**vmps server** *ipaddress* [**primary**]

**no vmps server** *ipaddress*

Syntax Description	<i>ipaddress</i>	IP address or host name of the primary or secondary VMPS servers. If you specify a hostname, the Domain Name System (DNS) server must be configured.
	<b>primary</b>	(Optional) Determines whether primary or secondary VMPS servers are being configured.

Defaults	No primary or secondary VMPS servers are defined.
----------	---

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

Command History	Release	Modification
	12.1(4)EA1	Support for this command was introduced on the Catalyst 4500 series switch.

**Usage Guidelines**

The first server that you entered is automatically selected as the primary server whether or not **primary** is entered. You can override the first server address by using **primary** in a subsequent command.

If a member switch in a cluster configuration does not have an IP address, the cluster does not use the VMPS server that is configured for that member switch. Instead, the cluster uses the VMPS server on the command switch, and the command switch proxies the VMPS requests. The VMPS server treats the cluster as a single switch and uses the IP address of the command switch to respond to requests.

When using the **no** form without specifying the *ipaddress*, all configured servers are deleted. If you delete all servers when dynamic-access ports are present, the switch cannot forward the packets from the new sources on these ports because it cannot query the VMPS.

You can verify your setting by entering the **show vmps** command and examining information in the VMPS Domain Server row.



---

**Examples**

This example shows how to configure the server with IP address 191.10.49.20 as the primary VMPS server. The servers with IP addresses 191.10.49.21 and 191.10.49.22 are configured as secondary servers:

```
Switch(config)# vmps server 191.10.49.20 primary
Switch(config)# vmps server 191.10.49.21
Switch(config)# vmps server 191.10.49.22
Switch(config)#
```

This example shows how to delete the server with IP address 191.10.49.21:

```
Switch(config)# no vmps server 191.10.49.21
Switch(config)#
```

---

**Related Commands**

[show vmps](#)

## vtp (global configuration mode)

To modify the name of a VTP configuration storage file, use the **vtp** command. To clear a filename, use the **no** form of this command.

**vtp** {{ **file** *filename* } | { **if-id** *name* }}

**no vtp** {{ **file** *filename* } | { **if-id** *name* }}

Syntax Description	<b>file</b> <i>filename</i>	Specifies the IFS file where VTP configuration will be stored.
	<b>if-id</b> <i>name</i>	Specifies the name of the interface providing the VTP updater ID for this device, where the <b>if-id</b> <i>name</i> is an ASCII string limited to 255 characters.

Defaults	Disabled
----------	----------

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

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	You cannot use the <b>vtp file</b> command to load a new database. You can use it only to rename the file in which the existing database is stored.
	You can use the <b>vtp if-id</b> command to specify the name of the interface providing the VTP updater ID for this device. The VTP updater is the device that adds, deletes, or modifies VLANs to a network, and triggers a VTP updater to inform the rest of the system of the changes.

Examples	This example shows how to specify the IFS file system file where VTP configuration is stored:
----------	---

```
Switch(config)# vtp file vtpconfig
Setting device to store VLAN database at filename vtpconfig.
Switch(config)#
```

This example shows how to specify the name of the interface providing the VTP updater ID:

```
Switch(config)# vtp if-id fastethernet
Switch(config)#
```

Related Commands	<a href="#">show vtp</a>
------------------	--------------------------

# vtp client

To place a device in VTP client mode, use the **vtp client** command. To return to VTP server mode, use the **no** form of this command.

**vtp client**

**no vtp client**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Disabled
-----------------	----------

<b>Command Modes</b>	VLAN configuration
----------------------	--------------------

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>If the receiving switch is in client mode, the client switch changes its configuration to duplicate the configuration of the server. If you have switches in client mode, make sure to make all VTP or VLAN configuration changes on a switch in server mode.</p> <p>The <b>vtp server</b> command is the functional equivalent of <b>no vtp client</b> except that it does not return an error if the device is not in client mode.</p>
-------------------------	---

<b>Examples</b>	<p>This example shows how to place the device in VTP client mode:</p> <pre>Switch(vlan-config)# vtp client Switch(vlan-config)#</pre>
-----------------	---

<b>Related Commands</b>	<p><a href="#">show vtp</a> <a href="#">vtp (global configuration mode)</a></p>
-------------------------	---

# vtp domain

To configure the administrative domain name for a device, use the **vtp domain** command.

**vtp domain** *domain-name*

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

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

Command Modes	VLAN configuration
---------------	--------------------

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

Usage Guidelines	When you define the <i>domain-name</i> , the domain name is case sensitive and can be from 1 to 32 characters.
	You must set a domain name before you can transmit any VTP advertisements.
	Even if you do not set a domain name, the device will leave the no-management-domain state upon receiving the first VTP summary packet on any port that is currently trunking.
	If the device receives its domain from a summary packet, it resets its configuration revision number to zero. Once the device leaves the no-management-domain state, it can never be configured to reenter the number except by cleaning NVRAM and reloading.

Examples	This example shows how to set the devices administrative domain:
	<pre>Switch(vlan-config)# vtp domain DomainChandon Switch(vlan-config)#</pre>

Related Commands	<a href="#">show vtp</a> <a href="#">vtp (global configuration mode)</a>
------------------	---

# vtp password

To create a VTP domain password, use the **vtp password** command. To delete the password, use the **no** form of this command.

**vtp password** *password-value*

**no vtp password**

Syntax Description	<i>password-value</i> An ASCII string, from 1 to 32 characters, identifying the administrative domain for the device.
--------------------	---

Defaults	Disabled
----------	----------

Command Modes	VLAN configuration
---------------	--------------------

Command History	Release	Modification
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

**Examples** This example shows how to create a VTP domain password:

```
Switch(vlan-config)# vtp password DomainChandon
Switch(vlan-config)#
```

This example shows how to delete the VTP domain password:

```
Switch(vlan-config)# no vtp password
Clearing device VLAN database password.
Switch(vlan-config)#
```

Related Commands	<a href="#">show vtp</a> <a href="#">vtp (global configuration mode)</a>
------------------	---

# vtp pruning

To enable pruning in the VLAN database, use the **vtp pruning** command. To disable pruning in the VLAN database, use the **no** form of this command.

**vtp pruning**

**no vtp pruning**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Disabled
-----------------	----------

<b>Command Modes</b>	VLAN configuration
----------------------	--------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	VTP pruning causes information about each pruning-eligible VLAN to be removed from VTP updates if there are no stations belonging to that VLAN.
-------------------------	---

<b>Examples</b>	This example shows how to enable pruning in the VLAN database:
-----------------	--

```
Switch(vlan-config)# vtp pruning
Pruning switched ON
Switch(vlan-config)#
```

This example shows how to disable pruning in the VLAN database:

```
Switch(vlan-config)# no vtp pruning
Pruning switched OFF
Switch(vlan-config)#
```

<b>Related Commands</b>	<a href="#">show vtp</a> <a href="#">vtp (global configuration mode)</a>
-------------------------	---

# vtp server

To place the device in VTP server mode, use the **vtp server** command.

## vtp server

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Enabled
-----------------	---------

<b>Command Modes</b>	VLAN configuration
----------------------	--------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	<p>If you make a change to the VTP or VLAN configuration on a switch in server mode, that change is propagated to all the switches in the same VTP domain.</p> <p>You can set VTP to either server or client mode only when you disable dynamic VLAN creation.</p> <p>If the receiving switch is in server mode, the configuration is not changed.</p> <p>The <b>vtp server</b> command is the functional equivalent of <b>no vtp client</b>, except that it does not return an error if the device is not in client mode.</p>
-------------------------	--

<b>Examples</b>	<p>This example shows how to place the device in VTP server mode:</p> <pre>Switch(vlan-config)# vtp server Switch(vlan-config)#</pre>
-----------------	---

<b>Related Commands</b>	<p><b>show vtp</b></p> <p><b>vtp (global configuration mode)</b></p>
-------------------------	--

# vtp transparent

To place a device in VTP transparent mode, use the **vtp transparent** command. To return to VTP server mode, use the **no** form of this command.

**vtp transparent**

**no vtp transparent**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Disabled
-----------------	----------

<b>Command Modes</b>	VLAN configuration
----------------------	--------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	The <b>vtp transparent</b> command disables VTP from the domain but does not remove the domain from the switch.
-------------------------	---

If the receiving switch is in transparent mode, the configuration is not changed. The switches in transparent mode do not participate in VTP. If you make VTP or VLAN configuration changes on a switch in transparent mode, the changes are not propagated to the other switches in the network.

The **vtp server** command is similar to the **no vtp transparent** command, except that it does not return an error if the device is not in transparent mode.

<b>Examples</b>	This example shows how to place the device in VTP transparent mode:
-----------------	---

```
Switch(vlan-config)# vtp transparent
Switch(vlan-config)#
```

This example shows how to return the device to VTP server mode:

```
Switch(vlan-config)# no vtp transparent
Switch(vlan-config)#
```

<b>Related Commands</b>	<b>show vtp</b>
	<b>vtp (global configuration mode)</b>



# vtp v2-mode

To enable version 2 mode, use the **vtp v2-mode** command. To disable version 2 mode, use the **no** form of this command.

**vtp v2-mode**

**no vtp v2-mode**

<b>Syntax Description</b>	This command has no arguments or keywords.
---------------------------	--

<b>Defaults</b>	Disabled
-----------------	----------

<b>Command Modes</b>	VLAN configuration
----------------------	--------------------

<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(8a)EW	Support for this command was introduced on the Catalyst 4500 series switch.

<b>Usage Guidelines</b>	All switches in a VTP domain must run the same version of VTP. VTP version 1 and VTP version 2 do not operate on switches in the same VTP domain.
-------------------------	---

If all switches in a domain are VTP version 2-capable, you only need to enable VTP version 2 on one switch; the version number is then propagated to the other version 2-capable switches in the VTP domain.
--

If you toggle the version 2 mode, the parameters of certain default VLANs will be modified.
---

<b>Examples</b>	This example shows how to enable version 2 mode in the VLAN database:
-----------------	---

Switch(vlan-config) # <b>vtp v2-mode</b> Switch(vlan-config) #
---

This example shows how to disable version 2 mode in the VLAN database:
--

Switch(vlan-config) # <b>no vtp v2-mode</b> Switch(vlan-config) #
--

<b>Related Commands</b>	<a href="#">show vtp</a> <a href="#">vtp (global configuration mode)</a>
-------------------------	---

vtp v2-mode



# Acronyms

---

---

## A

ACE	access control entry
ACL	access control list
AFI	authority and format identifier
Agport	aggregation port
AMP	Active Monitor Present
APaRT	Automated Packet Recognition and Translation
ARP	Address Resolution Protocol

---

## B

BGP	Border Gateway Protocol
BPDU	bridge protocol data unit
BRF	bridge relay function
BSC	Bisync
BSTUN	Block Serial Tunnel
BUS	broadcast and unknown server
BVI	bridge-group virtual interface

---

C

CAM	content-addressable memory
CAR	committed access rate
CCA	circuit card assembly
CDP	Cisco Discovery Protocol
CEF	Cisco Express Forwarding
CHAP	Challenge Handshake Authentication Protocol
CIR	committed information rate
CLI	command-line interface
CLNS	Connection-Less Network Service
CMNS	Connection-Mode Network Service
COPS	Common Open Policy Server
COPS-DS	Common Open Policy Server Differentiated Services
CoS	class of service
CPLD	Complex Programmable Logic Device
CRC	cyclic redundancy check
CRF	concentrator relay function
CST	Common Spanning Tree

---

D

DAI	Dynamic ARP Inspection
DBL	Dynamic Buffer Limiting
DCC	Data Country Code
dCEF	distributed Cisco Express Forwarding
DDR	dial-on-demand routing
DE	discard eligibility

DEC	Digital Equipment Corporation
DFI	Domain-Specific Part Format Identifier
DFP	Dynamic Feedback Protocol
DISL	Dynamic Inter-Switch Link
DLC	Data Link Control
DLSw	Data Link Switching
DMP	data movement processor
DNS	Domain Name System
DoD	Department of Defense
DOS	denial of service
DRAM	dynamic RAM
DRiP	Dual Ring Protocol
DSAP	destination service access point
DSCP	differentiated services code point
DSPU	downstream SNA Physical Units
DTP	Dynamic Trunking Protocol
DTR	data terminal ready
DVMRP	Distance Vector Multicast Routing Protocol
DXI	data exchange interface

---

## E

EAP	Extensible Authentication Protocol
EARL	Enhanced Address Recognition Logic
EEPROM	electrically erasable programmable read-only memory
EHSA	enhanced high system availability

EIA	Electronic Industries Association
ELAN	Emulated Local Area Network
EOBC	Ethernet out-of-band channel
ESI	end-system identifier

---

## F

FECN	forward explicit congestion notification
FM	feature manager
FRU	field replaceable unit
FSM	feasible successor metrics

---

## G

GARP	General Attribute Registration Protocol
GMRP	GARP Multicast Registration Protocol
GVRP	GARP VLAN Registration Protocol

---

## I

ICC	Inter-card Communication
ICD	International Code Designator
ICMP	Internet Control Message Protocol
IDB	interface descriptor block
IDP	initial domain part or Internet Datagram Protocol
IDPROM	ID Programmable Read-Only Memory
IFS	IOS File System
IGMP	Internet Group Management Protocol
IGRP	Interior Gateway Routing Protocol

ILMI	Integrated Local Management Interface
IP	Internet Protocol
IPC	interprocessor communication
IPX	Internetwork Packet Exchange
IS-IS	Intermediate System-to-Intermediate System Intradomain Routing Protocol
ISL	Inter-Switch Link
ISO	International Organization of Standardization
ISR	Integrated SONET router

---

## L

L2	Layer 2
L3	Layer 3
L4	Layer 4
LAN	local area network
LANE	LAN Emulation
LAPB	Link Access Procedure, Balanced
LDA	Local Director Acceleration
LCP	Link Control Protocol
LEC	LAN Emulation Client
LECS	LAN Emulation Configuration Server
LEM	link error monitor
LER	link error rate
LES	LAN Emulation Server
LLC	Logical Link Control
LTL	Local Target Logic

---

M

MAC	Media Access Control
MD5	Message Digest 5
MET	Multicast Expansion Table
MFIB	Multicast Forwarding Information Base
MIB	Management Information Base
MII	media-independent interface
MLS	Multilayer Switching
MLSE	maintenance loop signaling entity
MOP	Maintenance Operation Protocol
MOTD	message-of-the-day
MRM	multicast routing monitor
MRQ	Multicast Replication Queue
MSDP	Multicast Source Discovery Protocol
MST	Multiple Spanning Tree
MTU	maximum transmission unit
MVAP	multiple VLAN access port

---

N

NBP	Name Binding Protocol
NCIA	Native Client Interface Architecture
NDE	NetFlow Data Export
NET	network entity title
NetBIOS	Network Basic Input/Output System
NFFC	NetFlow Feature Card
NMP	Network Management Processor



NSAP	network service access point
NTP	Network Time Protocol
NVRAM	nonvolatile RAM

---

## O

OAM	Operation, Administration, and Maintenance
OSI	Open System Interconnection
OSPF	open shortest path first

---

## P

PAE	port access entity
PAgP	Port Aggregation Protocol
PBD	packet buffer daughterboard
PC	Personal Computer (formerly PCMCIA)
PCM	pulse code modulation
PCR	peak cell rate
PDP	policy decision point
PDU	protocol data unit
PEM	Power Entry Module
PEP	policy enforcement point
PGM	Pragmatic General Multicast
PHY	physical sublayer
PIB	policy information base
PIM	Protocol Independent Multicast
PM	Port manager
PPP	Point-to-Point Protocol

PRID	Policy Rule Identifiers
PVLAN	Private VLAN
PVST+	Per VLAN Spanning Tree+

---

## Q

QM	QoS manager
QoS	quality of service

---

## R

RACL	router interface access control list
RADIUS	Remote Access Dial-In User Service
RAM	random-access memory
RCP	Remote Copy Protocol
RGMP	Router Group Management Protocol
RIF	Routing Information Field
RMON	remote network monitor
ROM	read-only memory
RP	route processor or rendezvous point
RPC	remote procedure call
RPF	reverse path forwarding
RPR	Router Processor Redundancy
RSPAN	remote SPAN
RST	reset
RSVP	ReSerVation Protocol
Rx	Receive

---

S

SAID	Security Association Identifier
SAP	service access point
SCM	service connection manager
SCP	Switch-Module Configuration Protocol
SDLC	Synchronous Data Link Control
SGBP	Stack Group Bidding Protocol
SIMM	single in-line memory module
SLB	server load balancing
SLCP	Supervisor Line-Card Processor
SLIP	Serial Line Internet Protocol
SMDS	Software Management and Delivery Systems
SMF	software MAC filter
SMP	Standby Monitor Present
SMRP	Simple Multicast Routing Protocol
SMT	Station Management
SNAP	Subnetwork Access Protocol
SNMP	Simple Network Management Protocol
SPAN	Switched Port Analyzer
SRB	source-route bridging
SRT	source-route transparent bridging
SSTP	Cisco Shared Spanning Tree
STP	Spanning Tree Protocol
SVC	switched virtual circuit
SVI	switched virtual interface

---

T

TACACS+	Terminal Access Controller Access Control System Plus
TARP	Target Identifier Address Resolution Protocol
TCAM	Ternary Content Addressable Memory
TCL	table contention level
TCP/IP	Transmission Control Protocol/Internet Protocol
TFTP	Trivial File Transfer Protocol
TIA	Telecommunications Industry Association
TLV	type-length-value
TopN	Utility that allows the user to analyze port traffic by reports
TOS	type of service
TrBRF	Token Ring Bridge Relay Function
TrCRF	Token Ring Concentrator Relay Function
TTL	Time To Live
TVX	valid transmission
Tx	Transmit

---

U

UDLD	UniDirectional Link Detection Protocol
UDP	User Datagram Protocol
UNI	User-Network Interface
UTC	Coordinated Universal Time

---

V

VACL	VLAN access control list
------	--------------------------

VCC	virtual channel circuit
VCD	virtual circuit descriptor
VCI	virtual circuit identifier
VCR	Virtual Configuration Register
VINES	Virtual Network System
VLAN	virtual LAN
VMPS	VLAN Membership Policy Server
VTP	VLAN Trunking Protocol
VVID	voice VLAN ID

---

## W

WFQ	weighted fair queueing
WRED	weighted random early detection
WRR	weighted round-robin

---

## X

XNS	Xerox Network System
-----	----------------------





## Acknowledgments for Open-Source Software

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The Cisco IOS software pipe command uses Henry Spencer's regular expression library (regex). The most recent version of the library has been modified slightly in the Catalyst operating system software to maintain compatibility with earlier versions of the library.

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- ( ) in commands [1-10](#)
- \* matches 0 or more sequences of a pattern [1-7](#)
- + matches 1 or more sequences of a pattern [1-7](#)
- . matches any single character [1-7](#)
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