User Manual for the NETGEAR 7300 Series Layer 3 Managed Switch Software

NETGEAR

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Regulatory Compliance Information

This device is restricted to indoor use due to reduce the potential for harmful interference to co-channel Mobile Satellite and Radar Systems.

Canadian Department of Communications Compliance Statement

This Class B Digital apparatus (NETGEAR 7300 Series Layer 3 Managed Switch) meets all the requirements of the Canadian Interference Causing Equipment Regulations.

Cet appareil numerique del la classe B respect les exigences du Regalement sur le material broilleur du Canada.

This device comples with Class B limits of Industry of Canada. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

EN 55 022 Declaration of Conformance

This is to certify that the NETGEAR 7300 Series Layer 3 Managed Switch is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class B (CISPR 22).

Contents

Chapter 1
About This Guide

Thank you for purchasing the NETGEAR™ 7300 Series L3 Switch.

Audience

This reference manual assumes that the reader has basic-to-intermediate computer and Internet skills. However, basic computer network, Internet, and wireless technology tutorial information is provided in the Appendices.

This document describes configuration commands for the 7300 Series L3 Switch software. The commands can be accessed from the CLI, telnet, and Web interfaces.

Why the Document was Created

This document was created primarily for system administrators configuring and operating a system using 7300 Series L3 Switch software. It is intended to provide an understanding of the configuration options of 7300 Series L3 Switch software.

It is assumed that the reader has an understanding of the relevant switch platforms. It is also assumed that the reader has a basic knowledge of Ethernet and networking concepts.

How to Use This Document

This document describes configuration commands for the 7000 Series L3 Managed Switch software. The commands can be accessed from the CLI, telnet, and Web interfaces.

- Chapter 6, “Quick Start up” details the procedure to quickly become acquainted with the 7000 Series L3 Managed Switch Software.
- Chapter 8, “Switching Commands” describes the Switching commands.
- Chapter 9, “Routing Commands” describes the Routing commands.

Note: Refer to the release notes for the 7000 Series L3 Managed Switch Software application level code. The release notes detail the platform specific functionality of the Switching, Routing, SNMP, Config, Management, and Bandwidth Provisioning packages.

Typographical Conventions

This guide uses the following typographical conventions:

Table 1. Typographical conventions

italics	Emphasis.
bold times roman	User input.
[Enter]	Named keys in text are shown enclosed in square brackets. The notation [Enter] is used for the Enter key and the Return key.
[Ctrl]+C	Two or more keys that must be pressed simultaneously are shown in text linked with a plus (+) sign.
SMALL CAPS	DOS file and directory names.

Special Message Formats

This guide uses the following formats to highlight special messages:

Note: This format is used to highlight information of importance or special interest.

This manual is written for the 7300 Series L3 Switch according to these specifications:

Table 1-1. Manual Specifications

Product Version	NETGEAR 7300 Series Layer 3 Managed Switch
Manual Publication Date	June 2004

Note: Product updates are available on the NETGEAR, Inc. Web site at *http://www.netgear.com/support/main.asp*. Documentation updates are available on the NETGEAR, Inc. Web site at *http://www.netgear.com/docs*.

Features of the HTML Version of this Manual

The HTML version of this manual includes these features.

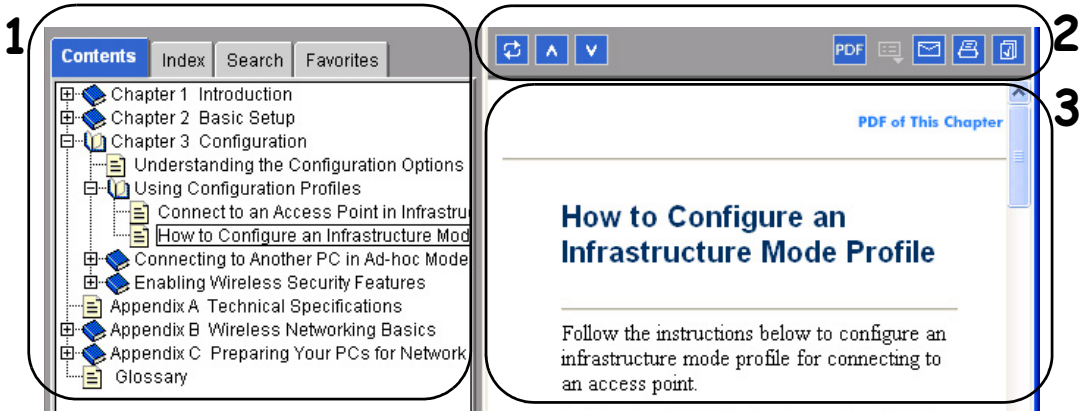

Figure Preface -2: HTML version of this manual

1. **Left pane**. Use the left pane to view the Contents, Index, Search, and Favorites tabs.

   To view the HTML version of the manual, you must have a version 4 or later browser with JavaScript enabled.

2. **Toolbar buttons**. Use the toolbar buttons across the top to navigate, print pages, and more.
   - The *Show in Contents* button locates the current topic in the Contents tab.
   - *Previous/Next* buttons display the previous or next topic.
   - The *PDF* button links to a PDF version of the full manual.
   - The *Print* button prints the current topic. Using this button when a step-by-step procedure is displayed will send the entire procedure to your printer—you do not have to worry about specifying the correct range of pages.

3. **Right pane**. Use the right pane to view the contents of the manual. Also, each page of the manual includes a PDF of This Chapter link at the top right which links to a PDF file containing just the currently selected chapter of the manual.

How to Print this Manual

To print this manual you man choose one of the following several options, according to your needs.

- **Printing a "How To" Sequence of Steps in the HTML View**. Use the *Print* button  on the upper right of the toolbar to print the currently displayed topic. Using this button when a step-by-step procedure is displayed will send the entire procedure to your printer–you do not have to worry about specifying the correct range of pages.
- **Printing a Chapter**. Use the PDF of This Chapter link at the top right of any page.
  - Click "PDF of This Chapter" link at the top right of any page in the chapter you want to print. The PDF version of the chapter you were viewing opens in a browser window.

    Note: Your computer must have the free Adobe Acrobat reader installed in order to view and print PDF files. The Acrobat reader is available on the Adobe Web site at *http://www.adobe.com*.
  - Click the print icon in the upper left of the window.

    Tip: If your printer supports printing two pages on a single sheet of paper, you can save paper and printer ink by selecting this feature.
- **Printing the Full Manual**. Use the PDF button in the toolbar at the top right of the browser window.
  - Click the PDF button  on the upper right of the toolbar. The PDF version of the chapter you were viewing opens in a browser window.
  - Click the print icon in the upper left of the window.

    Tip: If your printer supports printing two pages on a single sheet of paper, you can save paper and printer ink by selecting this feature.

Chapter 2
Switch Management Overview

This chapter gives an overview of switch management, including the methods you can use to manage your NETGEAR NETGEAR 7300 Series Layer 3 Managed Switch.

- Management Access Overview
- SNMP Access
- Protocols

Scope

The NETGEAR 7300 Series Layer 3 Managed Switch software has two purposes:

- Assist attached hardware in switching frames, based on Layer 2 or 3 information contained in the frames.
- Provide a complete switch management portfolio for the network administrator.

Switch Management Overview

Fast Ethernet (FEN) and Gigabit Ethernet (GEN) switching continues to evolve from high-end backbone applications to desktop switching applications. The price of the technology continues to decline, while performance and feature sets continue to improve. Devices that are capable of switching Layers 2, 3, and 4 are increasingly in demand. The NETGEAR 7300 Series Layer 3 Managed Switch provides a flexible solution to these ever-increasing needs.

The NETGEAR 7300 Series Layer 3 Managed Switch provides the network administrator with a set of comprehensive management functions for managing both the 7300 and the network. The network administrator has a choice of three easy-to-use management methods:

- Web-based
- VT100 interface

Note: The maximum number of configuration file command lines is 2000.

- Simple Network Protocol Management (SNMP)

Each management method enables the network administrator to configure, manage, and control the managed switch locally or remotely using in-band or out-of-band mechanisms. Management is standards-based, with configuration parameters and a private MIB providing control for functions not completely specified in the MIBs.

Table 2-1. Comparing Switch Management Methods

Management Method	Advantages	Disadvantages
Administration console	• Out-of-band access via direct cable connection means network bottlenecks, crashes, and downtime do not slow or prevent access • No IP address or subnet needed • Menu or CLI based • HyperTerminal access to full functionality (HyperTerminal are built into Microsoft Windows 95/98/NT/2000 operating systems) • Secure – make sure the switch is installed in a secure area.	• Must be near switch or use dial-up connection • Not convenient for remote users • Not graphical
Web browser or Telnet	• Can be accessed from any location via the switch's IP address • Ideal for configuring the switch remotely • Compatible with Internet Explorer and Netscape Navigator Web browsers • Familiar browser interface • Graphical data available • Most visually appealing • Menu or CLI interfaces available	• Security can be compromised (hackers can attack if they know IP address) • May encounter lag times on poor connections • Displaying graphical objects over a browser interface may slow navigation
SNMP Agent	• Communicates with switch functions at the Management Information Base (MIB) level • Based on open standards	• Requires SNMP manager software • Least visually appealing of all three methods • Limited amount of information available • Some settings require calculations • Security can be compromised (hackers need only know the community name)

Chapter 3
Administration Console Telnet Interface

The administration console is an internal, character-oriented, VT-100/ANSI menu-driven user interface for performing management activities. Using this method, you can view the administration console from a terminal, PC, Apple Macintosh, or UNIX workstation connected to the switch's console port. Figure 3-1 shows an example of this management method.

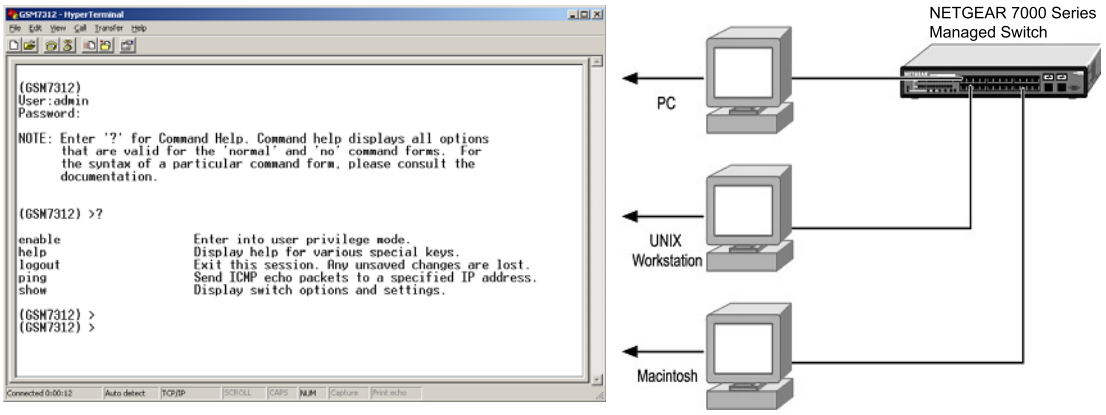

Figure 3-1: Administration Console Management Method

Set Up Your Switch Using Direct Console Access

The direct access management method is required when you initially set up your switch. Thereafter, the convenience and additional features of the Web management access method make it the best method to manage the switch. See "Web Based Management Overview" on page 4-1 for more information.

Direct access to the switch console is achieved by connecting the switch's console port to a VT-100 or compatible terminal or to a PC, Apple Macintosh, or UNIX workstation equipped with a terminal-emulation program. This connection is made using the null-modem cable supplied with the switch.

Examples of terminal-emulation programs include:

- HyperTerminal, which is included with Microsoft Windows operating systems
- ZTerm for the Apple Macintosh
- TIP for UNIX workstations

This example describes how to set up the connection using a HyperTerminal on a PC, but other systems follow similar steps.

1. Click the Windows Start button. Select Accessories and then Communications. HyperTerminal should be one of the options listed in this menu. Select HyperTerminal
2. The following screen will appear. Enter a name for this connection. In the example below, the name of the connection is FSM726. Click OK.

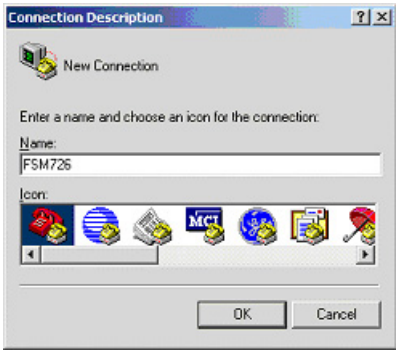

Figure 3-2: Connection Description

3. The following screen will appear. In the bottom, drop down box labeled **Connect Using:**, click the arrow and choose the COM port to which the switch will connect. In the example below, COM1 is the port selected. Click **OK**.

Figure 3-3: COM Port Selection

4. When the following screen appears, make sure that the port setting are as follows:

Baud Rate:	9600
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control:	None

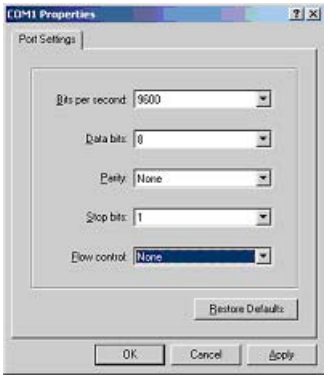

Figure 3-4: Connection Settings

5. Click OK.

The HyperTerminal window will open and you should be connected to the switch. If you do not get a welcome screen or a system menu, press the return key.

When attached to the User Interface via a Telnet Session, the following must be set in order to use the arrow keys: Under the terminal pull down menu, choose Properties and make sure the VT100 Arrows option is turned on.

Chapter 4
Web-Based Management Interface

Your NETGEAR 7300 Series Layer 3 Managed Switch provides a built-in browser interface that lets you configure and manage it remotely using a standard Web browser such as Microsoft Internet Explorer 5.0 or later or Netscape Navigator 6.0 or later.

This interface also allows for system monitoring and management of the switch. The ‘help’ page covers many of the basic functions and features of the switch and it’s web interface.

When you configure the switch for the first time from the console, you can assign an IP address and subnet mask to the switch. Thereafter, you can access the switch’s Web interface directly using your Web browser by entering the switch’s IP address into the address bar. In this way, you can use your Web browser to manage the switch from a central location, just as if you were directly connected to the switch’s console port. Figure 4-1 shows this management method.

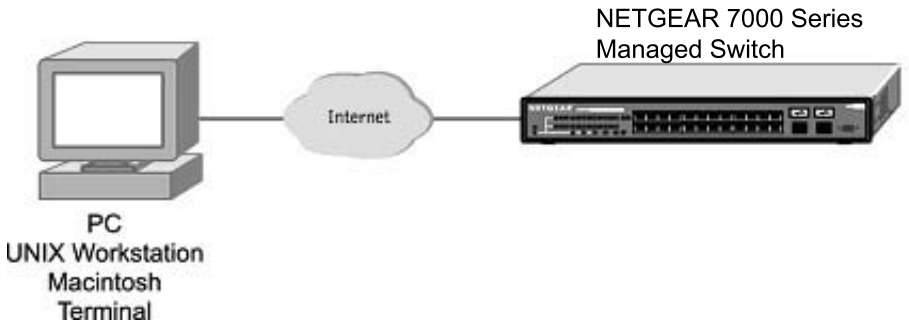

Figure 4-1: Web Management Method

Web Based Management Overview

The menu options available are: System Management, Switch, Routing, Traffic Management, and Smart Wizard. There is a help menu in the top of right side of screen; you can click the ‘help’ or the question mark to read the help menu.

The help menu contains:

- Web-Based Management Introduction to the Web management features.

- Device Management — Introduction of the basic icons and management of the device
- Interface Operations — Describes Web browser requirements, and common commands
- Product Overview — Describes supported SNMP and Web management features
- Summary of Features — Feature List

How to Log In to the Managed Switch

The NETGEAR 7300 Series Layer 3 Managed Switch can be configured remotely from Microsoft Internet Explorer browser version 5.0 or above, or Netscape Navigator web browser version 4.78 or above.

1. Determine the IP address of your managed switch.
2. Open a Web browser such as Internet Explorer or Netscape Navigator.
3. Log in to the managed switch using whatever IP address the unit is currently configured with. Use the default user name of **admin** and default of no password, or whatever LAN address and password you have set up.

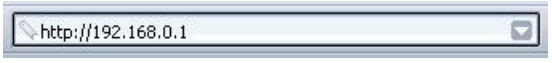

Figure 4-2: 7300 IP address in browser address bar

A login window opens:

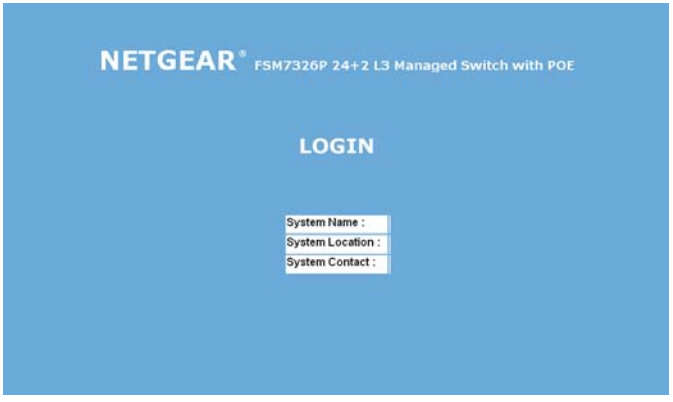

Figure 4-3: Login splash screen for the Managed Switch

Click the Login link.

A user name and password dialog box opens like this one.

Figure 4-4: User name/password dialog box

4. Type the default user name of **admin** and default of no password, or whatever password you have set up.

   Once you have entered your access point name, your Web browser should automatically find the 7300 Series L3 Switch and display the home page, as shown below.

Web-Based Management Utility Features

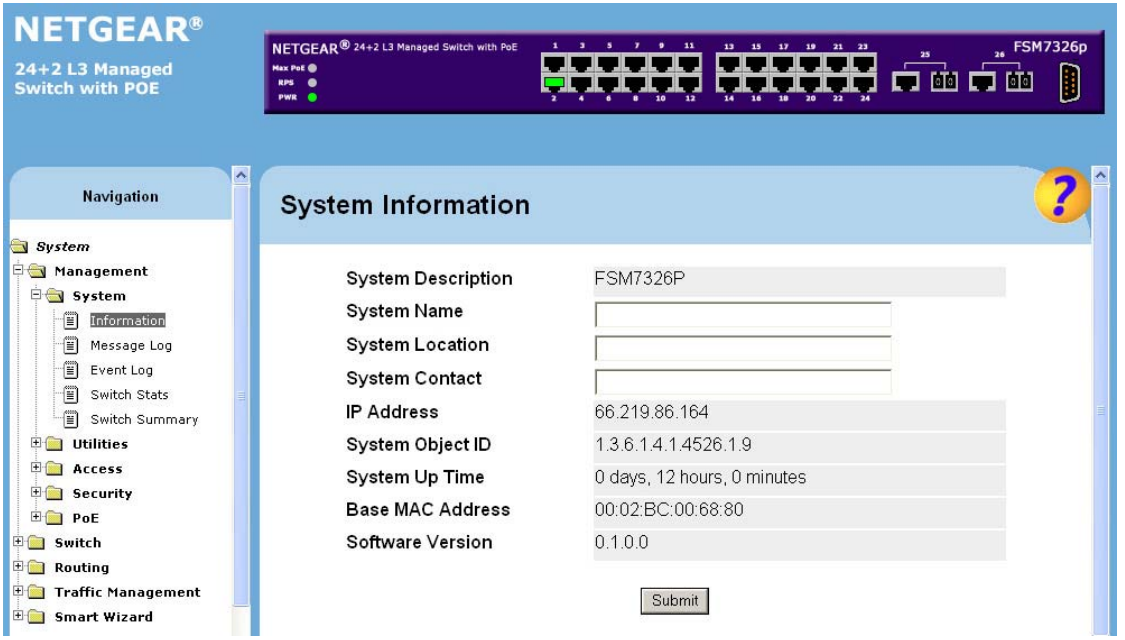

Figure 4-5: System Information page

This welcome page displays system information, such as:

- System Description
- System Name
- System Location
- System Contact
- IP Address
- System Object ID (OID)
- System Up Time

Interactive Switch Image

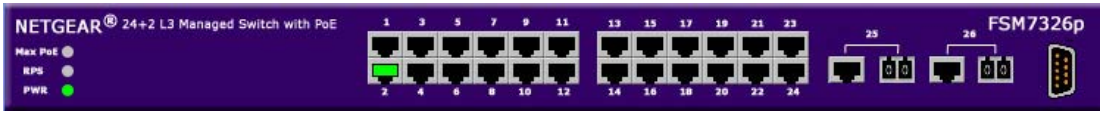

Figure 4-6: Interactive switch image

This dynamic image shows various real time conditions about the switch, including the status, fan operation, power, and the connectivity and traffic indication for each port. In addition, using the popup menus described below, you can directly access a wealth of information by right-clicking on a port and selecting a menu item from the popup-menu that displays.

Menus

The Web-based interface enables navigation through several menus. The main navigation menu is on the left of every page and contains the screens that let you access all the commands and statistics the switch provides.

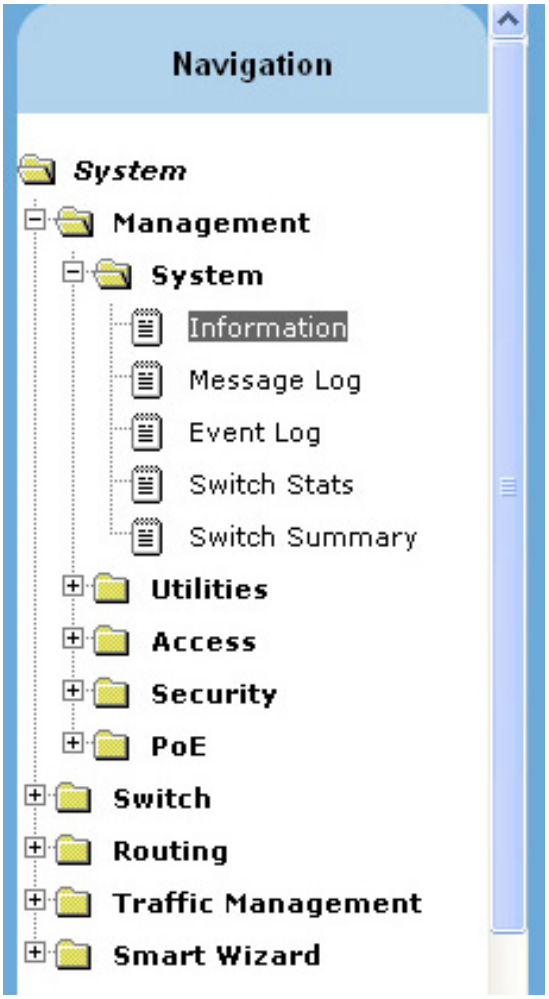

Figure 4-7: Menu navigation

Main Menus

- Management
- Switch
- Routing
- Traffic Management

- Smart Wizard

Secondary Menus

The Secondary Menus under the Main Menu contain a host of options that you can use to configure your switch. The online help contains a detailed description of the features on each screen. You can click the ‘help’ or the question mark at the top right of each screen to view the help menu topics.

The Secondary Menus are detailed below, with cross-references to the sections in this manual that contain the corresponding command descriptions.

Management

- System — see “System Information and Statistics Commands” on page 8-1
- Utilities — see “System Utilities” on page 8-112
- Access — see the following sections:
  - “Administration Console Telnet Interface” on page 3-1
  - “Management Commands” on page 8-18
- Security — see “Security Commands” on page 8-95 and “User Account Management Commands” on page 8-90
  - Port Access Control — “show dot1x” on page 8-106
  - RADIUS — see “show radius statistics” on page 8-110
  - PoE — see “FSM7326P Power Over Ethernet Commands” on page 13-1

Switch

- Port — see “show port” on page 8-61
- MAC Addresses — see “System Information and Statistics Commands” on page 8-1
- Spanning Tree — see “Spanning Tree Commands” on page 8-77
- Link Aggregation — see “Device Configuration Commands” on page 8-38
- VLAN — see “show vlan” on page 8-63
- Mcast Fwding DB — see “show forwardingdb agetime” on page 8-23

Routing

- Routing Commands — see “Routing Commands” on page 9-1

Traffic Management

- Diffserv — see Chapter 10, “CLI Commands: Differentiated Services
- Traffic Control — see “Management Commands” on page 8-18

Smart Wizard

- VLAN Routing Wizard — see “Routing Commands” on page 9-1
- Diffserv Wizard — see Chapter 10, “CLI Commands: Differentiated Services

System-Wide Popup Menus

The 7300 Series L3 Switch also provides several popup menus.

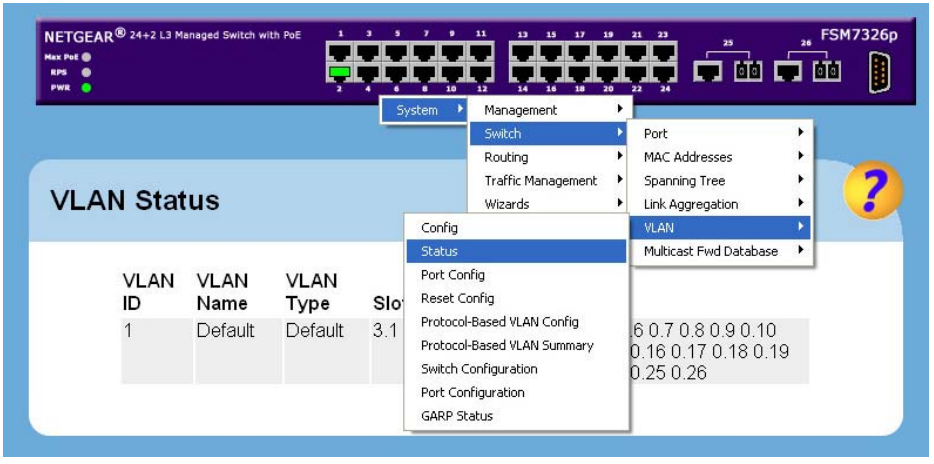

Figure 4-8: Switch popup menus

You can also access the main navigation menu by right clicking on the image of the switch and browsing to the menu you want to use.

Port-Specific Popup Menus

The 7300 Series L3 Switch also provides several popup menus for each port.

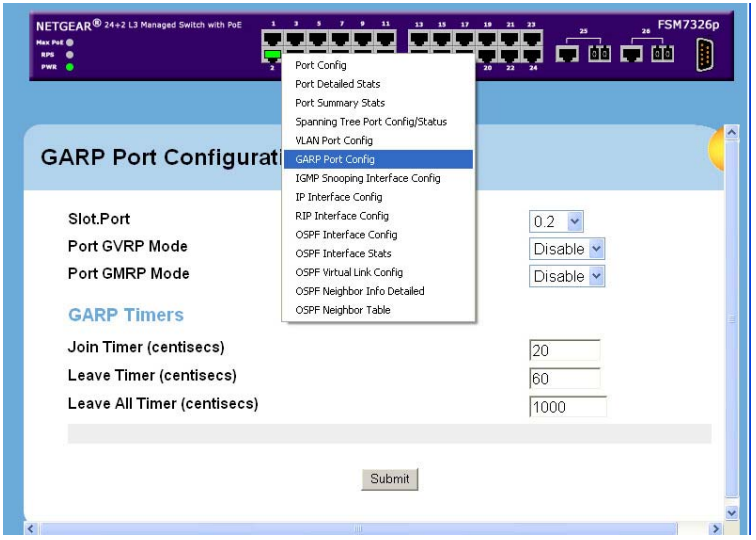

Figure 4-9: Switch popup menus

You can access a port-specific popup menu by right clicking on the port in the image of the switch and browsing to the menu you want to use.

Chapter 5
Command Line Interface Structure

The Command Line Interface (CLI) syntax, conventions and terminology are described in this section. Each CLI command is illustrated using the structure outlined below.

CLI Command Format

Commands are followed by values, parameters, or both.

Example 1

network parms <*ipaddr*> <*netmask*> [<*gateway*>]

- **network parms** is the command name.
- <***ipaddr***> <***netmask***> are the required values for the command.
- ***[<gateway>]*** is the optional value for the command.

Example 2

snmp-server location <*loc*>

- **snmp-server location** is the command name.
- <***loc***> is the required parameter for the command.

Example 3

clear vlan

- **clear vlan** is the command name.

Command

The text in bold, non-italic font must be typed exactly as shown.

Parameters

Parameters are order dependent.

The text in bold italics should be replaced with a name or number. To use spaces as part of a name parameter, enclose it in double quotes like this: "System Name with Spaces".

Parameters may be mandatory values, optional values, choices, or a combination.

- <parameter>. The <> angle brackets indicate that a mandatory parameter must be entered in place of the brackets and text inside them.
- [parameter]. The [] square brackets indicate that an optional parameter may be entered in place of the brackets and text inside them.
- choice1 | choice2. The | indicates that only one of the parameters should be entered.
- The {} curly braces indicate that a parameter must be chosen from the list of choices.

Values

ipaddr This parameter is a valid IP address, made up of four decimal bytes ranging from 0 to 255. The default for all IP parameters consists of zeros (that is, 0.0.0.1). The interface IP address of 0.0.0.0 is invalid. In some cases, the IP address can also be entered as a 32-bit number.

macaddr The MAC address format is six hexadecimal numbers separated by colons, for example 00:06:29:32:81:40.

areaid Area IDs may be entered in dotted-decimal notation (for example, 0.0.0.1). An area ID of 0.0.0.0 is reserved for the backbone. Area IDs have the same form as IP addresses, but are distinct from IP addresses. The IP network number of the sub-netted network may be used for the area ID.

routerid The value of <router id> must be entered in 4-digit dotted-decimal notation (for example, 0.0.0.1). A router ID of 0.0.0.0 is invalid.

slot/port This parameter denotes a valid slot number and a valid port number. For example, 0/1 represents slot number 0 and port number 1. The <slot/port> field is composed of a valid slot number and a valid port number separated by a forward slash (/).

logical slot/port This parameter denotes a logical slot number and logical port number assigned. This is applicable in the case of a port-channel (LAG). The operator can use the logical slot number and the logical port number to configure the port-channel.

Conventions

Network addresses are used to define a link to a remote host, workstation or network. Network addresses are shown using the following syntax:

Table 5-1. Network Address Syntax

Address Type	Format	Range
ipaddr	A.B.C.D	0.0.0.0 to 255.255.255.255 (decimal)
macaddr	YY:YY:YY:YY:YY:YY	hexidecimal digit pairs

Double quotation marks such as "System Name with Spaces" set off user defined strings. If the operator wishes to use spaces as part of a name parameter then it must be enclosed in double quotation marks.

Empty strings (““) are not valid user defined strings.

Command completion finishes spelling the command when enough letters of a command are typed to uniquely identify the command word. The command may be executed by typing <enter> (command abbreviation) or the command word may be completed by typing the <tab> or <space bar> (command completion).

The value 'Err' designates that the requested value was not internally accessible. This should never happen and indicates that there is a case in the software that is not handled correctly.

The value of '-----' designates that the value is unknown.

Annotations

The CLI allows the user to type single-line annotations at the command prompt for use when writing test or configuration scripts and for better readability. The exclamation point (‘!’) character flags the beginning of a comment. The comment flag character can begin a word anywhere on the command line and all input following this character is ignored. Any command line that begins with the character ‘!’ is recognized as a comment line and ignored by the parser.

Some examples are provided below:

! Script file for displaying the ip interface

! Display information about interfaces

show ip interface 0/1 !Displays the information about the first interface

! Display information about the next interface

show ip interface 0/2

! End of the script file

Chapter 6
Quick Start up

The CLI Quick Start up details procedures to quickly become acquainted with the 7300 Series L3 Switch.

Quick Starting the Switch

1. Read the device Installation Guide for the connectivity procedure. In-band connectivity allows access to the 7300 Series L3 Switch locally or from a remote workstation. The device must be configured with IP information (IP address, subnet mask, and default gateway).
2. Turn the Power ON.
3. Allow the device to load the software until the login prompt appears. The device initial state is called the default mode.
4. When the prompt asks for operator login, execute the following steps:
   - Type the word **`admin`** in the login area. Since a number of the Quick Setup commands require administrator account rights, NETGEAR suggests logging into an administrator account.
   - Do not enter a password because there is no password in the default mode.
   - Press the enter key two times.
   - The CLI User EXEC prompt will be displayed.
   - Use “enable” to switch to the Privileged EXEC mode from User EXEC.
   - Use “configure” to switch to the Global Config mode from Privileged EXEC.
   - Use “exit” to return to the previous mode.

System Info and System Setup

Quick Start up Software Version Information

Table 6-1. Quick Start up Software Version Information

Command	Details
show hardware (in Privileged EXEC)	Allows the user to see the software version the device contains
	System Description - The switch's model name
	Burned in MAC address - the MAC address assigned to this switch CPU
	Software version - software release of this switch

Quick Start up Physical Port Data

Table 6-2. Quick Start up Physical Port Data

Command	Details
show port all (in Privileged EXEC)	Displays the Ports
	slot/port
	Type - Indicates if the port is a special type of port
	Admin Mode - Selects the Port Control Administration State
	Physical Mode - Selects the desired port speed and duplex mode
	Physical Status - Indicates the port speed and duplex mode
	Link Status - Indicates whether the link is up or down
	Link Trap - Determines whether or not to send a trap when link status changes
	LACP Mode - Displays whether LACP is enabled or disabled on this port.

Quick Start up User Account Management

Table 6-3. Quick Start up User Account Management

Command	Details
show users **(in Privileged EXEC)**	Displays all of the users that are allowed to access the switch
	Access Mode - Shows whether the user is able to change parameters on the switch(Read/Write) or is only able to view then (Read Only). As a factory default, admin has Read/Write access and guest has Read Only access. There can only be one Read/Write user and up to 5 Read Only users.
show loginsession **(in User EXEC)**	Displays all of the login session information
users passwd <*username*> **(in Global Config)**	Allows the user to set passwords or change passwords needed to login A prompt will appear after the command is entered requesting the users old password. In the absence of an old password leave the area blank. The operator must press enter to execute the command. The system then prompts the user for a new password then a prompt to confirm the new password. If the new password and the confirmed password match a message will be displayed. User password should not be more than eight characters in length.
copy system:running-config nvram:startup-config **(in Privileged EXEC)**	This will save passwords and all other changes to the device. If you do not save config, all configurations will be lost when a power cycle is performed on the switch or when the switch is reset
logout **(in User EXEC and Privileged EXEC)**	Logs the user out of the switch

Quick Start up IP Address

To view the network parameters the operator can access the device by the following three methods.

- Simple Network Management Protocol - SNMP
- Telnet

- Web Browser

Note: The user should do a **copy system:running-config nvram:startup-config** after configuring the network parameters so that the configurations are not lost

Table 6-4. Quick Start up IP Address

Command	Details
show network (in User EXEC)	Displays the Network Configurations
	IP Address - IP Address of the interface Default IP is 0.0.0.0
	Subnet Mask - IP Subnet Mask for the interface Default is 0.0.0.0
	Default Gateway - The default Gateway for this interface Default value is 0.0.0.0
	Burned in MAC Address - The Burned in MAC Address used for in-band connectivity
	Network Configurations Protocol Current - Indicates which network protocol is being used Default is none
	Management VLAN Id - Specifies VLAN id
	Web Mode - Indicates whether HTTP/Web is enabled.
	Java Mode - Indicates whether java mode is enabled.
network parms (in Privileged EXEC)	**network parms <ipaddr> *<netmask> [<gateway>]***
	IP Address range from 0.0.0.0 to 255.255.255.255
	Subnet Mask range from 0.0.0.0 to 255.255.255.255
	Gateway Address range from 0.0.0.0 to 255.255.255.255

Note: The IP address assigned to **network** in the above table will not be routable. If access to management CPU via the routable interface is desired, use the **ip** command.

Quick Start up Uploading from Switch to Out-of-Band PC (Only XMODEM)

Table 6-5. Quick Start up Uploading from Switch to Out-of-Band PC (XMODEM)

Command	Details
copy { nvram:startup-config | nvram:errorlog | nvram:msglog | nvram:traplog} <url>	The types are: config - configuration file errorlog - error log system trace - system trace traplog - trap log The URL must be specified as: xmodem:filepath/fileName
	This starts the upload and also displays the mode of uploading and the type of upload it is and confirms the upload is taking place. For example: If the user is using HyperTerminal, the user must specify where the file is going to be received by the PC.

Quick Start up Downloading from Out-of-Band PC to Switch (Only XMODEM)

Table 6-6. Quick Start up Downloading from Out-of-Band PC to Switch (Only XMODEM)

Command	Details
copy <url> {nvram:startup-config | system:image}	Sets the download datatype to be an image or config file. The URL must be specified as: xmodem:filepath/fileName
	For example: If the user is using HyperTerminal, the user must specify which file is to be sent to the switch. The Switch will restart automatically once the code has been downloaded.

Quick Start up Downloading from TFTP Server

Before starting a TFTP server download, the operator must complete the Quick Start up for the IP Address.

Table 6-7. Quick Start up Downloading from TFTP Server

Command	Details
copy <url> {nvram:startup-config | system:image}	Sets the download datatype to be an image or config file. The URL must be specified as: tftp://ipAddr/filepath/fileName. The nvram:startup-config option downloads the config file using tftp and system:image option downloads the code file.

Quick Start up Factory Defaults

Table 6-8. Quick Start up Factory Defaults

Command	Details
clear config	Enter yes when the prompt pops up to clear all the configurations made to the switch.
copy system:running-config nvram:startup-config	Enter yes when the prompt pops up that asks if you want to save the configurations made to the switch.
reload OR Cold Boot the Switch	Enter yes when the prompt pops up that asks if you want to reset the system. This is the users choice either reset the switch or cold boot the switch, both work effectively.

Chapter 7
Mode-based CLI

The CLI groups all the commands in appropriate modes according to the nature of the command. A sample of the CLI command modes are described below. Each of the command modes support specific 7300 Series L3 Switch commands.

- User Exec Mode
- Privileged Exec Mode
- Global Config Mode
- Vlan Mode
- Interface Config Mode
- Line Config Mode
- Policy Map Mode
- Policy Class Mode
- Class Map Mode
- Router Config OSPF Mode
- Router Config RIP Mode
- DHCP Pool Configuration Mode

The Command Mode table captures the command modes, the prompts visible in that mode and the exit method from that mode.

Table 7-1. Command Mode

Command Mode	Access Method	Prompt	Exit or Access Next Mode
User Exec Mode	This is the first level of access. Perform basic tasks and list system information.	Switch>	Enter Logout command
Privileged Exec Mode	From the User Exec Mode, enter the **enable** command.	Switch#	To exit this mode, enter exit or press Ctrl-Z.

Table 7-1. Command Mode (continued)

Command Mode	Access Method	Prompt	Exit or Access Next Mode
VLAN Mode	From the Privileged User Exec mode, enter the **vlan database** command.	Switch (Vlan) #	To exit to the Privileged Exec mode, enter the exit command, or press Ctrl-Z to switch to user exec mode.
Global Config Mode	From the Privileged Exec mode, enter the **configure** command.	Switch (Config)#	To exit to the Privileged Exec mode, enter the exit command, or press Ctrl-Z to switch to user exec mode.
Interface Config Mode	From the Global Configuration mode, enter the **interface config <slot/port>** command.	Switch (Interface-"if number")#	To exit to the Global Config mode enter exit. To return to user EXEC mode enter ctrl-Z.
Line Config Mode	From the Global Configuration mode, enter the **lineconfig** command.	Switch (line) #	To exit to the Global Config mode enter exit. To return to User Exec mode enter ctrl-Z.
Policy Map Mode	From the Global Configuration mode, enter the **policy map** command.	Switch (Config-policy-map)#	To exit to the Global Config mode enter exit. To return to user EXEC mode enter ctrl-Z.
Policy Class Mode	From the Policy Map mode enter the **class** command.	Switch (Config-policy-classmap)#	To exit to Policy Map mode enter exit. To return to User Exec mode enter ctrl-Z.
Class Map Mode	From the Global Config mode, enter the **class-map** command.	Switch (Config-class-map)#	To exit to Global Config mode enter exit. To return to User Exec mode enter ctrl-Z.
Router Config OSPF Mode	From the Global Configuration mode, enter the **router ospf** command	Switch (Config-router)#	To exit to the Global Config mode enter exit. To return to User Exec mode enter ctrl-Z.

Table 7-1. Command Mode (continued)

Command Mode	Access Method	Prompt	Exit or Access Next Mode
Router Config RIP Mode	From the Global Config mode, enter the **router rip** command	Switch (Config-router)#	To exit to the Global Config mode enter exit. To return to User Exec mode enter ctrl-Z.
DHCP Pool Configuration Mode	From the Global Configuration mode, enter the **ip dhcp pool** <**pool-name**> command.	Routing (Config-dhcp-pool)	To exit to Global Configuration mode enter exit. To return to user EXEC mode, enter ctrl-Z

Mode-based Topology

The CLI tree is built on a mode concept where the commands are available according to the interface. Some of the modes are depicted in the mode-based CLI Figure 1.

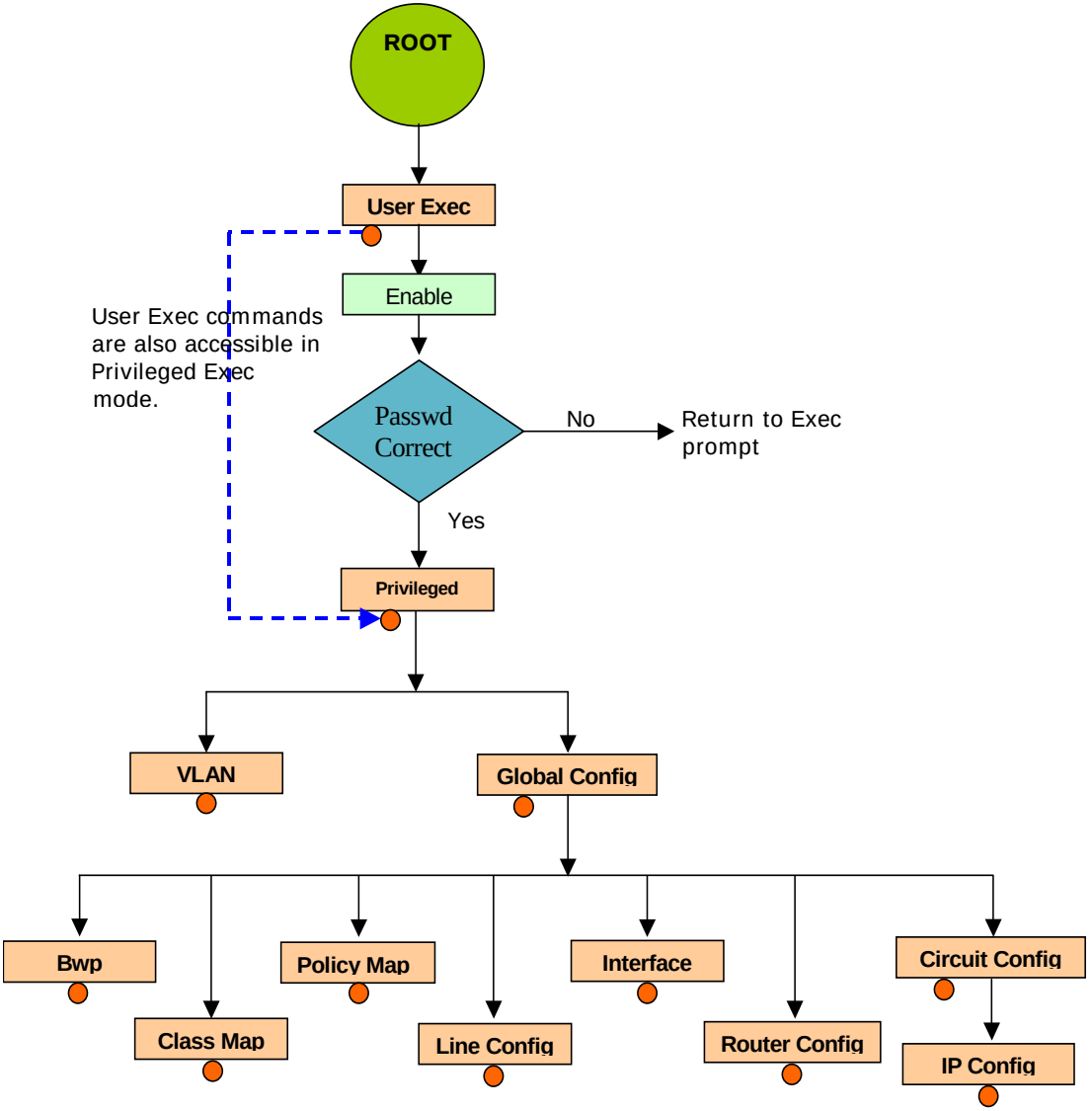

FIGURE 1. Mode-based CLI

Access to all commands in the Privileged Exec mode and below are restricted through a password.

Mode-based Command Hierarchy

The CLI is divided into various modes. The Commands in one mode are not available until the operator switches to that particular mode, with the exception of the User Exec mode commands. The User Exec mode commands may also be executed in the Privileged Exec mode.

The commands available to the operator at any point in time depend upon the mode. Entering a question mark (?) at the CLI prompt, displays a list of the available commands and descriptions of the commands.

The CLI provides the following modes:

User Exec Mode — When the operator logs into the CLI, the User Exec mode is the initial mode. The User Exec mode contains a limited set of commands. The command prompt shown at this level is:

Command Prompt: $(Exec)>

Privileged Exec Mode — To have access to the full suite of commands, the operator must enter the Privileged Exec mode. The Privileged Exec mode requires password authentication. From Privileged Exec mode, the operator can issue any Exec command or enter the Global Configuration mode. The command prompt shown at this level is:

Command Prompt: $(Exec)#

Global Config Mode — This mode permits the operator to make modifications to the running configuration. General setup commands are grouped in this mode. From the Global Configuration mode, the operator can enter the System Configuration mode, the Physical Port config, the Interface Configuration mode, or the Protocol Specific modes specified below. The command prompt at this level is:

Command Prompt: $(Config)#

From the Global Config mode, the operator may enter the following config modes:

VLAN Mode — This mode groups all the commands pertaining to VLANs. The command prompt shown at this level is:

Command Prompt: $(VLAN)#

Interface Config Mode — Many features are enabled for a particular interface. The Interface commands enable or modify the operation of an interface.

In this mode, a physical port is set up for a specific logical connection operation. The Interface Config mode provides access to

	the router interface configuration commands. The command prompt at this level is: **Command Prompt: $(Interface <slot/port>)#** The resulting prompt for the interface configuration command entered in the Global Configuration mode is shown below: **$(Config)# interface 2/1** **$(Interface 2/1)#**
Line Config Mode	This mode allows the operator to configure the console interface. The operator may configure the interface from the directly connected console or the virtual terminal used with Telnet. The command prompt at this level is: **Command Prompt: $(Line)#**
Policy Map Mode	Use the policy-map command to access the QoS policy map configuration mode to configure the QoS policy map. **$(Config)# policy-map** **Command Prompt: $(Config policy-map)#**
Policy Class Mode	Use the "class" command to access the QoS policy- classmap mode to configure the QoS policy map. **$(Config-policy-map)# class** **Command Prompt: $(Config - policy-classmap)#**
Class Map Mode	This mode consists of class creation/deletion and matching commands. The class match commands specify layer 2, layer 3 and general match criteria. Use the class-map commands to access the QoS class map configuration mode to configure QoS class maps. **$(Config)# class map** **Command Prompt: $(Config - class)#**
Router Config OSPF Mode	In this mode, the operator is allowed to access the router OSPF configuration commands. The command prompt at this level is: **$(Config)# router ospf** **Command Prompt: $(Config-router)#**
Router Config RIP Mode	In this mode, the operator is allowed to access the router RIP configuration commands. The command prompt at this level is: **$(Config)# router rip** **Command Prompt: $(Config-router)#**
DHCP Pool Configuration Mode	Use the ip dhcp pool <pool-name> command to access the DHCP Pool Config Mode.

$(Config)# ip dhcp pool <pool-name>

Command Prompt: (Config-dhcp-pool)#

Flow of Operation

This section captures the flow of operation for the CLI:

1. The operator logs into the CLI session and enters the User Exec mode. In the User Exec mode the $(exec)> prompt is displayed on the screen.

The parsing process is initiated whenever the operator types a command and presses <ENTER>. The command tree is searched for the command of interest. If the command is not found, the output message indicates where the offending entry begins. For instance, command node A has the command **`"show arp brief"`** but the operator attempts to execute the command **`"show arpp brief"`** then the output message would be **$(exec)> show arpp brief**^. ***$%Invalid input detected at*** *'^'* ***marker.*** If the operator has given an invalid input parameter in the command, then the message conveys to the operator an invalid input was detected. The layout of the output is depicted below:

```
(exec) #show arpp brief
                ^
%Invalid input detected at '^' marker.
```

FIGURE 2. Syntax Error Message

After all the mandatory parameters are entered, any additional parameters entered are treated as optional parameters. If any of the parameters are not recognized a syntax error message will be displayed.

2. After the command is successfully parsed and validated, the control of execution goes to the corresponding CLI callback function.
3. For mandatory parameters, the command tree extends till the mandatory parameters make the leaf of the branch. The callback function is only invoked when all the mandatory parameters are provided. For optional parameters, the command tree extends till the mandatory parameters and the optional parameters make the leaf of the branch. However, the call back function is associated with the node where the mandatory parameters are fetched. The call back function then takes care of the optional parameters.

4. Once the control has reached the callback function, the callback function has complete information about the parameters entered by the operator.

“No” Form of a Command

"No" is a specific form of an existing command and does not represent a new or distinct command. Only the configuration commands are available in the "no"form. The behavior and the support details of the “no” form is captured as part of the mapping sheets. The mapping sheets are contained in the Appendix A, “IS CLI Mapping section.

Support for “No” Form

Almost every configuration command has a “no” form. In general, use the no form to reverse the action of a command or reset a value back to the default. For example, the “no shutdown interface’ configuration command reverses the shutdown of an interface. Use the command without the keyword no to re-enable a disabled feature or to enable a feature that is disabled by default.

Behavior of Command Help ("?")

The "no"form is treated as a specific form of an existing command and does not represent a new or distinct command. This implies that the behavior of the "?" and help text is the same for the “no” form:

- The help message is the same for all forms of the command. The help string may be augmented with details about the "no" form behavior.
- For the (no config interface?) and (no config inte?) cases of the "?", the options displayed are identical to the case when the "no" token is not specified.

Chapter 8
Switching Commands

This chapter provides detailed explanation of the Switching commands. The commands are divided into five functional groups:

- Show commands display switch settings, statistics, and other information.
- Configuration Commands configure features and options of the switch. For every configuration command there is a show command that displays the configuration setting.
- Copy commands transfers or saves configuration and informational files to and from the switch.
- Clear commands clear some or all of the settings to factory defaults.

This chapter includes the following configuration types:

- System information and statistics commands
- Management commands
- Device configuration commands
- User account management commands
- Security commands
- System utilities

System Information and Statistics Commands

show arp switch

This command displays connectivity between the switch and other devices. The Address Resolution Protocol (ARP) cache identifies the MAC addresses of the IP stations communicating with the switch.

Format	`show arp switch`
Mode	`Privileged EXEC`
MAC Address	A unicast MAC address for which the switch has forwarding and/or filtering information. The format is 6 two-digit hexadecimal

	numbers that are separated by colons, for example 01:23:45:67:89:AB
IP Address	The IP address assigned to each interface.
slot/port	Valid slot number and a valid port number.

show eventlog

This command displays the event log, which contains error messages from the system. The event log is not cleared on a system reset.

Format	`show eventlog`
Mode	`Privileged EXEC`
File	The file in which the event originated.
Line	The line number of the event
Task Id	The task ID of the event.
Code	The event code.
Time	The time this event occurred.

Note: Event log information is retained across a switch reset.

show hardware

This command displays inventory information for the switch.

Format	`show hardware`
Mode	`Privileged EXEC`
Switch Description	Text used to identify the product name of this switch.
Machine Type	Specifies the machine model as defined by the Vital Product Data.
Machine Model	Specifies the machine model as defined by the Vital Product Data.
Serial Number	The unique box serial number for this switch.
FRU Number	The field replaceable unit number.
Part Number	Manufacturing part number.
Maintenance Level	Indicates hardware changes that are significant to software.
Manufacturer	Manufacturer descriptor field.

Burned in MAC Address Universally assigned network address.

Software Version The release.version.revision number of the code currently running on the switch.

Operating System The operating system currently running on the switch.

Network Processing Element The type of the processor microcode.

Additional Packages This displays the additional packages that are incorporated into this system, such as 7300 Series L3 Switch BGP-4, or 7300 Series L3 Switch Multicast.

show interface

This command displays a summary of statistics for a specific port or a count of all CPU traffic based upon the argument.

Format `show interface {<slot/port> | switchport}`

Mode `Privileged EXEC`

The display parameters when the argument is ' <slot/port>' is as follows:

Packets Received Without Error The total number of packets (including broadcast packets and multicast packets) received by the processor.

Packets Received With Error The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.

Broadcast Packets Received The total number of packets received that were directed to the broadcast address. Note that this does not include multicast packets.

Packets Transmitted Without Error The total number of packets transmitted out of the interface.

Transmit Packets Errors The number of outbound packets that could not be transmitted because of errors.

Collisions Frames The best estimate of the total number of collisions on this Ethernet segment.

Time Since Counters Last Cleared The elapsed time, in days, hours, minutes, and seconds since the statistics for this port were last cleared.

The display parameters when the argument is 'switchport' is as follows:

Packets Received Without Error The total number of packets (including broadcast packets and multicast packets) received by the processor.

Broadcast Packets Received The total number of packets received that were directed to the broadcast address. Note that this does not include multicast packets.

Packets Received With Error The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.

Packets Transmitted Without Error The total number of packets transmitted out of the interface.

Broadcast Packets Transmitted The total number of packets that higher-level protocols requested to be transmitted to the Broadcast address, including those that were discarded or not sent.

Transmit Packet Errors The number of outbound packets that could not be transmitted because of errors.

Address Entries Currently In Use The total number of Forwarding Database Address Table entries now active on the switch, including learned and static entries.

VLAN Entries Currently In Use The number of VLAN entries presently occupying the VLAN table.

Time Since Counters Last Cleared The elapsed time, in days, hours, minutes, and seconds since the statistics for this switch were last cleared.

show interface ethernet

This command displays detailed statistics for a specific port or for all CPU traffic based upon the argument.

Format **show interface ethernet {<*slot/port*> | *switchport}***

Mode `Privileged EXEC`

The display parameters when the argument is ' <slot/port>' is as follows:

Packets Received **Octets Received** - The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). This object can be used as a reasonable estimate of ethernet utilization. If greater precision is desired, the etherStatsPkts and etherStatsOctets objects should be sampled before and after a common interval. ----- The result of

this equation is the value Utilization which is the percent utilization of the ethernet segment on a scale of 0 to 100 percent.

Packets Received < 64 Octets - The total number of packets (including bad packets) received that were < 64 octets in length (excluding framing bits but including FCS octets).

Packets Received 64 Octets - The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).

Packets Received 65-127 Octets - The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received 128-255 Octets - The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received 256-511 Octets - The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received 512-1023 Octets - The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received 1024-1518 Octets - The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received 1519-1522 Octets - The total number of packets (including bad packets) received that were between 1519 and 1522 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received > 1522 Octets - The total number of packets received that were longer than 1522 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.

Packets Received Successfully

Total - The total number of packets received that were without errors.

Unicast Packets Received - The number of subnetwork-unicast packets delivered to a higher-layer protocol.

Multicast Packets Received - The total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.

Broadcast Packets Received - The total number of good packets received that were directed to the broadcast address. Note that this does not include multicast packets.

Packets Received with MAC Errors

Total - The total number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.

Jabbers Received - The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Note that this definition of jabber is different than the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.

Fragments/Undersize Received - The total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets).

Alignment Errors - The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with a non-integral number of octets.

Rx FCS Errors - The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with an integral number of octets

Overruns - The total number of frames discarded as this port was overloaded with incoming packets, and could not keep up with the inflow.

Received Packets not forwarded

Total - A count of valid frames received which were discarded (i.e. filtered) by the forwarding process.

Local Traffic Frames - The total number of frames dropped in the forwarding process because the destination address was located off of this port.

802.3x Pause Frames Received - A count of MAC Control frames received on this interface with an opcode indicating the PAUSE operation. This counter does not increment when the interface is operating in half-duplex mode.

Unacceptable Frame Type - The number of frames discarded from this port due to being an unacceptable frame type.

VLAN Membership Mismatch - The number of frames discarded on this port due to ingress filtering.

VLAN Viable Discards - The number of frames discarded on this port when a lookup on a particular VLAN occurs while that entry in the VLAN table is being modified, or if the VLAN has not been configured.

Multicast Tree Viable Discards - The number of frames discarded when a lookup in the multicast tree for a VLAN occurs while that tree is being modified.

Reserved Address Discards - The number of frames discarded that are destined to an IEEE 802.1 reserved address and are not supported by the system.

Broadcast Storm Recovery - The number of frames discarded that are destined for FF:FF:FF:FF:FF:FF when Broadcast Storm Recovery is enabled.

CFI Discards - The number of frames discarded that have CFI bit set and the addresses in RIF are in non-canonical format.

Upstream Threshold - The number of frames discarded due to lack of cell descriptors available for that packet's priority level.

Packets Transmitted Octets

Total Bytes - The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). This object can be used as a reasonable estimate of ethernet utilization. If greater precision is desired, the etherStatsPkts and etherStatsOctets objects should be sampled before and after a common interval. -----

Packets Transmitted 64 Octets - The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).

Packets Transmitted 65-127 Octets - The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Transmitted 128-255 Octets - The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Transmitted 256-511 Octets - The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Transmitted 512-1023 Octets - The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Transmitted 1024-1518 Octets - The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Transmitted 1519-1522 Octets - The total number of packets (including bad packets) received that were between 1519 and 1522 octets in length inclusive (excluding framing bits but including FCS octets).

Max Info - The maximum size of the Info (non-MAC) field that this port will receive or transmit.

Packets Transmitted Successfully

Total - The number of frames that have been transmitted by this port to its segment.

Unicast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.

Multicast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to a Multicast address, including those that were discarded or not sent.

Broadcast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to the Broadcast address, including those that were discarded or not sent.

Transmit Errors

Total Errors - The sum of Single, Multiple, and Excessive Collisions.

Tx FCS Errors - The total number of packets transmitted that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with an integral number of octets

Oversized - The total number of frames that exceeded the max permitted frame size. This counter has a max increment rate of 815 counts per sec. at 10 Mb/s.

Underrun Errors - The total number of frames discarded because the transmit FIFO buffer became empty during frame transmission.

Transmit Discards

Total Discards - The sum of single collision frames discarded, multiple collision frames discarded, and excessive frames discarded.

Single Collision Frames - A count of the number of successfully transmitted frames on a particular interface for which transmission is inhibited by exactly one collision.

Multiple Collision Frames - A count of the number of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision.

Excessive Collisions - A count of frames for which transmission on a particular interface fails due to excessive collisions.

Port Membership - The number of frames discarded on egress for this port due to egress filtering being enabled.

VLAN Viable Discards - The number of frames discarded on this port when a lookup on a particular VLAN occurs while that entry in the VLAN table is being modified, or if the VLAN has not been configured.

Protocol Statistics

BPDU's received - The count of BPDU's (Bridge Protocol Data Units) received in the spanning tree layer.

BPDU's Transmitted - The count of BPDU's (Bridge Protocol Data Units) transmitted from the spanning tree layer.

802.3x Pause Frames Received - A count of MAC Control frames received on this interface with an opcode indicating the PAUSE operation. This counter does not increment when the interface is operating in half-duplex mode.

GVRP PDU's Received - The count of GVRP PDU's received in the GARP layer.

GVRP PDU's Transmitted - The count of GVRP PDU's transmitted from the GARP layer.

GVRP Failed Registrations - The number of times attempted GVRP registrations could not be completed.

GMRP PDU's received - The count of GMRP PDU's received in the GARP layer.

GMRP PDU's Transmitted - The count of GMRP PDU's transmitted from the GARP layer.

GMRP Failed Registrations - The number of times attempted GMRP registrations could not be completed.

STP BPDUs Transmitted - Spanning Tree Protocol Bridge Protocol Data Units sent

STP BPDUs Received - Spanning Tree Protocol Bridge Protocol Data Units received

RST BPDUs Transmitted - Rapid Spanning Tree Protocol Bridge Protocol Data Units sent

RSTP BPDUs Received - Rapid Spanning Tree Protocol Bridge Protocol Data Units received

MSTP BPDUs Transmitted - Multiple Spanning Tree Protocol Bridge Protocol Data Units sent

MSTP BPDUs Received - Multiple Spanning Tree Protocol Bridge Protocol Data Units received

Dot1x Statistics

EAPOL Frames Received - The number of valid EAPOL frames of any type that have been received by this authenticator.

EAPOL Frames Transmitted - The number of EAPOL frames of any type that have been transmitted by this authenticator.

Time Since Counters Last Cleared The elapsed time, in days, hours, minutes, and seconds since the statistics for this port were last cleared.

The display parameters when the argument is ‘switchport’ is as follows:

Octets Received - The total number of octets of data received by the processor (excluding framing bits but including FCS octets).

Total Packets Received Without Error- The total number of packets (including broadcast packets and multicast packets) received by the processor.

Unicast Packets Received - The number of subnetwork-unicast packets delivered to a higher-layer protocol.

Multicast Packets Received - The total number of packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.

Broadcast Packets Received - The total number of packets received that were directed to the broadcast address. Note that this does not include multicast packets.

Receive Packets Discarded - The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.

Octets Transmitted - The total number of octets transmitted out of the interface, including framing characters.

Packets Transmitted without Errors - The total number of packets transmitted out of the interface.

Unicast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.

Multicast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to a Multicast address, including those that were discarded or not sent.

Broadcast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to the Broadcast address, including those that were discarded or not sent.

Transmit Packets Discarded - The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer

protocol. A possible reason for discarding a packet could be to free up buffer space.

Most Address Entries Ever Used - The highest number of Forwarding Database Address Table entries that have been learned by this switch since the most recent reboot.

Address Entries in Use - The number of Learned and static entries in the Forwarding Database Address Table for this switch.

Maximum VLAN Entries - The maximum number of Virtual LANs (VLANs) allowed on this switch.

Most VLAN Entries Ever Used - The largest number of VLANs that have been active on this switch since the last reboot.

Static VLAN Entries - The number of presently active VLAN entries on this switch that have been created statically.

Dynamic VLAN Entries - The number of presently active VLAN entries on this switch that have been created by GVRP registration.

VLAN Deletes - The number of VLANs on this switch that have been created and then deleted since the last reboot.

Time Since Counters Last Cleared The elapsed time, in days, hours, minutes, and seconds, since the statistics for this switch were last cleared.

show logging

This command displays the trap log maintained by the switch.

The trap log contains a maximum of 256 entries that wrap.

Format `show logging`

Mode `Privileged EXEC`

Number of Traps since last reset The number of traps that have occurred since the last reset of this device.

Number of Traps since log last displayed The number of traps that have occurred since the traps were last displayed. Getting the traps by any method (terminal interface display, Web display, upload file from switch etc.) will result in this counter being cleared to 0.

Log The sequence number of this trap.

System Up Time	The relative time since the last reboot of the switch at which this trap occurred.
Trap	The relevant information of this trap.

Note: Trap log information is not retained across a switch reset.

show mac-addr-table

This command displays the forwarding database entries. If the command is entered with no parameter, the entire table is displayed. This is the same as entering the optional *all* parameter. Alternatively, the administrator can enter a MAC Address to display the table entry for the requested MAC address and all entries following the requested MAC address.

Format	`show mac-addr-table [<macaddr> | all]`
Mode	`Privileged EXEC`
Mac Address	A unicast MAC address for which the switch has forwarding and or filtering information. The format is 6 or 8 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. In an IVL system the MAC address will be displayed as 8 bytes. In an SVL system, the MAC address will be displayed as 6 bytes.
slot/port	The port which this address was learned.
if Index	This object indicates the ifIndex of the interface table entry associated with this port.
Status	The status of this entry. The meanings of the values are: **Static** The value of the corresponding instance was added by the system or a user when a static MAC filter was defined. It cannot be relearned. **Learned** The value of the corresponding instance was learned by observing the source MAC addresses of incoming traffic, and is currently in use. **Management** The value of the corresponding instance (system MAC address) is also the value of an existing instance of dot1dStaticAddress. It is identified with interface 0/1 and is currently used when enabling VLANs for routing. **Self** The value of the corresponding instance is the address of one of the switch's physical interfaces (the system's own MAC address).

GMRP Learned The value of the corresponding was learned via GMRP and applies to Multicast.

Other The value of the corresponding instance does not fall into one of the other categories.

show msglog

This command displays the message log maintained by the switch. The message log contains system trace information.

The trap log contains a maximum of 256 entries that wrap.

Format	`show msglog`
Mode	`Privileged EXEC`
Message	The message that has been logged.

Note: Message log information is not retained across a switch reset.

show running-config

This command is used to display the current setting of different protocol packages supported on switch. This command displays only those parameters, the values of which differ from default value. The output is displayed in the script format, which can be used to configure another switch with same configuration.

Format	`show running-config`
Mode	`Privileged EXEC`

show sysinfo

This command displays switch information.

Format	`show sysinfo`
Mode	`Privileged EXEC`
Switch Description	Text used to identify this switch.
System Name	Name used to identify the switch.
System Location	Text used to identify the location of the switch. May be up to 31 alpha-numeric characters. The factory default is blank.

System Contact	Text used to identify a contact person for this switch. May be up to 31 alpha-numeric characters. The factory default is blank.
System ObjectID	The base object ID for the switch's enterprise MIB.
System Up Time	The time in days, hours and minutes since the last switch reboot.
MIBs Supported	A list of MIBs supported by this agent.

snmp-server

This command sets the name and the physical location of the switch, and the organization responsible for the network.The range for name, location and contact is from 1 to 31 alphanumeric characters.

Default	None
Format	**`snmp-server {sysname <name> | location <loc> | contact <con>}`**
Mode	**`Global Config`**

Management VLAN Commands

network mgmt_vlan

This command configures the Management VLAN ID.

Default	1
Format	**`network mgmt_vlan <1-4094>`**
Mode	**`Privileged EXEC`**

Dot1P Commands

classofservice dot1pmapping

This command maps an 802.1p priority to an internal traffic class for a device when in 'Global Config' mode. The number of available traffic classes may vary with the platform. Userpriority and trafficclass can both be the range from 1-7. Under 'Interface Config' mode, this command maps an 802.1p priority to an internal traffic class for a specific interface. The command (in either modes) is only available on platforms that support priority to traffic class mapping on a 'per-port' basis, and the number of available traffic classes may vary with the platform.

Format `classofservice dot1pmapping <userpriority> <traffic-class>`

Mode `Global Config or Interface Config`

show classofservice dot1pmapping

This command displays the current 802.1p priority mapping to internal traffic classes for a specific interface. The slot/port parameter is required on platforms that support priority to traffic class mapping on a 'per-port' basis.

Platforms that support priority to traffic class mapping on a per-port basis:

Format `show classofservice dot1pmapping <slot/port>`

*Platforms that **do not** support priority to traffic class mapping on a per-port basis:*

Format `Show classofservice dot1pmapping`

Mode `Privileged EXEC and User EXEC`

vlan port priority all

This command configures the port priority assigned for untagged packets for all ports presently plugged into the device. The range for the priority is 0-7. Any subsequent per port configuration will override this configuration setting.

Format `vlan port priority all <priority>`

Mode `Global Config`

vlan priority

This command configures the default 802.1p port priority assigned for untagged packets for a specific interface. The range for the priority is 0-7

Default	`0`
Format	`vlan priority <priority>`
Mode	`Interface Config`

LAG/Port-Channel (802.3ad) Commands

port-channel staticcapability

This command enables the support of port-channels (static link aggregations - LAGs) on the device. By default, the static capability for all port-channels is disabled.

Default	Disabled
Format	`port-channel staticcapability`
Mode	`Global Config`

no port-channel staticcapability

This command disables the support of static port-channels (link aggregations - LAGs) on the device.

Default	Disabled
Format	`no port-channel staticcapability`
Mode	`Global Config`

show port-channel brief

This command displays the static capability of all port-channels (LAGs) on the device as well as a summary of individual port-channels.

Format	`show port-channel brief`
Mode	`Privileged EXEC and User EXEC`

Static Capability	This field displays whether or not the device has static capability enabled.
For each port-channel the following information is displayed:	
Name	This field displays the name of the port-channel.
Link State	This field indicates whether the link is up or down.
Mbr Ports	This field lists the ports that are members of this port-channel, in slot/port notation.
Active Ports	This field lists the ports that are actively participating in this port-channel.

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Management Commands

These commands manage the switch and show current management settings.

bridge aging-time

This command configures the forwarding database address aging timeout in seconds. In an IVL system, the [fdbid/all] parameter is required. In an SVL system, the [fdbid/all] parameter is not used and will be ignored if entered.

Default	300
Format	**`bridge aging-time <10-1,000,000> [fdbid | all]`**
Mode	**`Global Config`**
Seconds	The <seconds> parameter must be within the range of 10 to 1,000,000 seconds.
Forwarding Database ID	Fdbid (Forwarding database ID) indicates which forwarding database's aging timeout is being configured. All is used to configure all forwarding database's agetime. In an SVL system, the [fdbid/all] parameter is not used and will be ignored if entered.

no bridge aging-time

This command sets the forwarding database address aging timeout to 300 seconds. In an IVL system, the [fdbid/all] parameter is required. In an SVL system, the [fdbid/all] parameter is not used and will be ignored if entered.

Format `no bridge aging-time [fdbid | all]`

Mode `Global Config`

Forwarding Database ID Fdbid (Forwarding database ID) indicates which forwarding database's aging timeout is being configured. All is used to configure all forwarding database's agetime. In an SVL system, the [fdbid/all] parameter is not used and will be ignored if entered.

mtu

This command sets the maximum transmission unit (MTU) size (in bytes) for physical and port-channel (LAG) interfaces. For the standard implementation, the range of <mtusize> is a valid integer between 1522-9216.

Default 1522

Format `mtu <1522-9216>`

Mode `Interface Config`

no mtu

This command sets the default maximum transmission unit (MTU) size (in bytes) for the interface.

Format `no mtu`

Mode `Interface Config`

network javamode

This command specifies whether or not the switch should allow access to the Java applet in the header frame of the Web interface. When access is enabled, the Java applet can be viewed from the Web interface. When access is disabled, the user cannot view the Java applet.

Default `Enabled`

Format `network javamode`

Mode `Privileged EXEC`

no network javamode

This command disallows access to the Java applet in the header frame of the Web interface. When access is disabled, the user cannot view the Java applet.

Format `no network javamode`

Mode `Privileged EXEC`

network mac-address

This command sets locally administered MAC addresses. The following rules apply:

- Bit 6 of byte 0 (called the U/L bit) indicates whether the address is universally administered (b'0') or locally administered (b'1').
- Bit 7 of byte 0 (called the I/G bit) indicates whether the destination address is an individual address (b'0') or a group address (b'1').
- The second character, of the twelve character macaddr, must be 2, 6, A or E.

A locally administered address must have bit 6 On (b'1') and bit 7 Off (b'0').

Format `network mac-address <macaddr>`

Mode `Privileged EXEC`

network mac-type

This command specifies whether the burned in MAC address or the locally-administered MAC address is used.

Default `burnedin`

Format `network mac-type {local | burnedin}`

Mode `Privileged EXEC`

no network mac-type

This command resets the value of MAC address to its default.

Format `no network mac-type`

Mode `Privileged EXEC`

network parms

This command sets the IP Address, subnet mask and gateway of the router. The IP Address and the gateway must be on the same subnet.

Format `network parms <ipaddr> <netmask> [<gateway>]`

Mode **Privileged EXEC**

network protocol

This command specifies the network configuration protocol to be used. If you modify this value change is effective immediately.

Default **None**

Format **network protocol {*none* | *bootp* | *dhcp*},** where **bootp** indicates that the switch periodically sends requests to a Bootstrap Protocol (BootP) server or a dhcp server until a response is received. **none** indicates that the switch should be manually configured with IP information.

Mode **Privileged EXEC**

remotecon maxsessions

This command specifies the maximum number of remote connection sessions that can be established. A value of 0 indicates that no remote connection can be established. The range is 0 to 5.

Default **5**

Format **remotecon maxsessions <*0-5*>**

Mode **Privileged EXEC**

no remotecon maxsessions

This command sets the maximum number of remote connection sessions that can be established to the default value.

Default **5**

Format **no remotecon maxsessions**

Mode **Privileged EXEC**

remotecon timeout

This command sets the remote connection session timeout value, in minutes. A session is active as long as the session has been idle for the value set. A value of 0 indicates that a session remains active indefinitely. The time is a decimal value from 0 to 160.

Note: Changing the timeout value for active sessions does not become effective until the session is reaccessed. Any keystroke will also activate the new timeout duration.

Default **5**

Format **remotecon timeout *<0-160>***

Mode **Privileged EXEC**

no remotecon timeout

This command sets the remote connection session timeout value, in minutes, to the default.

Note: Changing the timeout value for active sessions does not become effective until the session is reaccessed. Any keystroke will also activate the new timeout duration.

Default **5**

Format **no remotecon timeout**

Mode **Privileged EXEC**

serial baudrate

This command specifies the communication rate of the terminal interface. The supported rates are 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200.

Default 9600

Format **serial baudrate {1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200}**

Mode **Line Config**

no serial baudrate

This command sets the communication rate of the terminal interface to 9600.

Format **no serial baudrate**

Mode **Line Config**

serial timeout

This command specifies the maximum connect time (in minutes) without console activity. A value of 0 indicates that a console can be connected indefinitely. The time range is 0 to 160.

Default 5

Format `serial timeout <0 - 160>`

Mode `Line Config`

no serial timeout

This command sets the maximum connect time (in minutes) without console activity to 5.

Format `no serial timeout`

Mode `Line Config`

set prompt

This command changes the name of the prompt. The length of name may be up to 64 alphanumeric characters.

Format `set prompt <prompt string>`

Mode `Privileged EXEC`

show forwardingdb agetime

This command displays the timeout for address aging. In an IVL system, the [fdbid | all] parameter is required. In an SVL system, the [fdbid | all] parameter is not used and will be ignored if entered.

Default `all`

Format `show forwardingdb agetime [fdbid | all]`

Mode `Privileged EXEC`

Forwarding DB ID Fdbid (Forwarding database ID) indicates the forwarding database whose aging timeout is to be shown. The all option is used to display the aging timeouts associated with all forwarding databases. This field displays the forwarding database ID in an IVL system. This field will not be displayed in an SVL system.

Agetime Displays the address aging timeout for the associated forwarding database in IVL. In an SVL system, this will display the system's address aging timeout value in seconds.

show network

This command displays configuration settings associated with the switch's network interface. The network interface is the logical interface used for in-band connectivity with the switch via any of the switch's front panel ports. The configuration parameters associated with the switch's network interface do not affect the configuration of the front panel ports through which traffic is switched or routed.

Format `show network`

Mode `Privileged EXEC and User EXEC`

IP Address The IP address of the interface. The factory default value is 0.0.0.0

Subnet Mask The IP subnet mask for this interface. The factory default value is 0.0.0.0

Default Gateway The default gateway for this IP interface. The factory default value is 0.0.0.0

Burned In MAC Address The burned in MAC address used for in-band connectivity.

Locally Administered MAC Address If desired, a locally administered MAC address can be configured for in-band connectivity. To take effect, 'MAC Address Type' must be set to 'Locally Administered'. Enter the address as twelve hexadecimal digits (6 bytes) with a colon between each byte. Bit 1 of byte 0 must be set to a 1 and bit 0 to a 0, i.e. byte 0 should have the following mask 'xxxx xx10'. The MAC address used by this bridge when it must be referred to in a unique fashion. It is recommended that this be the numerically smallest MAC address of all ports that belong to this bridge. However it is only required to be unique. When concatenated with dot1dStpPriority a unique BridgeIdentifier is formed which is used in the Spanning Tree Protocol.

MAC Address Type Specifies which MAC address should be used for in-band connectivity. The choices are the burned in or the Locally Administered address. The factory default is to use the burned in MAC address.

Network Configuration Protocol Current Indicates which network protocol is being used. The options are bootp | dhcp | none.

Java Mode Specifies if the switch should allow access to the Java applet in the header frame. Enabled means the applet can be viewed. The factory default is disabled.

Management VLAN ID Specifies the management VLAN ID.

show remotecon

This command displays telnet settings.

Format `show remotecon`

Mode `Privileged EXEC and User EXEC`

Remote Connection Login Timeout (minutes) This object indicates the number of minutes a remote connection session is allowed to remain inactive before being logged off.A zero means there will be no timeout. May be specified as a number from 0 to 160. The factory default is 5.

Maximum Number of Remote Connection Sessions This object indicates the number of simultaneous remote connection sessions allowed. The factory default is 5.

Allow New Telnet Sessions Indicates that new telnet sessions will not be allowed when set to no. The factory default value is yes.

show serial

This command displays serial communication settings for the switch.

Format `show serial`

Mode `Privileged EXEC and User EXEC`

Serial Port Login Timeout (minutes) Specifies the time, in minutes, of inactivity on a Serial port connection, after which the Switch will close the connection. Any numeric value between 0 and 160 is allowed, the factory default is 5. A value of 0 disables the timeout.

Baud Rate The default baud rate at which the serial port will try to connect. The available values are 1200, 2400, 4800, 9600, 19200,

	38400,57600, and 115200 baud. The factory Default is 9600 baud.
Character Size	The number of bits in a character. The number of bits is always 8.
Flow Control	Whether Hardware Flow-Control is enabled or disabled. Hardware Flow Control is always disabled.
Stop Bits	The number of Stop bits per character. The number of Stop bits is always 1.
Parity Type	The Parity Method used on the Serial Port. The Parity Method is always None.

show serviceport

This command displays service port configuration information.

Format	`show serviceport`
Mode	`Privileged EXEC`
IP Address	The IP address of the interface. The factory default value is 0.0.0.0
Subnet Mask	The IP subnet mask for this interface. The factory default value is 0.0.0.0
Default Gateway	The default gateway for this IP interface. The factory default value is 0.0.0.0
ServPort Configuration Protocol Current	Indicates what network protocol was used on the last, or current power-up cycle, if any.
Burned in MAC Address	The burned in MAC address used for in-band connectivity.

show snmpcommunity

This command displays SNMP community information.

Six communities are supported. You can add, change, or delete communities. The switch does not have to be reset for changes to take effect.

The SNMP agent of the switch complies with SNMP Version 1 (for more about the SNMP specification, see the SNMP RFCs). The SNMP agent sends traps through TCP/IP to an external SNMP manager based on the SNMP configuration (the trap receiver and other SNMP community parameters).

Format	`show snmpcommunity`
Mode	`Privileged EXEC`
SNMP Community Name	The community string to which this entry grants access. A valid entry is a case-sensitive alphanumeric string of up to 16 characters. Each row of this table must contain a unique community name.
Client IP Address -	An IP address (or portion thereof) from which this device will accept SNMP packets with the associated community. The requesting entity's IP address is ANDed with the Subnet Mask before being compared to the IP Address. **Note:** That if the Subnet Mask is set to 0.0.0.0, an IP Address of 0.0.0.0 matches all IP addresses. The default value is 0.0.0.0
Client IP Mask -	A mask to be ANDed with the requesting entity's IP address before comparison with IP Address. If the result matches with IP Address then the address is an authenticated IP address. For example, if the IP Address = 9.47.128.0 and the corresponding Subnet Mask = 255.255.255.0 a range of incoming IP addresses would match, i.e. the incoming IP Address could equal 9.47.128.0 - 9.47.128.255. The default value is 0.0.0.0
Access Mode	The access level for this community string.
Status	The status of this community access entry.

show snmptrap

This command displays SNMP trap receivers. Trap messages are sent across a network to an SNMP Network Manager. These messages alert the manager to events occurring within the switch or on the network. Six trap receivers are simultaneously supported.

Format	`show snmptrap`
Mode	`Privileged EXEC`
SNMP Trap Name	The community string of the SNMP trap packet sent to the trap manager. This may be up to 16 alphanumeric characters. This string is case sensitive.
IP Address	The IP address to receive SNMP traps from this device. Enter 4 numbers between 0 and 255 separated by periods.

Status	A pull down menu that indicates the receiver's status(enabled or disabled) and allows the administrator/user to perform actions on this user entry: **Enable** - send traps to the receiver **Disable** - do not send traps to the receiver. **Delete** - remove the table entry.

show trapflags

This command displays trap conditions. Configure which traps the switch should generate by enabling or disabling the trap condition. If a trap condition is enabled and the condition is detected, the switch's SNMP agent sends the trap to all enabled trap receivers. The switch does not have to be reset to implement the changes. Cold and warm start traps are always generated and cannot be disabled.

Format	`show trapflags`
Mode	`Privileged EXEC`
Authentication Flag	May be enabled or disabled. The factory default is enabled. Indicates whether authentication failure traps will be sent.
Link Up/Down Flag	May be enabled or disabled. The factory default is enabled. Indicates whether link status traps will be sent. Multiple Users Flag.
Multiple Users Flag	May be enabled or disabled. The factory default is enabled. Indicates whether a trap will be sent when the same user ID is logged into the switch more than once at the same time (either via telnet or serial port).
Spanning Tree Flag	May be enabled or disabled. The factory default is enabled. Indicates whether spanning tree traps will be sent.
Broadcast Storm Flag	May be enabled or disabled. The factory default is enabled. Indicates whether broadcast storm traps will be sent.
DVMRP Traps	May be enabled or disabled. The factory default is disabled. Indicates whether DVMRP traps will be sent.
OSPF Traps	May be enabled or disabled. The factory default is disabled. Indicates whether OSPF traps will be sent.
PIM Traps	May be enabled or disabled. The factory default is disabled. Indicates whether PIM traps will be sent.

snmp-server community

This command adds (and names) a new SNMP community. A community name is a name associated with the switch and with a set of SNMP managers that manage it with a specified privileged level. The length of name can be up to 16 case-sensitive characters.

Note: Community names in the SNMP community table must be unique. If you make multiple entries using the same community name, the first entry is kept and processed and all duplicate entries are ignored.

Default	Two default community names: Public and Private. You can replace these default community names with unique identifiers for each community. The default values for the remaining four community names are blank.
Format	`snmp-server community <name>`
Mode	`Global Config`

no snmp-server community

This command removes this community name from the table. The name is the community name to be deleted.

Format	`no snmp-server community <name>`
Mode	`Global Config`

snmp-server community ipaddr

This command sets a client IP address for an SNMP community. The address is the associated community SNMP packet sending address and is used along with the client IP mask value to denote a range of IP addresses from which SNMP clients may use that community to access the device. A value of 0.0.0.0 allows access from any IP address. Otherwise, this value is ANDed with the mask to determine the range of allowed client IP addresses. The name is the applicable community name.

Default	**0.0.0.0**
Format	`snmp-server community ipaddr <ipaddr> <name>`
Mode	`Global Config`

no snmp-server community ipaddr

This command sets a client IP address for an SNMP community to **0.0.0.0**. The name is the applicable community name.

Format `no snmp-server community ipaddr <name>`

Mode `Global Config`

snmp-server community ipmask

This command sets a client IP mask for an SNMP community. The address is the associated community SNMP packet sending address and is used along with the client IP address value to denote a range of IP addresses from which SNMP clients may use that community to access the device. A value of 255.255.255.255 will allow access from only one station, and will use that machine's IP address for the client IP Address. A value of 0.0.0.0 will allow access from any IP address. The name is the applicable community name.

Default 0.0.0.0

Format `snmp-server community ipmask <ipmask> <name>`

Mode `Global Config`

no snmp-server community ipmask

This command sets a client IP mask for an SNMP community to **0.0.0.0**. The name is the applicable community name. The community name may be up to 16 alphanumeric characters.

Format `no snmp-server community ipmask <name>`

Mode `Global Config`

snmp-server community mode

This command activates an SNMP community. If a community is enabled, an SNMP manager associated with this community manages the switch according to its access right. If the community is disabled, no SNMP requests using this community are accepted. In this case the SNMP manager associated with this community cannot manage the switch until the Status is changed back to Enable.

Default The default private and public communities are enabled by default. The four undefined communities are disabled by default.

Format `snmp-server community mode <name>`

Mode `Global Config`

no snmp-server community mode

This command deactivates an SNMP community. If the community is disabled, no SNMP requests using this community are accepted. In this case the SNMP manager associated with this community cannot manage the switch until the Status is changed back to Enable.

Format `no snmp-server community mode <name>`

Mode `Global Config`

snmp-server community ro

This command restricts access to switch information. The access mode is read-only (also called public).

Format `snmp-server community ro <name>`

Mode `Global Config`

snmp-server community rw

This command restricts access to switch information. The access mode is read/write (also called private).

Format `snmp-server community rw <name>`

Mode `Global Config`

snmp-server enable traps

This command enables the Authentication Flag.

Default `Enabled`

Format `snmp-server enable traps`

Mode `Global Config`

no snmp-server enable traps

This command disables the Authentication Flag.

Format `no snmp-server enable traps`

Mode `Global Config`

snmp-server enable traps bcaststorm

This command enables the broadcast storm trap. When enabled, broadcast storm traps are sent only if the broadcast storm recovery mode setting associated with the port is enabled.

Default `Enabled`

Format `snmp-server enable traps bcaststorm`

Mode `Global Config`

no snmp-server enable traps bcaststorm

This command disables the broadcast storm trap. When enabled, broadcast storm traps are sent only if the broadcast storm recovery mode setting associated with the port is enabled.

Format `no snmp-server enable traps bcaststorm`

Mode `Global Config`

snmp-server enable traps linkmode

This command enables Link Up/Down traps for the entire switch. When enabled, link traps are sent only if the Link Trap flag setting associated with the port is enabled (see ‘snmp trap link-status’ command).

Default `Enabled`

Format `snmp-server enable traps linkmode`

Mode `Global Config`

no snmp-server enable traps linkmode

This command disables Link Up/Down traps for the entire switch.

Format `no snmp-server enable traps linkmode`

Mode `Global Config`

snmp-server enable traps multiusers

This command enables Multiple User traps. When the traps are enabled, a Multiple User Trap is sent when a user logs in to the terminal interface (EIA 232 or telnet) and there is an existing terminal interface session.

Default	`Enabled`
Format	`snmp-server enable traps multiusers`
Mode	`Global Config`

no snmp-server enable traps multiusers

This command disables Multiple User traps.

Format	`no snmp-server enable traps multiusers`
Mode	`Global Config`

snmp-server enable traps stpmode

This command enables the sending of new root traps and topology change notification traps.

Default	`Enabled`
Format	`snmp-server enable traps stpmode`
Mode	`Global Config`

no snmp-server enable traps stpmode

This command disables the sending of new root traps and topology change notification traps.

Format	`no snmp-server enable traps stpmode`
Mode	`Global Config`

snmptrap

This command adds an SNMP trap name. The maximum length of name is 16 case-sensitive alphanumeric characters.

Default	The default name for the six undefined community names is Delete.
Format	`snmptrap <name> <ipaddr>`

Mode `Global Config`

no snmptrap

This command deletes trap receivers for a community.

Format `no snmptrap <name> <ipaddr>`

Mode `Global Config`

snmptrap ipaddr

This command assigns an IP address to a specified community name. The maximum length of name is 16 case-sensitive alphanumeric characters.

Note: IP addresses in the SNMP trap receiver table must be unique. If you make multiple entries using the same IP address, the first entry is retained and processed. All duplicate entries are ignored.

Format `snmptrap ipaddr <name> <ipaddrold> <ipaddrnew>`

Mode `Global Config`

snmptrap mode

This command activates or deactivates an SNMP trap. Enabled trap receivers are active (able to receive traps). Disabled trap receivers are inactive (not able to receive traps).

Format `snmptrap mode <name> <ipaddr>`

Mode `Global Config`

no snmptrap mode

This command deactivates an SNMP trap. Disabled trap receivers are inactive (not able to receive traps).

Format `no snmptrap mode <name> <ipaddr>`

Mode `Global Config`

telnet

This command regulates new telnet sessions. If sessions are enabled, new telnet sessions can be established until there are no more sessions available. If sessions are disabled, no new telnet sessions are established. An established session remains active until the session is ended or an abnormal network error ends it.

Default	**Enabled**
Format	**telnet**
Mode	**Privileged EXEC**

no telnet

This command disables telnet sessions. If sessions are disabled, no new telnet sessions are established.

Format	**no telnet**
Mode	**Privileged EXEC**

HTTP Commands

ip http secure-port

This command is used to set the sslt port where port can be 1-65535 and the default is port 443.

Default	443
Format	**ip http secure-port <portid>**
Mode	**Privileged EXEC**

no ip http secure-port

This command is used to reset the sslt port to the default value.

Format	**no ip http secure-port**
Mode	**Privileged EXEC**

ip http secure-protocol

This command is used to set protocol levels (versions). The protocol level can be set to TLS1, SSL3 or to both TLS1 and SSL3.

Default	SSL3 and TLS1
Format	`ip http secure-protocol [SSL3] [TLS1]`
Mode	`Privileged EXEC`

no ip http secure-protocol

This command is used to remove protocol levels (versions) for secure HTTP.

Format	`no ip http secure-protocol [SSL3] [TLS1]`
Mode	`Privileged EXEC`

ip http secure-server

This command is used to enable the secure socket layer for secure HTTP.

Default	Disabled
Format	`ip http secure-server`
Mode	`Privileged EXEC`

no ip http secure-server

This command is used to disable the secure socket layer for secure HTTP.

Format	`ip http secure-server`
Mode	`Privileged EXEC`

ip http server

This command enables access to the switch through the Web interface. When access is enabled, the user can login to the switch from the Web interface. When access is disabled, the user cannot login to the switch's Web server.

Disabling the Web interface takes effect immediately. All interfaces are effected.

Default `enabled`

Format `ip http server`

Mode `Privileged EXEC`

no ip http server

This command disables access to the switch through the Web interface. When access is disabled, the user cannot login to the switch's Web server.

Default enabled

Format `no ip http server`

Mode `Privileged EXEC`

show ip http

This command displays the http settings for the switch.

Format `show ip http`

Mode `Privileged EXEC`

Secure-Server Administrative Mode This field indicates whether the administrative mode of secure HTTP is enabled or disabled.

Secure Protocol Level The protocol level may have the values of SSL3, TSL1, or both SSL3 and TSL1.

Secure Port This field specifies the port configured for SSLT.

HTTP Mode THis field indicates whether the HTTP mode is enabled or disabled.

Secure Shell (SSH) Commands

ip ssh

This command is used to enable SSH.

Default Disabled

Format `ip ssh`

Mode `Privileged EXEC`

no ip ssh

This command is used to disable SSH.

Format	`no ip ssh`
Mode	`Privileged EXEC`

ip ssh protocol

This command is used to set or remove protocol levels (or versions) for SSH. Either SSH1 (1), SSH2 (2), or both SSH 1 and SSH 2 (1 and 2) can be set.

Default	1 and 2
Format	`ip ssh protocol [1] [2]`
Mode	`Privileged EXEC`

show ip ssh

This command displays the ssh settings.

Format	`show ip ssh`
Mode	`Privileged EXEC`
Administrative Mode	This field indicates whether the administrative mode of SSH is enabled or disabled.
Protocol Level	The protocol level may have the values of version 1, version 2 or both versions 1 and version 2.

Connections This field specifies the current ssh connections.

Device Configuration Commands

addport

This command adds one port to the port-channel (LAG). The first interface is a logical slot and port number of a configured port-channel.

Note: Before adding a port to a port-channel, set the physical mode of the port. See ‘speed’ command.

Format	**addport** <*logical slot/port*>
Mode	**Interface Config**

auto-negotiate

This command enables automatic negotiation on a port. The default value is enable.

Format	**auto-negotiate**
Mode	**Interface Config**

no auto-negotiate

This command disables automatic negotiation on a port.

Format	**no auto-negotiate**
Mode	**Interface Config**

auto-negotiate all

This command enables automatic negotiation on all ports. The default value is enable.

Format	**auto-negotiate all**
Mode	**Global Config**

no auto-negotiate all

This command disables automatic negotiation on all ports.

Format	**no auto-negotiate all**
Mode	**Global Config**

delete interface

This command deletes an existing port-channel (LAG) from the configuration. The interface is a logical slot and port for a configured port-channel. The **all** option removes all configured port-channels (LAGs).

Format	**delete interface {**<*logical slot/port*>	*all}*
Mode	**Interface Config**

deleteport

This command deletes the port from the port-channel (LAG). The interface is a logical slot and port number of a configured port-channel.

Format	**deleteport** <*logical slot/port*>
Mode	**Interface Config**

deleteport

This command deletes all configured ports from the port-channel (LAG). The interface is a logical slot and port number of a configured port-channel.

Format	**deleteport** <*logical slot/port*> *all*
Mode	**Global Config**

monitor session

This command configures a probe port and a monitored port for monitor session (port monitoring). The first slot/port is the source monitored port and the second slot/port is the destination probe port. If this command is executed while port monitoring is enabled, it will have the effect of changing the probe and monitored port values.

Format	**monitor session source <***slot/port***> *destination* <***slot/port***>**
Mode	**Global Config**

no monitor session

This command removes the monitor session (port monitoring) designation from both the source probe port and the destination monitored port and removes the probe port from all VLANs. The port must be manually re-added to any desired VLANs.

Format	**no monitor session**
Mode	**Global Config**

monitor session mode

This command configures the monitor session (port monitoring) mode to enable. The probe and monitored ports must be configured before monitor session (port monitoring) can be enabled. If enabled, the probe port will monitor all traffic received and transmitted on the physical monitored port. It is not necessary to disable port monitoring before modifying the probe and monitored ports.

Default	Disabled
Format	`monitor session mode`
Mode	`Global Config`

no monitor session mode

This command sets the monitor session (port monitoring) mode to disable.

Format	`no monitor session mode`
Mode	`Global Config`

port lacpmode

This command enables Link Aggregation Control Protocol (LACP) on a port.

Default	`Disabled`
Format	`port lacpmode`
Mode	`Interface Config`

no port lacpmode

This command disables Link Aggregation Control Protocol (LACP) on a port.

Format	`no port lacpmode`
Mode	`Interface Config`

port lacpmode all

This command enables Link Aggregation Control Protocol (LACP) on all ports.

Format	`port lacpmode all`
Mode	`Global Config`

no port lacpmode all

This command disables Link Aggregation Control Protocol (LACP) on all ports.

Format	**no port lacpmode all**
Mode	**Global Config**

port-channel

This command configures a new port-channel (LAG) and generates a logical slot and port number for it. Display this number using the “show port-channel”.

Note: Before including a port in a port-channel, set the port physical mode. See ‘speed’ command.

Format	**port-channel** *<name>*
Mode	**Global Config**

port-channel adminmode

This command enables a port-channel (LAG). The interface is a logical slot and port for a configured port-channel. The option **all** sets every configured port-channel with the same administrative mode setting.

Format	**port-channel adminmode** *{<logical slot/port> | all}*
Mode	**Global Config**

no port-channel adminmode

This command disables a port-channel (LAG). The interface is a logical slot and port for a configured port-channel. The option **all** sets every configured port-channel with the same administrative mode setting.

Format	**no port-channel adminmode** *{<logical slot/port> | all}*
Mode	**Global Config**

port-channel linktrap

This command enables link trap notifications for the port-channel (LAG). The interface is a logical slot and port for a configured port-channel. The option **all** sets every configured port-channel with the same administrative mode setting.

Default	**Enabled**
Format	**port-channel linktrap {**<*logical slot/port*> | *all*}
Mode	**Global Config**

no port-channel linktrap

This command disables link trap notifications for the port-channel (LAG). The interface is a logical slot and port for a configured port-channel. The option **all** sets every configured port-channel with the same administrative mode setting.

Format	**no port-channel linktrap {**<*logical slot/port*> | *all*}
Mode	**GlobalConfig**

port-channel name

This command defines a name for the port-channel (LAG). The interface is a logical slot and port for a configured port-channel, and name is an alphanumeric string up to 15 characters. This command is used to modify the name that was associated with the port-channel when it was created.

Format	**port-channel name {**<*logical slot/port*> | *all*} <*name*>
Mode	**Global Config**

protocol group

This command attaches a <vlanid> to the protocol-based VLAN identified by <groupid>. A group may only be associated with one VLAN at a time, however the VLAN association can be changed.

Default	**none**
Format	**protocol group <groupid> <vlanid>**
Mode	**VLAN database**

no protocol group

This command removes the <vlanid> from this protocol-based VLAN group that is identified by this <*groupid*>.

Format	**no protocol group <groupid> <vlanid>**
Mode	**VLAN database**

protocol vlan group

This command adds the physical <slot/port> interface to the protocol-based VLAN identified by <groupid>. A group may have more than one interface associated with it. Each interface and protocol combination can only be associated with one group. If adding an interface to a group causes any conflicts with protocols currently associated with the group, this command will fail and the interface(s) will not be added to the group.

Default	`none`
Format	`protocol vlan group <groupid>`
Mode	`Interface Config`

no protocol vlan group

This command removes the <interface> from this protocol-based VLAN group that is identified by this <groupid>. If <all> is selected, all ports will be removed from this protocol group.

Format	`no protocol vlan group <groupid>`
Mode	`Interface Config`

protocol vlan group all

This command adds all physical interfaces to the protocol-based VLAN identified by <groupid>. A group may have more than one interface associated with it. Each interface and protocol combination can only be associated with one group. If adding an interface to a group causes any conflicts with protocols currently associated with the group, this command will fail and the interface(s) will not be added to the group.

Default	`none`
Format	`protocol vlan group all <groupid>`
Mode	`Global Config`

no protocol vlan group all

This command removes all interfaces from this protocol-based VLAN group that is identified by this <groupid>.

Format	`no protocol vlan group all <groupid>`
Mode	`Global Config`

set garp timer join

This command sets the GVRP join time per port and per GARP. Join time is the interval between the transmission of GARP Protocol Data Units (PDUs) registering (or re-registering) membership for a VLAN or multicast group.

This command has an effect only when GVRP is enabled. The time is from 10 to 100 (centiseconds)

Default 20 centiseconds (0.2 seconds)

Format *set garp timer join <10-100>*

Mode **Interface Config**

no set garp timer join

This command sets the GVRP join time per port and per GARP to 20 centiseconds (0.2 seconds). This command has an effect only when GVRP is enabled.

Format *no set garp timer join*

Mode **Interface Config**

set garp timer join all

This command sets the GVRP join time for all ports and per GARP. Join time is the interval between the transmission of GARP Protocol Data Units (PDUs) registering (or re-registering) membership for a VLAN or multicast group.

This command has an effect only when GVRP is enabled. The time is from 10 to 100 (centiseconds)

Default 20 centiseconds (0.2 seconds)

Format *set garp timer join all <10-100>*

Mode **Global Config**

no set garp timer join all

This command sets the GVRP join time for all ports and per GARP to 20 centiseconds (0.2 seconds). This command has an effect only when GVRP is enabled.

Format *no set garp timer join all*

Mode **Global Config**

set garp timer leave

This command sets the GVRP leave time per port. Leave time is the time to wait after receiving an unregister request for a VLAN or a multicast group before deleting the VLAN entry. This can be considered a buffer time for another station to assert registration for the same attribute in order to maintain uninterrupted service.time is 20 to 600 (centiseconds).

Note: This command has an effect only when GVRP is enabled.

Default	60 centiseconds (0.6 seconds)
Format	`set garp timer leave <20-600>`
Mode	`Interface Config`

no set garp timer leave

This command sets the GVRP leave time per port to 60 centiseconds (0.6 seconds).

Note: This command has an effect only when GVRP is enabled.

Format	`no set garp timer leave`
Mode	`Interface Config`

set garp timer leave all

This command sets the GVRP leave time for all ports. Leave time is the time to wait after receiving an unregister request for a VLAN or a multicast group before deleting the VLAN entry. This can be considered a buffer time for another station to assert registration for the same attribute in order to maintain uninterrupted service.time is 20 to 600 (centiseconds).

Note: This command has an effect only when GVRP is enabled.

Default	60 centiseconds (0.6 seconds)
Format	`set garp timer leave all <20-600>`
Mode	`Global Config`

no set garp timer leave all

This command sets the GVRP leave time for all ports to the default 60 centiseconds (0.6 seconds).

Note: This command has an effect only when GVRP is enabled.

Format	`no set garp timer leave all`

Mode `Global Config`

set garp timer leaveall

This command sets how frequently Leave All PDUs are generated per port. A Leave All PDU indicates that all registrations will be unregistered. Participants would need to rejoin in order to maintain registration. The value applies per port and per GARP participation. The time may range from 200 to 6000 (centiseconds).

Note: This command has an effect only when GVRP is enabled.

Default 1000 centiseconds (10 seconds)

Format `set garp timer leaveall <200-6000>`

Mode `Interface Config`

no set garp timer leaveall

This command sets how frequently Leave All PDUs are generated per port to 1000 centiseconds (10 seconds).

Note: This command has an effect only when GVRP is enabled.

Format `no set garp timer leaveall`

Mode `Interface Config`

set garp timer leaveall all

This command sets how frequently Leave All PDUs are generated for all ports. A Leave All PDU indicates that all registrations will be unregistered. Participants would need to rejoin in order to maintain registration. The value applies per port and per GARP participation. The time may range from 200 to 6000 (centiseconds).

Note: This command has an effect only when GVRP is enabled.

Default 1000 centiseconds (10 seconds)

Format `set garp timer leaveall all <200-6000>`

Mode `Global Config`

no set garp timer leaveall all

This command sets how frequently Leave All PDUs are generated for all ports to 1000 centiseconds (10 seconds).

Note: This command has an effect only when GVRP is enabled.

Format `no set garp timer leaveall all`

Mode `Global Config`

set gmrp adminmode

This command enables GARP Multicast Registration Protocol (GMRP) on the system. The default value is disable.

Format `set gmrp adminmode`

Mode `Privileged EXEC`

no set gmrp adminmode

This command disables GARP Multicast Registration Protocol (GMRP) on the system.

Format `no set gmrp adminmode`

Mode `Privileged EXEC`

set gmrp interfacemode

This command enables GARP Multicast Registration Protocol on a selected interface. If an interface which has GARP enabled is enabled for routing or is enlisted as a member of a port-channel (LAG), GARP functionality will be disabled on that interface. GARP functionality will subsequently be re-enabled if routing is disabled and port-channel (LAG) membership is removed from an interface that has GARP enabled.

Default Disabled

Format `set gmrp interfacemode`

Mode `Interface Config`

no set gmrp interfacemode

This command disables GARP Multicast Registration Protocol on a selected interface. If an interface which has GARP enabled is enabled for routing or is enlisted as a member of a port-channel (LAG), GARP functionality will be disabled on that interface. GARP functionality will subsequently be re-enabled if routing is disabled and port-channel (LAG) membership is removed from an interface that has GARP enabled.

Format `no set gmrp interfacemode`

Mode `Interface Config`

set gmrp interfacemode all

This command enables GARP Multicast Registration Protocol on all interfaces. If an interface which has GARP enabled is enabled for routing or is enlisted as a member of a port-channel (LAG), GARP functionality will be disabled on that interface. GARP functionality will subsequently be re-enabled if routing is disabled and port-channel (LAG) membership is removed from an interface that has GARP enabled.

Default Disabled

Format `set gmrp interfacemode all`

Mode `Global Config`

no set gmrp interfacemode all

This command disables GARP Multicast Registration Protocol on a selected interface.

Format `no set gmrp interfacemode all`

Mode `Global Config`

set gvrp adminmode

This command enables GVRP.

Default `Disabled`

Format `set gvrp adminmode`

Mode `Privileged EXEC`

no set gvrp adminmode

This command disables GVRP.

Format	`no set gvrp adminmode`
Mode	`Privileged EXEC`

set gvrp interfacemode

This command enables GVRP (GARP VLAN Registration Protocol) for a specific port.

Default	`Disabled`
Format	`set gvrp interfacemode`
Mode	`Interface Config`

no set gvrp interfacemode

This command disables GVRP (GARP VLAN Registration Protocol) for a specific port. If GVRP is disabled, Join Time, Leave Time and Leave All Time have no effect.

Format	`no set gvrp interfacemode`
Mode	`Interface Config`

set gvrp interfacemode all

This command enables GVRP (GARP VLAN Registration Protocol) for all ports.

Default	`Disabled`
Format	`set gvrp interfacemode all`
Mode	`Global Config`

no set gvrp interfacemode all

This command disables GVRP (GARP VLAN Registration Protocol) for all ports. If GVRP is disabled, Join Time, Leave Time and Leave All Time have no effect.

Format	`no set gvrp interfacemode all`
Mode	`Global Config`

set igmp

This command enables IGMP Snooping on the system. The default value is disable.

Note: The IGMP application supports the following:

- Global configuration or per interface configuration. Per VLAN configuration is unsupported in the IGMP snooping application.
- Validation of the IP header checksum (as well as the IGMP header checksum) and discarding of the frame upon checksum error.
- Maintenance of the forwarding table entries based on the MAC address versus the IP address.
- Flooding of unregistered multicast data packets to all ports in the VLAN.

Format `set igmp`

Mode `Global Config`

no set igmp

This command disables IGMP Snooping on the system.

Format `no set igmp`

Mode `Global Config`

set igmp

This command enables IGMP Snooping on a selected interface. If an interface which has IGMP Snooping enabled is enabled for routing or is enlisted as a member of a port-channel (LAG), IGMP Snooping functionality will be disabled on that interface. IGMP Snooping functionality will subsequently be re-enabled if routing is disabled or port-channel (LAG) membership is removed from an interface that has IGMP Snooping enabled.

Default Disabled

Format `set igmp`

Mode `Interface Config`

no set igmp

This command disables IGMP Snooping on a selected interface.

Format `no set igmp`

Mode `Interface Config`

set igmp groupmembershipinterval

This command sets the IGMP Group Membership Interval time on the system. The Group Membership Interval time is the amount of time in seconds that a switch will wait for a report from a particular group on a particular interface before deleting the interface from the entry. This value must be greater than the IGMP Maximum Response time value. The range is 1 to 3600 seconds.

Default	260 seconds
Format	`set igmp groupmembershipinterval <1-3600>`
Mode	`Global Config`

no set igmp groupmembershipinterval

This command sets the IGMP Group Membership Interval time on the system to 260 seconds.

Format	`no set igmp groupmembershipinterval`
Mode	`Global Config`

set igmp interfacemode all

This command enables IGMP Snooping on all interfaces. If an interface which has IGMP Snooping enabled is enabled for routing or is enlisted as a member of a port-channel (LAG), IGMP Snooping functionality will be disabled on that interface. IGMP Snooping functionality will subsequently be re-enabled if routing is disabled or port-channel (LAG) membership is removed from an interface that has IGMP Snooping enabled.

Default	Disabled
Format	`set igmp interfacemode all`
Mode	`Global Config`

no set igmp interfacemode all

This command disables IGMP Snooping on all interfaces.

Format	`no set igmp interfacemode all`
Mode	`Global Config`

set igmp maxresponse

This command sets the IGMP Maximum Response time on the system. The Maximum Response time is the amount of time in seconds that a switch will wait after sending a query on an interface because it did not receive a report for a particular group in that interface. This value must be less than the IGMP Query Interval time value. The range is 1 to 3600 seconds.

Default	10 seconds
Format	`set igmp maxresponse <1-3600>`
Mode	`Global Config`

no set igmp maxresponse

This command sets the IGMP Maximum Response time on the system to 10 seconds.

Format	`no set igmp maxresponse`
Mode	`Global Config`

set igmp mcrtrexpiretime

This command sets the Multicast Router Present Expiration time on the system. This is the amount of time in seconds that a switch will wait for a query to be received on an interface before the interface is removed from the list of interfaces with multicast routers attached. The range is 0 to 3600 seconds. A value of 0 indicates an infinite timeout, i.e. no expiration.

Default	**0**
Format	`set igmp mcrtexpiretime <0-3600>`
Mode	`Global Config`

no set igmp mcrtrexpiretime

This command sets the Multicast Router Present Expiration time on the system to 0. A value of 0 indicates an infinite timeout, i.e. no expiration.

Format	`no set igmp mcrtexpiretime`
Mode	`Global Config`

show garp

This command displays Generic Attributes Registration Protocol (GARP) information.

Format	`show garp`
Mode	`Privileged EXEC and User EXEC`
GMRP Admin Mode	This displays the administrative mode of GARP Multicast Registration Protocol (GMRP) for the system.
GVRP Admin Mode	This displays the administrative mode of GARP VLAN Registration Protocol (GVRP) for the system.

show gmrp configuration

This command displays Generic Attributes Registration Protocol (GARP) information for one or all interfaces.

Format	`show gmrp configuration {<slot/port> | all}`
Mode	`Privileged EXEC and User EXEC`
Interface	This displays the slot/port of the interface that this row in the table describes.
Join Timer	Specifies the interval between the transmission of GARP PDUs registering (or re-registering) membership for an attribute. Current attributes are a VLAN or multicast group. There is an instance of this timer on a per-Port, per-GARP participant basis. Permissible values are 10 to 100 centiseconds (0.1 to 1.0 seconds). The factory default is 20 centiseconds (0.2 seconds). The finest granularity of specification is 1 centisecond (0.01 seconds).
Leave Timer	Specifies the period of time to wait after receiving an unregister request for an attribute before deleting the attribute. Current attributes are a VLAN or multicast group. This may be considered a buffer time for another station to assert registration for the same attribute in order to maintain uninterrupted service. There is an instance of this timer on a per-Port, per-GARP participant basis. Permissible values are 20 to 600 centiseconds (0.2 to 6.0 seconds). The factory default is 60 centiseconds (0.6 seconds). The finest granularity of specification is 1 centisecond (0.01 seconds).
LeaveAll Timer	This Leave All Time controls how frequently LeaveAll PDUs are generated. A LeaveAll PDU indicates that all registrations will shortly be deregistered. Participants will need to rejoin in order to maintain registration. There is an instance of this timer on a per-

Port, per-GARP participant basis. The Leave All Period Timer is set to a random value in the range of LeaveAllTime to 1.5*LeaveAllTime. Permissible values are 200 to 6000 centiseconds (2 to 60 seconds). The factory default is 1000 centiseconds (10 seconds). The finest granularity of specification is 1 centisecond (0.01 seconds).

Port GMRP Mode Indicates the GMRP administrative mode for the port. It may be enabled or disabled. If this parameter is disabled, Join Time, Leave Time and Leave All Time have no effect. The factory default is disabled.

Port GVRP Mode Indicates the GVRP administrative mode for the port. It may be enabled or disabled. If this parameter is disabled, Join Time, Leave Time and Leave All Time have no effect. The factory default is disabled.

show gvrp configuration

This command displays Generic Attributes Registration Protocol (GARP) information for one or all interfaces.

Format `show gvrp configuration {<slot/port> | all}`

Mode `Privileged EXEC and User EXEC`

Interface This displays the slot/port of the interface that this row in the table describes.

Join Timer Specifies the interval between the transmission of GARP PDUs registering (or re-registering) membership for an attribute. Current attributes are a VLAN or multicast group. There is an instance of this timer on a per-Port, per-GARP participant basis. Permissible values are 10 to 100 centiseconds (0.1 to 1.0 seconds). The factory default is 20 centiseconds (0.2 seconds). The finest granularity of specification is 1 centisecond (0.01 seconds).

Leave Timer Specifies the period of time to wait after receiving an unregister request for an attribute before deleting the attribute. Current attributes are a VLAN or multicast group. This may be considered a buffer time for another station to assert registration for the same attribute in order to maintain uninterrupted service. There is an instance of this timer on a per-Port, per-GARP participant basis. Permissible values are 20 to 600 centiseconds (0.2 to 6.0

seconds). The factory default is 60 centiseconds (0.6 seconds). The finest granularity of specification is 1 centisecond (0.01 seconds).

LeaveAll Timer This Leave All Time controls how frequently LeaveAll PDUs are generated. A LeaveAll PDU indicates that all registrations will shortly be deregistered. Participants will need to rejoin in order to maintain registration. There is an instance of this timer on a per-Port, per-GARP participant basis. The Leave All Period Timer is set to a random value in the range of LeaveAllTime to 1.5*LeaveAllTime. Permissible values are 200 to 6000 centiseconds (2 to 60 seconds). The factory default is 1000 centiseconds (10 seconds). The finest granularity of specification is 1 centisecond (0.01 seconds).

Port GMRP Mode Indicates the GMRP administrative mode for the port. It may be enabled or disabled. If this parameter is disabled, Join Time, Leave Time and Leave All Time have no effect. The factory default is disabled.

Port GVRP Mode Indicates the GVRP administrative mode for the port. It may be enabled or disabled. If this parameter is disabled, Join Time, Leave Time and Leave All Time have no effect. The factory default is disabled.

show igmpsnooping

This command displays IGMP Snooping information. Configured information is displayed whether or not IGMP Snooping is enabled. Status information is only displayed when IGMP Snooping is enabled.

Format `show igmpsnooping`

Mode `Privileged EXEC`

Admin Mode This indicates whether or not IGMP Snooping is active on the switch.

Query Interval Time This displays the IGMP Query Interval Time. This is the amount of time a switch will wait for a report for a particular group on a particular interface before it sends a query on that interface. This value may be configured

Max Response Time This displays the amount of time the switch will wait after sending a query on an interface because it did not receive a report for a particular group on that interface. This value may be configured.

Multicast Router Present Expiration Time If a query is not received on an interface within this amount of time, the interface is removed from the list of interfaces with multicast routers attached. This value may be configured.

Interfaces Enabled for IGMP Snooping This is the list of interfaces on which IGMP Snooping is enabled.

The following status values are only displayed when IGMP Snooping is enabled.

Multicast Control Frame Count This displays the number of multicast control frames that are processed by the CPU.

show mac-address-table gmrp

This command displays the GARP Multicast Registration Protocol (GMRP) entries in the Multicast Forwarding Database (MFDB) table.

Format `show mac-address-table gmrp`

Mode `Privileged EXEC`

Mac Address A unicast MAC address for which the switch has forwarding and or filtering information. The format is 6 or 8 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. In an IVL system the MAC address will be displayed as 8 bytes. In an SVL system, the MAC address will be displayed as 6 bytes.

Type This displays the type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.

Description The text description of this multicast table entry.

Interfaces The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).

show mac-address-table igmpsnooping

This command displays the IGMP Snooping entries in the Multicast Forwarding Database (MFDB) table.

Format	`show mac-address-table igmpsnooping`
Mode	`Privileged EXEC`
Mac Address	A unicast MAC address for which the switch has forwarding and or filtering information. The format is 6 or 8 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. In an IVL system the MAC address will be displayed as 8 bytes. In an SVL system, the MAC address will be displayed as 6 bytes.
Type	This displays the type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.
Description	The text description of this multicast table entry.
Interfaces	The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).

show mac-address-table multicast

This command displays the Multicast Forwarding Database (MFDB) information. If the command is entered with no parameter, the entire table is displayed. This is the same as entering the optional *all* parameter. The user can display the table entry for one MAC Address by specifying the MAC address as an optional parameter.

Format	`show mac-address-table multicast [<macaddr> | all]`
Mode	`Privileged EXEC`
Mac Address	A unicast MAC address for which the switch has forwarding and or filtering information. The format is 6 or 8 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. In an IVL system the MAC address will be displayed as 8 bytes. In an SVL system, the MAC address will be displayed as 6 bytes.
Type	This displays the type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.

Component	The component that is responsible for this entry in the Multicast Forwarding Database. Possible values are IGMP Snooping, GMRP, and Static Filtering.
Description	The text description of this multicast table entry.
Interfaces	The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).
Forwarding Interfaces	The resultant forwarding list is derived from combining all the component's forwarding interfaces and removing the interfaces that are listed as the static filtering interfaces.

show mac-address-table static

This command displays the Static MAC Filtering information for all Static MAC Filters. If <all> is selected, all the Static MAC Filters in the system are displayed. If a macaddr is entered, a vlan must also be entered and the Static MAC Filter information will be displayed only for that MAC address and VLAN.

Format	`show mac-address-table static {<macaddr> <vlanid> | all}`
Mode	`Privileged EXEC`
MAC Address	Is the MAC Address of the static MAC filter entry.
VLAN ID	Is the VLAN ID of the static MAC filter entry.
Source Port(s)	Indicates the source port filter set's slot and port(s).
Destination Port(s)	Indicates the destination port filter set's slot and port(s).

show mac-address-table staticfiltering

This command displays the Static Filtering entries in the Multicast Forwarding Database (MFDB) table.

Format	`show mac-address-table staticfiltering`
Mode	`Privileged EXEC`
Mac Address	A unicast MAC address for which the switch has forwarding and or filtering information. The format is 6 or 8 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. In an IVL system the MAC address will be

displayed as 8 bytes. In an SVL system, the MAC address will be displayed as 6 bytes.

Type This displays the type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.

Description The text description of this multicast table entry.

Interfaces The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).

show mac-address-table stats

This command displays the Multicast Forwarding Database (MFDB) statistics.

Format `show mac-address-table stats`

Mode `Privileged EXEC`

Total Entries This displays the total number of entries that can possibly be in the Multicast Forwarding Database table.

Most MFDB Entries Ever Used This displays the largest number of entries that have been present in the Multicast Forwarding Database table. This value is also known as the MFDB high-water mark.

Current Entries This displays the current number of entries in the Multicast Forwarding Database table.

show monitor

This command displays the Port monitoring information for the system.

Format `show monitor`

Mode `Privileged EXEC`

Port Monitor Mode indicates whether the Port Monitoring feature is enabled or disabled. The possible values are enable and disable.

Probe Port slot/port is the slot/port that is configured as the probe port. If this value has not been configured, 'Not Configured' will be displayed.

Monitored Port slot/port is the slot/port that is configured as the monitored port. If this value has not been configured, 'Not Configured' will be displayed.

show port

This command displays port information.

Format	**show port {**<*slot/port*> | *all}*
Mode	**Privileged EXEC**
slot/port	The physical slot and physical port.
Type	If not blank, this field indicates that this port is a special type of port. The possible values are: **Mon** - this port is a monitoring port. Look at the Port Monitoring screens to find out more information. **Lag** - this port is a member of a port-channel (LAG). **Probe** - this port is a probe port.
Admin Mode	Selects the Port control administration state. The port must be enabled in order for it to be allowed into the network. - May be enabled or disabled. The factory default is enabled.
Physical Mode	Selects the desired port speed and duplex mode. If auto-negotiation support is selected, then the duplex mode and speed will be set from the auto-negotiation process. Note that the port's maximum capability (full duplex -100M) will be advertised. Otherwise, this object will determine the port's duplex mode and transmission rate. The factory default is Auto.
Physical Status	Indicates the port speed and duplex mode.
Link Status	Indicates whether the Link is up or down.
Link Trap	This object determines whether or not to send a trap when link status changes. The factory default is enabled.
LACP Mode	Displays whether LACP is enabled or disabled on this port.

show port protocol

This command displays the Protocol-Based VLAN information for either the entire system, or for the indicated Group.

Format	**show port protocol {<groupid> | all}**
Mode	**Privileged EXEC**

Group Name	This field displays the group name of an entry in the Protocol-based VLAN table.
Group ID	This field displays the group identifier of the protocol group.
Protocol(s)	This field indicates the type of protocol(s) for this group.
VLAN	This field indicates the VLAN associated with this Protocol Group.
Interface(s)	This field lists the slot/port interface(s) that are associated with this Protocol Group.

show port-channel

This command displays an overview of all port-channels (LAGs) on the switch.

Format	`show port-channel {<logical slot/port> | all}`
Mode	`Privileged EXEC`
Logical slot/port	The logical slot and the logical port.
Name	The name of this port-channel (LAG). You may enter any string of up to 15 alphanumeric characters.
Link State	Indicates whether the Link is up or down.
Admin Mode	May be enabled or disabled. The factory default is enabled.
Link Trap Mode	This object determines whether or not to send a trap when link status changes. The factory default is enabled.
STP Mode	The Spanning Tree Protocol Administrative Mode associated with the port or port-channel (LAG). The possible values are: **Disable** - Spanning tree is disabled for this port. **Enable** - Spanning tree is enabled for this port.
Mbr Ports	A listing of the ports that are members of this port-channel (LAG), in slot/port notation. There can be a maximum of eight ports assigned to a given port-channel (LAG).
Port Speed	Speed of the port-channel port.
Type	This field displays the status designating whether a particular port-channel (LAG) is statically or dynamically maintained. The possible values of this field are Static, indicating that the port-channel is statically maintained; and Dynamic, indicating that the port-channel is dynamically maintained.

Active Ports This field lists the ports that are actively participating in the port-channel (LAG).

show storm-control

This command displays switch configuration information.

Format `show storm-control`

Mode `Privileged EXEC`

Broadcast Storm Recovery Mode May be enabled or disabled. The factory default is disabled.

802.3x Flow Control Mode May be enabled or disabled. The factory default is disabled.

show vlan

This command displays detailed information, including interface information, for a specific VLAN.

Format `show vlan <vlanid>`, where the ID is a valid VLAN identification number

Mode `Privileged EXEC and User EXEC`

VLAN ID There is a VLAN Identifier (VID) associated with each VLAN. The range of the VLAN ID is 1 to 4094.

VLAN Name A string associated with this VLAN as a convenience. It can be up to 16 alphanumeric characters long, including blanks. The default is blank. VLAN ID 1 always has a name of `Default`. This field is optional.

VLAN Type Type of VLAN, which can be Default, (VLAN ID = 1), a static (one that is configured and permanently defined), or Dynamic (one that is created by GVRP registration).

slot/port Indicates by slot id and port number which port is controlled by the fields on this line. It is possible to set the parameters for all ports by using the selectors on the top line.

Current Determines the degree of participation of this port in this VLAN. The permissible values are:

Include - This port is always a member of this VLAN. This is equivalent to registration fixed in the IEEE 802.1Q standard.

	Exclude - This port is never a member of this VLAN. This is equivalent to registration forbidden in the IEEE 802.1Q standard. **Autodetect** - Specifies to allow the port to be dynamically registered in this VLAN via GVRP. The port will not participate in this VLAN unless a join request is received on this port. This is equivalent to registration normal in the IEEE 802.1Q standard.
Configured	Determines the configured degree of participation of this port in this VLAN. The permissible values are: **Include** - This port is always a member of this VLAN. This is equivalent to registration fixed in the IEEE 802.1Q standard. **Exclude** - This port is never a member of this VLAN. This is equivalent to registration forbidden in the IEEE 802.1Q standard. **Autodetect** - Specifies to allow the port to be dynamically registered in this VLAN via GVRP. The port will not participate in this VLAN unless a join request is received on this port. This is equivalent to registration normal in the IEEE 802.1Q standard.
Tagging	Select the tagging behavior for this port in this VLAN. **Tagged** - specifies to transmit traffic for this VLAN as tagged frames. **Untagged** - specifies to transmit traffic for this VLAN as untagged frames.

show vlan brief

This command displays a list of all configured VLANs.

Format	`show vlan brief`
Mode	`Privileged EXEC and User EXEC`
VLAN ID	There is a VLAN Identifier (vlanid)associated with each VLAN. The range of the VLAN ID is 1 to 4094.
VLAN Name	A string associated with this VLAN as a convenience. It can be up to 16 alphanumeric characters long, including blanks. The default is blank. VLAN ID 1 always has a name of `Default`. This field is optional.
VLAN Type	Type of VLAN, which can be Default, (VLAN ID = 1), a static (one that is configured and permanently defined), or a Dynamic (one that is created by GVRP registration).

show vlan port

This command displays VLAN port information.

Format `show vlan port {<slot/port> | all}`

Mode `Privileged EXEC and User EXEC`

slot/port Indicates by slot id and port number which port is controlled by the fields on this line. It is possible to set the parameters for all ports by using the selectors on the top line.

Port VLAN ID The VLAN ID that this port will assign to untagged frames or priority tagged frames received on this port. The value must be for an existing VLAN. The factory default is 1.

Acceptable Frame Types Specifies the types of frames that may be received on this port. The options are 'VLAN only' and 'Admit All'. When set to 'VLAN only', untagged frames or priority tagged frames received on this port are discarded. When set to 'Admit All', untagged frames or priority tagged frames received on this port are accepted and assigned the value of the Port VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance to the 802.1Q VLAN specification.

Ingress Filtering May be enabled or disabled. When enabled, the frame is discarded if this port is not a member of the VLAN with which this frame is associated. In a tagged frame, the VLAN is identified by the VLAN ID in the tag. In an untagged frame, the VLAN is the Port VLAN ID specified for the port that received this frame. When disabled, all frames are forwarded in accordance with the 802.1Q VLAN bridge specification. The factory default is disabled.

GVRP May May be enabled or disabled.

Default Priority The 802.1p priority assigned to tagged packets arriving on the port.

shutdown

This command disables a port.

Default `Enabled`

Format `shutdown`

Mode `Interface Config`

no shutdown

This command enables a port.

Format `no shutdown`

Mode `Interface Config`

shutdown all

This command disables all ports.

Default `Enabled`

Format `shutdown all`

Mode `Global Config`

no shutdown all

This command enables all ports.

Format `no shutdown` *`all`*

Mode `Global Config`

snmp trap link-status

This command enables link status traps by interface.

Note: This command is valid only when the Link Up/Down Flag is enabled. See ‘snmp-server enable traps linkmode’ command.

Format `snmp trap link-status`

Mode `Interface Config`

no snmp trap link-status

This command disables link status traps by interface.

Note: This command is valid only when the Link Up/Down Flag is enabled. See ‘snmp-server enable traps linkmode’ command).

Format `no snmp trap link-status`

Mode `Interface Config`

snmp trap link-status all

This command enables link status traps for all interfaces.

Note: This command is valid only when the Link Up/Down Flag is enabled (see "snmp-server enable traps linkmode").

Format `snmp trap link-status all`

Mode `Global Config`

no snmp trap link-status all

This command disables link status traps for all interfaces.

Note: This command is valid only when the Link Up/Down Flag is enabled (see "snmp-server enable traps linkmode").

Format `no snmp trap link-status all`

Mode `Global Config`

spanning-tree

This command sets the STP mode for a specific port-channel (LAG). This is the value specified for STP Mode on the Port Configuration Menu. 802.1D mode is the default. The interface is a logical slot and port for a configured port-channel. The **`all`** `option sets` all configured port-channels (LAGs) with the same option.

Format **`spanning-tree {`**<*`logical slot/port`*> | *`all`*`} {`*`off`* | *`802.1d`* | *`fast`*`}`

Mode `Global Config`

The mode is one of the following:

802.1d	IEEE 802.1D-compliant STP mode is used
fast	Fast STP mode is used
off	STP is turned off

spanning-tree bpdumigrationcheck

This command enables BPDU migration check on a given interface. The **all** option enables BPDU migration check on all interfaces.

Format **spanning-tree bpdumigrationcheck {**<*slot/port*> | *all}*

Mode **Global Config**

no spanning-tree bpdumigrationcheck

This command disables BPDU migration check on a given interface. The **all** option disables BPDU migration check on all interfaces.

Format **no spanning-tree bpdumigrationcheck {**<*slot/port*> | *all}*

Mode **Global Config**

speed

This command sets the speed and duplex setting for the interface.

Format **speed {***100* | *10} {half-duplex* | *full-duplex}* | *1000 full-duplex}*

Mode

Interface Config

Acceptable values are:

100h 100BASE-T half-duplex

100f 100BASE-T full duplex

10h 10BASE-T half duplex

10f 100BASE-T full duplex

speed all

This command sets the speed and duplex setting for all interfaces.

Format **speed all {***100* | *10} {half-duplex* | *full-duplex}* | *1000 full-duplex}*

Mode `Global Config`

Acceptable values are:

100h 100BASE-T half-duplex

100f 100BASE-T full duplex

10h 10BASE-T half duplex

10f 100BASE-T full duplex

storm-control broadcast

This command enables broadcast storm recovery mode. If the mode is enabled, broadcast storm recovery with high and low thresholds is implemented.

The threshold implementation follows a percentage pattern. If the broadcast traffic on any Ethernet port exceeds the high threshold percentage (as represented in “Broadcast Storm Recovery Thresholds” table) of the link speed, the switch discards the broadcasts traffic until the broadcast traffic returns to the low threshold percentage or less. The full implementation is depicted in the “Broadcast Storm Recovery Thresholds” table.

Table 8-1. Broadcast Storm Recovery Thresholds

Link Speed	High	Low
10M	20	10
100M	5	2
1000M	5	2

Format `switchconfig storm-control broadcast`

Mode `Global Covnfig`

no storm-control broadcast

This command disables broadcast storm recovery mode.

The threshold implementation follows a percentage pattern. If the broadcast traffic on any Ethernet port exceeds the high threshold percentage (as represented in “Broadcast Storm Recovery Thresholds” table) of the link speed, the switch discards the broadcasts traffic until the broadcast traffic returns to the low threshold percentage or less. The full implementation is depicted in the “Broadcast Storm Recovery Thresholds” table.

Table 8-2. Broadcast Storm Recovery Thresholds

Link Speed	High	Low
10M	20	10
100M	5	2
1000M	5	2

Format `no switchconfig storm-control broadcast`

Mode `Global Config`

storm-control flowcontrol

This command enables 802.3x flow control for the switch.

Note: This command only applies to full-duplex mode ports.

Default `Disabled`

Format `storm-control flowcontrol`

Mode `Global Config`

no storm-control flowcontrol

This command disables 802.3x flow control for the switch.

Note: This command only applies to full-duplex mode ports.

Format `no storm-control flowcontrol`

Mode `Global Config`

vlan

This command creates a new VLAN and assigns it an ID. The ID is a valid VLAN identification number (ID 1 is reserved for the default VLAN). VLAN range is 2-4094.

Format `vlan <2-4094>`

Mode `VLAN database`

no vlan

This command deletes an existing VLAN. The ID is a valid VLAN identification number (ID 1 is reserved for the default VLAN). VLAN range is 2-4094.

Format	`no vlan <2-4094>`
Mode	`VLAN database`

vlan acceptframe

This command sets the frame acceptance mode per interface. For VLAN Only mode, untagged frames or priority frames received on this interface are discarded. For Admit All mode, untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1Q VLAN Specification.

Default	`Admit All`
Format	`vlan acceptframe {vlanonly | all}`
Mode	`Interface Config`

no vlan acceptframe

This command sets the frame acceptance mode per interface to **Admit All**. For Admit All mode, untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1Q VLAN Specification.

Format	`vlan acceptframe {vlanonly | all}`
Mode	`Interface Config`

vlan ingressfilter

This command enables ingress filtering. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

Default	`Disabled`
Format	`vlan ingressfilter`
Mode	`Interface Config`

no vlan ingressfilter

This command disables ingress filtering. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

Format	`no vlan ingressfilter`
Mode	`Interface Config`

vlan makestatic

This command changes a dynamically created VLAN (one that is created by GVRP registration) to a static VLAN (one that is permanently configured and defined). The ID is a valid VLAN identification number. VLAN range is 2-4094.

Format	`vlan makestatic <2-4094>`
Mode	`VLAN database`

vlan name

This command changes the name of a VLAN. The name is an alphanumeric string of up to 16 characters, and the ID is a valid VLAN identification number. ID range is 1-4094.

Default	The name for VLAN ID 1 is always Default. The name for other VLANs is defaulted to a blank string.
Format	`vlan name <2-4094> <name>`
Mode	`VLAN database`

no vlan name

This command sets the name of a VLAN to a blank string. The VLAN ID is a valid VLAN identification number. ID range is 1-4094.

Format	`no vlan name <2-4094>`
Mode	`VLAN database`

vlan participation

This command configures the degree of participation for a specific interface in a VLAN. The ID is a valid VLAN identification number, and the interface is a valid interface number.

Format	**vlan participation {***exclude* | *include* | *auto}* *<1-4094>*
Mode	**Interface Config**

Participation options are:

include	The interface is always a member of this VLAN. This is equivalent to registration fixed.
exclude	The interface is never a member of this VLAN. This is equivalent to registration forbidden.
auto	The interface is dynamically registered in this VLAN by GVRP. The interface will not participate in this VLAN unless a join request is received on this interface. This is equivalent to registration normal.

vlan participation all

This command configures the degree of participation for all interfaces in a VLAN. The ID is a valid VLAN identification number.

Format	**vlan participation all {***exclude* | *include* | *auto}* *<1-4094>*
Mode	**Global Config**

Participation options are:

include	The interface is always a member of this VLAN. This is equivalent to registration fixed.
exclude	The interface is never a member of this VLAN. This is equivalent to registration forbidden.
auto	The interface is dynamically registered in this VLAN by GVRP. The interface will not participate in this VLAN unless a join request is received on this interface. This is equivalent to registration normal.

vlan port acceptframe all

This command sets the frame acceptance mode for all interfaces. For VLAN Only mode, untagged frames or priority frames received on this interface are discarded. For Admit All mode, untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1Q VLAN Specification.

Default `Admit All`

Format `vlan port acceptframe all {vlanonly | all}`

Mode `Global Config`

no vlan port acceptframe all

This command sets the frame acceptance mode for all interfaces to **Admit All**. For Admit All mode, untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1Q VLAN Specification.

Format `no vlan port acceptframe all {vlanonly | all}`

Mode `Global Config`

vlan port ingressfilter all

This command enables ingress filtering for all ports. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

Default `Disabled`

Format `vlan port ingressfilter all`

Mode `Global Config`

no vlan port ingressfilter all

This command disables ingress filtering for all ports. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

Format `no vlan port ingressfilter all`

Mode `Global Config`

vlan port pvid all

This command changes the VLAN ID for all interface.

Default `1`

Format `vlan port pvid all <1-4094>`

Mode `Global Config`

no vlan port pvid all

This command sets the VLAN ID for all interfaces to 1.

Format `no vlan port pvid all <1-4094>`

Mode `Global Config`

vlan port tagging all

This command configures the tagging behavior for all interfaces in a VLAN to enabled. If tagging is enabled, traffic is transmitted as tagged frames. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

Format `vlan port tagging all <1-4094>`

Mode `Global Config`

no vlan port tagging all

This command configures the tagging behavior for all interfaces in a VLAN to disabled. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

Format `no vlan port tagging all <1-4094>`

Mode `Global Config`

vlan protocol group

This command adds protocol-based VLAN group to the system. The <*groupName*> is a character string of 1 to 16 characters. When it is created, the protocol group will be assigned a unique number that will be used to identify the group in subsequent commands.

Format `vlan protocol group <groupname>`

Mode `Global Config`

vlan protocol group add protocol

This command adds the <protocol> to the protocol-based VLAN identified by <groupid>. A group may have more than one protocol associated with it. Each interface and protocol combination can only be associated with one group. If adding a protocol to a group causes any conflicts with interfaces currently associated with the group, this command will fail and the protocol will not be added to the group. The possible values for protocol are ip, arp, and ipx.

Default `none`

Format `vlan protocol group add protocol <groupid> <protocol>`

Mode `Global Config`

no vlan protocol group add protocol

This command removes the <protocol> from this protocol-based VLAN group that is identified by this <groupid>. The possible values for protocol are ip, arp, and ipx.

Format `no vlan protocol group add protocol <groupid> <protocol>`

Mode `Global Config`

vlan protocol group remove

This command removes the protocol-based VLAN group that is identified by this <groupid>.

Format `vlan protocol group remove <groupid>`

Mode `Global Config`

vlan pvid

This command changes the VLAN ID per interface.

Default `1`

Format `vlan pvid <1-4094>`

Mode `Interface Config`

no vlan pvid

This command sets the VLAN ID per interface to 1.

Format	**no vlan pvid <*1-4094*>**
Mode	**Interface Config**

vlan tagging

This command configures the tagging behavior for a specific interface in a VLAN to enabled. If tagging is enabled, traffic is transmitted as tagged frames. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

Format	**vlan tagging <*1-4094*>**
Mode	**Interface Config**

no vlan tagging

This command configures the tagging behavior for a specific interface in a VLAN to disabled. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

Format	**no vlan tagging <*1-4094*>**
Mode	**Interface Config**

Spanning Tree Commands

This section provides detailed explanation of the spanning tree commands. The commands are divided into two functional groups:

- Show commands display spanning tree settings, statistics, and other information.
- Configuration Commands configure features and options of the switch. For every configuration command there is a show command that displays the configuration setting.

show spanning-tree

This command displays spanning tree settings for the common and internal spanning tree, when the optional parameter “brief” is not included in the command. The following details are displayed.

Format	show spanning-tree [brief]
Mode	Privileged EXEC and User EXEC
Bridge Priority	Configured value.
Bridge Identifier	
Time Since Topology Change	in seconds
Topology Change Count	Number of times changed.
Topology Change	Boolean value of the Topology Change parameter for the switch indicating if a topology change is in progress on any port assigned to the common and internal spanning tree.
Designated Root	
Root Path Cost	Value of the Root Path Cost parameter for the common and internal spanning tree.
Root Port Identifier	
Root Port Max Age	Derived value
Root Port Bridge Forward Delay	Derived value
Hello Time	Configured value
Bridge Hold Time	Minimum time between transmission of Configuration Bridge Protocol Data Units (BPDUs)
CST Regional Root	
Regional Root Path Cost	
Associated FIDs	List of forwarding database identifiers currently associated with this instance.
Associated VLANs	List of VLAN IDs currenty associated with this instance.

When the “brief” optional parameter is included, this command displays spanning tree settings for the bridge. In this case, the following details are displayed.

Bridge Priority	Configured value.
Bridge Identifier	
Bridge Max Age	TConfigured value.
Bridge Hello Time	Configured value.
Bridge Forward Delay	Configured value.
Bridge Hold Time	Minimum time between transmission of Configuration Bridge Protocol Data Units (BPDUs)

show spanning-tree interface

This command displays the settings and parameters for a specific switch port within the common and internal spanning tree. The <slot/port> is the desired switch port. The following details are displayed on execution of the command.

Format show spanning-tree interface <slot/port>

Mode Privileged EXEC and User EXEC

Port mode Enabled or disabled.

Port Up Time Since Counters Last Cleared Time since port was reset, displayed in days, hours, minutes, and seconds.

STP BPDUs Transmitted Spanning Tree Protocol Bridge Protocol Data Units sent

STP BPDUs Received Spanning Tree Protocol Bridge Protocol Data Units received.

RST BPDUs Transmitted Rapid Spanning Tree Protocol Bridge Protocol Data Units sent

RST BPDUs Received Rapid Spanning Tree Protocol Bridge Protocol Data Units received.

MSTP BPDUs Transmitted Multiple Spanning Tree Protocol Bridge Protocol Data Units sent

MSTP BPDUs Received Multiple Spanning Tree Protocol Bridge Protocol Data Units received.

show spanning-tree mst detailed

This command displays settings and parameters for the specified multiple spanning tree instance. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance ID. The following details are displayed.

Format show spanning-tree mst detailed <mstid>

Mode Privileged EXEC and User EXEC

MST Instance ID

MST Bridge Priority

Time Since Topology Change in seconds

Topology Change Count Number of times the topology has changed for this multiple spanning tree instance.

Topology Change in Progress Value of the Topology Change parameter for the multiple spanning tree instance

Designated Root	Identifier of the Regional Root for this multiple spanning tree instance.
Root Path Cost	Path Cost to the Designated Root for this multiple spanning tree instance
Root Port Identifier	Port to access the Designated Root for this multiple spanning tree instance
Associated FIDs	List of forwarding database identifiers associated with this instance.
Associated VLANs	List of VLAN IDs associated with this instance.

show spanning-tree mst port detailed

This command displays the detailed settings and parameters for a specific switch port within a particular multiple spanning tree instance. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance. The <slot/port> is the desired switch port.

Format	show spanning-tree mst port detailed <mstid> <slot/port>
Mode	Privileged EXEC and User EXEC
MST Instance ID	
Port Identifier	
Port Priority	
Port Forwarding State	Current spanning tree state of this port
Port Role	
Port Path Cost	Configured value of the Internal Port Path Cost parameter
Designated Root	The Identifier of the designated root for this port.
Designated Port Cost	Path Cost offered to the LAN by the Designated Port
Designated Bridge	Bridge Identifier of the bridge with the Designated Port.
Designated Port Identifier	Port on the Designated Bridge that offers the lowest cost to the

LAN

If 0 (defined as the default CIST ID) is passed as the <mstid>, then this command displays the settings and parameters for a specific switch port within the common and internal spanning tree. The <slot/port> is the desired switch port. In this case, the followig are displayed.

Port Identifier	The port identifier for this port within the CST.
Port Priority	The priority of the port within the CST.
Port Forwarding State	The forwarding state of the port within the CST.
Port Role	The role of the specified interface within the CST.
Port Path Cost	The configured path cost for the specified interface.
Designated Root	Identifier of the designated root for this port within the CST.
Designated Port Cost	Path Cost offered to the LAN by the Designated Port.
Designated Bridge	The bridge containing the designated port
Designated Port Identifier	Port on the Designated Bridge that offers the lowest cost to the LAN
Topology Change Acknowledgement	Value of flag in next Configuration Bridge Protocol Data Unit (BPDU) transmission indicating if a topology change is in progress for this port.
Hello Time	The hello time in use for this port.
Edge Port	The configured value indicating if this port is an edge port.
Edge Port Status	The derived value of the edge port status. True if operating as an edge port; false otherwise.
Point To Point MAC Status	Derived value indicating if this port is part of a point to point link.
CST Regional Root	The regional root identifier in use for this port.
CST Port Cost	The configured path cost for this port.

show spanning-tree mst port summary

This command displays the settings of one or all ports within the specified multiple spanning tree instance. The parameter <mstid> indicates a particular MST instance. The parameter {<slot/port> | all} indicates the desired switch port or all ports.

If 0 (defined as the default CIST ID) is passed as the <mstid>, then the status summary is displayed for one or all ports within the common and internal spanning tree.

Format	show spanning-tree mst port summary <mstid> {<slot/port> | all}
Mode	Privileged EXEC and User EXEC
MST Instance ID	The MST instance associated with this port.

Slot/Port	The interface being displayed
Type	Currently not used.
STP State	The forwarding state of the port in the specified spanning tree instance
Port Role	The role of the specified port within the spanning tree.
Link Status	The operational status of the link. Possible values are “Up” or “Down”.
Link Trap	The link trap configuration for the specified interface.

show spanning-tree mst summary

This command displays summary information about all multiple spanning tree instances in the switch. On execution, the following details are displayed.

Format	show spanning-tree mst summary
Mode	Privileged EXEC and User EXEC
MST Instance ID List	List of multiple spanning trees IDs currently configured.
For each MSTID:	
Associated FIDs	List of forwarding database identifiers associated with this instance.
Associated VLANs	List of VLAN IDs associated with this instance.

show spanning-tree summary

This command displays spanning tree settings and parameters for the switch. The following details are displayed on execution of the command.

Format	show spanning-tree summary
Mode	Privileged EXEC and User EXEC
Spanning Tree Adminmode	Enabled or disabled.
Spanning Tree Version	Version of 802.1 currently supported (IEEE 802.1s, IEEE 802.1w, or IEEE 802.1d) based upon the Force Protocol Version parameter
Configuration Name	TConfigured name.
Configuration Revision Level	Configured value.

Configuration Digest Key Calculated value.

Configuration Format Selector Configured value.

MST Instances List of all multiple spanning tree instances configured on the switch

show spanning-tree vlan

This command displays the association between a VLAN and a multiple spanning tree instance. The <vlanid> corresponds to an existing VLAN ID.

Format show spanning-tree vlan <vlanid>

Mode Privileged EXEC and User EXEC

VLAN Identifier

Associated Instance Identifier for the associated multiple spanning tree instance or "CST" if associated with the common and internal spanning tree

spanning-tree

This command sets the spanning-tree operational mode to enabled.

Default Disabled

Format spanning-tree

Mode Global Config

no spanning-tree

This command sets the spanning-tree operational mode to disabled. While disabled, the spanning-tree configuration is retained and can be changed, but is not activated.

Format no spanning-tree

Mode Global Config

spanning-tree configuration name

This command sets the Configuration Identifier Name for use in identifying the configuration that this switch is currently using. The <name> is a string of at most 32 characters.

Default	The base MAC address displayed using hexadecimal notation as specified in IEEE 802 standard.
Format	spanning-tree configuration name <name>
Mode	Global Config

no spanning-tree configuration name

This command resets the Configuration Identifier Name to its default.

Format	no spanning-tree configuration name
Mode	Global Config

spanning-tree configuration revision

This command sets the Configuration Identifier Revision Level for use in identifying the configuration that this switch is currently using. The Configuration Identifier Revision Level is a number in the range of 0 to 65535.

Default	0
Format	spanning-tree configuration revision <0-65535>
Mode	Global Config

no spanning-tree configuration revision

This command sets the Configuration Identifier Revision Level for use in identifying the configuration that this switch is currently using to the default value, i.e. 0.

Format	no spanning-tree configuration revision
Mode	Global Config

spanning-tree edgeport

This command specifies that this port is an Edge Port within the common and internal spanning tree. This will allow this port to transition to Forwarding State without delay.

Format	spanning-tree edgeport
Mode	Interface Config

no spanning-tree edgeport

This command specifies that this port is not an Edge Port within the common and internal spanning tree.

Format no spanning-tree edgeport

Mode Interface Config

spanning-tree forceversion

This command sets the Force Protocol Version parameter to a new value. The Force Protocol Version can be one of the following:

- 802.1d - ST BPDUs are transmitted rather than MST BPDUs (IEEE 802.1d functionality supported)
- 802.1w - RST BPDUs are transmitted rather than MST BPDUs (IEEE 802.1w functionality supported)
- 802.1s - MST BPDUs are transmitted (IEEE 802.1s functionality supported)

Default 802.1s

Format spanning-tree forceversion <802.1d | 802.1w | 802.1s>

Mode Global Config

no spanning-tree forceversion

This command sets the Force Protocol Version parameter to the default value, i.e. 802.1s.

Format no spanning-tree forceversion

Mode Global Config

spanning-tree forward-time

This command sets the Bridge Forward Delay parameter to a new value for the common and internal spanning tree. The forward-time value is in seconds within a range of 4 to 30, with the value being greater than or equal to "(Bridge Max Age / 2) + 1".

Default 15

Format spanning-tree forward-time <4-30>

Mode Global Config

no spanning-tree forward-time

This command sets the Bridge Forward Delay parameter for the common and internal spanning tree to the default value, i.e. 15.

Format no spanning-tree forward-time

Mode Global Config

spanning-tree hello-time

This command sets the Hello Time parameter to a new value for the common and internal spanning tree. The hellotime <value> is in whole seconds within a range of 1 to 10 with the value being less than or equal to "(Bridge Max Age / 2) - 1".

Default 2

Format spanning-tree hello-time <1-10>

Mode Global Config

no spanning-tree hello-time

This command sets the Hello Time parameter for the common and internal spanning tree to the default value, i.e. 2.

Format no spanning-tree hello-time

Mode Global Config

spanning-tree max-age

This command sets the Bridge Max Age parameter to a new value for the common and internal spanning tree. The max-age value is in seconds within a range of 6 to 40, with the value being less than or equal to "2 times (Bridge Forward Delay - 1)".

Default 20

Format spanning-tree max-age <6-40>

Mode Global Config

no spanning-tree max-age

This command sets the Bridge Max Age parameter for the common and internal spanning tree to the default value, i.e. 20.

Format	no spanning-tree max-age
Mode	Global Config

spanning-tree mst

This command sets the Path Cost or Port Priority for this port within the multiple spanning tree instance or in the common and internal spanning tree. If the <mstid> parameter corresponds to an existing multiple spanning tree instance, then the configurations are done for that multiple spanning tree instance. If however 0 (defined as the default CIST ID) is passed as the <mstid>, then the configurations are performed for the common and internal spanning tree instance.

If the ‘cost’ token is specified, this command sets the path cost for this port within a multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter. The pathcost can be specified as a number in the range of 1 to 200000000 or auto. If "auto" is specified, the pathcost value will be set based on Link Speed.

If the ‘port-priority’ token is specified, this command sets the priority for this port within a specific multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter. The port-priority value is a number in the range of 0 to 240 in increments of 16.

Default	cost: auto
port-priorty	128
Format	spanning-tree mst <mstid> {cost {<1-200000000> | auto} | port-priority <0-240>}
Mode	Interface Config

no spanning-tree mst

This command sets the Path Cost or Port Priority for this port within the multiple spanning tree instance or in the common and internal spanning tree to the respective default values. If the <mstid> parameter corresponds to an existing multiple spanning tree instance, then the configurations are done for that multiple spanning tree instance. If however 0 (defined as the default CIST ID) is passed as the <mstid>, then the configurations are performed for the common and internal spanning tree instance.

If the ‘cost’ token is specified, this command sets the path cost for this port within a multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter, to the default value, i.e. a pathcost value based on the Link Speed.

If the ‘port-priority’ token is specified, this command sets the priority for this port within a specific multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter, to the default value, i.e. 128.

Format no spanning-tree mst <mstid> {cost | port-priority}

Mode Interface Config

spanning-tree mst instance

This command adds a multiple spanning tree instance to the switch. The instance <mstid> is a number within a range of 1 to 4094, that corresponds to the new instance ID to be added. The maximum number of multiple instances supported by the 7300 Series L3 Switch is 4.

Format spanning-tree mst instance <mstid>

Mode Global Config

no spanning-tree mst instance

This command removes a multiple spanning tree instance from the switch and reallocates all VLANs allocated to the deleted instance to the common and internal spanning tree. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance to be removed.

Format no spanning-tree mst instance <mstid>

Mode Global Config

spanning-tree mst priority

This command sets the bridge priority for a specific multiple spanning tree instance. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance. The priority value is a number within a range of 0 to 61440 in increments of 4096.

If 0 (defined as the default CIST ID) is passed as the <mstid>, then this command sets the Bridge Priority parameter to a new value for the common and internal spanning tree. The bridge priority value again is a number within a range of 0 to 61440. The twelve least significant bits will be masked according to the 802.1s specification. This will cause the priority to be rounded down to the next lower valid priority.

Default	32768
Format	spanning-tree mst priority <mstid> <0-61440>
Mode	Global Config

no spanning-tree mst priority

This command sets the bridge priority for a specific multiple spanning tree instance to the default value, i.e. 32768. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance.

If 0 (defined as the default CIST ID) is passed as the <mstid>, then this command sets the Bridge Priority parameter for the common and internal spanning tree to the default value, i.e. 32768.

Format	spanning-tree mst priority <mstid>
Mode	Global Config

spanning-tree mst vlan

This command adds an association between a multiple spanning tree instance and a VLAN. The VLAN will no longer be associated with the common and internal spanning tree. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance. The <vlanid> corresponds to an existing VLAN ID.

Format	spanning-tree mst vlan <mstid> <vlanid>
Mode	Global Config

no spanning-tree mst vlan

This command removes an association between a multiple spanning tree instance and a VLAN. The VLAN will again be associated with the common and internal spanning tree. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance. The <vlanid> corresponds to an existing VLAN ID.

Format	no spanning-tree mst vlan <mstid> <vlanid>

Mode Global Config

spanning-tree port mode

This command sets the Administrative Switch Port State for this port to enabled.

Default Disabled

Format spanning-tree port mode

Mode Interface Config

no spanning-tree port mode

This command sets the Administrative Switch Port State for this port to disabled.

Format no spanning-tree port mode

Mode Interface Config

spanning-tree port mode all

This command sets the Administrative Switch Port State for all ports to enabled.

Default Disabled

Format spanning-tree port mode all

Mode Global Config

no spanning-tree port mode all

This command sets the Administrative Switch Port State for all ports to disabled.

Format no spanning-tree port mode all

Mode Global Config

User Account Management Commands

These commands manage user accounts.

disconnect

This command closes a telnet session.

Format **disconnect {**<*sessionID*> | *all}*

Mode **Privileged EXEC**

show loginsession

This command displays current telnet and serial port connections to the switch.

Format **show loginsession**

Mode Privileged EXEC

ID Login Session ID

User Name The name the user will use to login using the serial port or Telnet. A new user may be added to the switch by entering a name in a blank entry. The user name may be up to 8 characters, and is not case sensitive. Two users are included as the factory default, admin and guest.

Connection From IP address of the telnet client machine or EIA-232 for the serial port connection.

Idle Time Time this session has been idle.

Session Time Total time this session has been connected.

show users

This command displays the configured user names and their settings. This command is only available for users with readwrite privileges. The SNMPv3 fields will only be displayed if SNMP is available on the system.

Format **show users**

Mode **Privileged EXEC**

User Name The name the user will use to login using the serial port, Telnet or Web. A new user may be added to the switch by entering a name in a blank entry. The user name may be up to eight characters, and is not case sensitive. Two users are included as the factory default, admin and guest

Access Mode	Shows whether the operator is able to change parameters on the switch (Read/Write) or is only able to view them (Read Only). As a factory default, admin has Read/Write access and guest has Read Only access. There can only be one Read/Write user and up to five Read Only users.
SNMPv3 AccessMode	This field displays the SNMPv3 Access Mode. If the value is set to **ReadWrite,** the SNMPv3 user will be able to set and retrieve parameters on the system. If the value is set to **ReadOnly,** the SNMPv3 user will only be able to retrieve parameter information. The SNMPv3 access mode may be different than the CLI and Web access mode.
SNMPv3 Authentication	This field displays the authentication protocol to be used for the specified login user.
SNMPv3 Encryption	This field displays the encryption protocol to be used for the specified login user.

users name

This command adds a new user (account) if space permits. The account <username> can be up to eight characters in length. The name may be comprised of alphanumeric characters as well as the dash (‘-’) and underscore (‘_’). The <username> is not case-sensitive.

Six user names can be defined.

Format	**users name <*username*>**
Mode	**Global Config**

no users name

This command removes an operator.

Format	**no users name <*username*>**
Mode	**Global Config**

Note: The admin user account cannot be deleted.

users passwd

This command changes the password of an existing operator. User password should not be more than eight characters in length. If a user is authorized for authentication or encryption is enabled, password must be eight alphanumeric characters in length. The username and password are not case-sensitive. When a password is changed, a prompt will ask for the operator's former password. If none, press enter.

Default	No Password
Format	**users passwd <***username***>**
Mode	**Global Config**

no users passwd

This command sets the password of an existing operator to blank. When a password is changed, a prompt will ask for the operator's former password. If none, press enter.

Format	**no users passwd <***username***>**
Mode	**Global Config**

users snmpv3 accessmode

This command specifies the snmpv3 access privileges for the specified login user. The valid accessmode values are **readonly** or **readwrite**. The <**username>** is the login user name for which the specified access mode will apply.

Default	**readwrite** for admin user; **readonly** for all other users
Format	**users snmpv3 accessmode <username> {readonly | read-write}**
Mode	**Global Config**

no users snmpv3 accessmode

This command sets the snmpv3 access privileges for the specified login user as **readwrite** for admin user; **readonly** for all other users. The <username> is the login user name for which the specified access mode will apply.

Format	**no users snmpv3 accessmode <username>**
Mode	**Global Config**

users snmpv3 authentication

This command specifies the authentication protocol to be used for the specified login user. The valid authentication protocols are **none**, **md5** or **sha**. If **md5** or **sha** are specified, the user login password will be used as the snmpv3 authentication password. The <username> is the login user name for which the specified authentication protocol will be used.

Default no authentication

Format **users snmpv3 authentication <username> {none | md5 | sha}**

Mode **Global Config**

no users snmpv3 authentication

This command sets the authentication protocol to be used for the specified login user to **none**. The <username> is the login user name for which the specified authentication protocol will be used.

Format **users snmpv3 authentication <username>**

Mode **Global Config**

users snmpv3 encryption

This command specifies the encryption protocol and key to be used for the specified login user. The valid encryption protocols are **none** or **des**. The **des** protocol requires a **key**, which can be specified on the command line. The **key** may be up to 16 characters long. If the **des** protocol is specified but a key is not provided, the user will be prompted for the key. If **none** is specified, a key must not be provided. The <username> is the login user name for which the specified encryption protocol will be used.

Default no encryption

Format **users snmpv3 encryption <username> {none | des [key]}**

Mode **Global Config**

no users snmpv3 encryption

This command sets the encryption protocol to **none**. The <username> is the login user name for which the specified encryption protocol will be used.

Format **no users snmpv3 encryption <username>**

Mode **Global Config**

Security Commands

This section describes commands used for configuring security settings for login users and port users.

authentication login

This command creates an authentication login list. The <**listname>** is up to 15 alphanumeric characters and is not case sensitive. Up to 10 authentication login lists can be configured on the switch. When a list is created, the authentication method "local" is set as the first method.

When the optional parameters "Option1", "Option2" and/or "Option3" are used, an ordered list of methods are set in the authentication login list. If the authentication login list does not exist, a new authentication login list os first created and then the authentication methods are set in the authentication login list. The maximum number of authentication login methods is three. The possible method values are **local, radius** and **reject**.

The value of **local** indicates that the user's locally stored ID and password are used for authentication. The value of **radius** indicates that the user's ID and password will be authenticated using the RADIUS server. The value of **reject** indicates that the user is never authenticated.

To authenticate a user, the authentication methods in the user's login will be attempted in order until an authentication attempt succeeds or fails.

Note that the default login list included with the default configuration can not be changed.

Format `authentication login <listname> [method1 [method2 [method3]]]`

Mode `Global Config`

no authentication login

This command deletes the specified authentication login list. The attempt to delete will fail if any of the following conditions are true:

- The login list name is invalid or does not match an existing authentication login list
- The specified authentication login list is assigned to any user or to the nonconfigured user for any component
- The login list is the default login list included with the default configuration and was not created using 'config authentication login create'. The default login list cannot be deleted.

Format	`no authentication login <listname>`
Mode	`Global Config`

clear dot1x statistics

This command resets the 802.1x statistics for the specified port or for all ports.

Format	clear dot1x statistics {<slot/port> | all}
Mode	Privileged EXEC

clear radius statistics

This command is used to clear all RADIUS statistics.

Format	clear radius statistics
Mode	Privileged EXEC

dot1x defaultlogin

This command assigns the authentication login list to use for non-configured users for 802.1x port security. This setting is over-ridden by the authentication login list assigned to a specific user if the user is configured locally. If this value is not configured, users will be authenticated using local authentication only.

Format	dot1x defaultlogin <listname>
Mode	Global Config

dot1x initialize

This command begins the initialization sequence on the specified port. This command is only valid if the control mode for the specified port is 'auto'. If the control mode is not 'auto' an error will be returned.

Format	dot1x initialize <slot/port>
Mode	Privileged EXEC

dot1x login

This command assigns the specified authentication login list to the specified user for 802.1x port security. The <user> parameter must be a configured user and the <listname> parameter must be a configured authentication login list.

Format dot1x login <user> <listname>

Mode Global Config

dot1x max-req

This command sets the maximum number of times the authenticator state machine on this port will transmit an EAPOL EAP Request/Identity frame before timing out the supplicant. The <count> value must be in the range 1 - 10.

Default 2

Format dot1x max-req <count>

Mode `Interface` Config

no dot1x max-req

This command sets the maximum number of times the authenticator state machine on this port will transmit an EAPOL EAP Request/Identity frame before timing out the supplicant to the default value, i.e. 2.

Format no dot1x max-req

Mode `Interface Config`

dot1x port-control

This command sets the authentication mode to be used on the specified port. . The control mode may be one of the following.

- ***force-unauthorized:*** The authenticator PAE unconditionally sets the controlled port to unauthorized.
- **force-authorized:** The authenticator PAE unconditionally sets the controlled port to authorized.
- ***auto:*** The authenticator PAE sets the controlled port mode to reflect the outcome of the authentication exchanges between the supplicant, authenticator and the authentication server.

Default	auto
Format	dot1x port-control {force-unauthorized | force-authorized | auto}
Mode	Interface Config

no dot1x port-control

This command sets the authentication mode to be used on the specified port to 'auto'.

Format	no dot1x port-control
Mode	`Interface Config`

dot1x port-control All

This command sets the authentication mode to be used on all ports. The control mode may be one of the following.

- ***force-unauthorized:*** The authenticator PAE unconditionally sets the controlled port to unauthorized.
- **force-authorized:** The authenticator PAE unconditionally sets the controlled port to authorized.
- ***auto:*** The authenticator PAE sets the controlled port mode to reflect the outcome of the authentication exchanges between the supplicant, authenticator and the authentication server.

Default	auto
Format	dot1x port-control all {force-unauthorized | force-authorized | auto}
Mode	Global Config

no dot1x port-control All

This command sets the authentication mode to be used on all ports to 'auto'.

Format	no dot1x port-control all
Mode	`Global Config`

dot1x re-authenticate

This command begins the re-authentication sequence on the specified port. This command is only valid if the control mode for the specified port is 'auto'. If the control mode is not 'auto' an error will be returned.

Format dot1x re-authenticate <slot/port>

Mode Privileged EXEC

dot1x re-authentication

This command enables re-authentication of the supplicant for the specified port.

Default Disabled

Format dot1x re-authentication

Mode **`Interface`** Config

no dot1x re-authentication

This command disables re-authentication of the supplicant for the specified port.

Format no dot1x re-authentication

Mode **`Interface Config`**

dot1x system-auth-control

This command is used to enable the dot1x authentication support on the switch. By default, the authentication support is disabled. While disabled, the dot1x configuration is retained and can be changed, but is not activated.

Default Disabled

Format dot1x system-auth-control

Mode Global Config

no dot1x system-auth-control

This command is used to disable the dot1x authentication support on the switch.

Format no dot1x system-auth-control

Mode `Global Config`

dot1x timeout

This command sets the value, in seconds, of the timer used by the authenticator state machine on this port. Depending on the token used and the value (in seconds) passed, various timeout configurable parameters are set. The following tokens are supported.

reauth-period: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to determine when re-authentication of the supplicant takes place. The reauth-period must be a value in the range 1 - 65535.

quiet-period: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to define periods of time in which it will not attempt to acquire a supplicant. The quiet-period must be a value in the range 0 - 65535.

tx-period: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to determine when to send an EAPOL EAP Request/Identity frame to the supplicant. The quiet-period must be a value in the range 1 - 65535.

supp-timeout: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to timeout the supplicant. The supp-timeout must be a value in the range 1 - 65535.

server-timeout: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to timeout the authentication server. The supp-timeout must be a value in the range 1 - 65535.

Default reauth-period: 3600 seconds
quiet-period: 60 seconds
tx-period: 30 seconds
supp-timeout: 30 seconds
server-timeout: 30 seconds

Format dot1x timeout {{reauth-period <seconds>} | {quiet-period <seconds>} | {tx-period <seconds>} | {supp-timeout <seconds>} | {server-timeout <seconds>}}

Mode Interface Config

no dot1x timeout

This command sets the value, in seconds, of the timer used by the authenticator state machine on this port to the default values. Depending on the token used, the corresponding default values are set.

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

Mode `Interface Config`

dot1x user

This command adds the specified user to the list of users with access to the specified port or all ports. The <user> parameter must be a configured user.

Format dot1x user <user> {<slot/port> | all}

Mode Global Config

no dot1x user

This command removes the user from the list of users with access to the specified port or all ports.

Format no dot1x user <user> {<slot/port> | all}

Mode `Global Config`

radius accounting mode

This command is used to enable the RADIUS accounting function.

Default `Disabled`

Format radius accounting mode

Mode Global Config

no radius accounting mode

This command is used to set the RADIUS accounting function to the default value - i.e. the RADIUS accounting function is disabled.

Format no radius accounting mode

Mode `Global Config`

radius server host

This command is used to configure the RADIUS authentication and accounting server.

If the 'auth' token is used, the command configures the IP address to use to connect to a RADIUS authentication server. Up to 3 servers can be configured per RADIUS client. If the maximum number of configured servers is reached, the command will fail until one of the servers is removed by executing the no form of the command. If the optional <port> parameter is used, the command will configure the UDP port number to use to connect to the configured RADIUS server. In order to configure the UDP port number, the IP address must match that of a previously configured RADIUS authentication server. The port number must lie between 1 - 65535, with 1812 being the default value.

If the 'acct' token is used, the command configures the IP address to use for the RADIUS accounting server. Only a single accounting server can be configured. If an accounting server is currently configured, it must be removed from the configuration using the no form of the command before this command succeeds. If the optional <port> parameter is used, the command will configure the UDP port to use to connect to the RADIUS accounting server. The IP address specified must match that of a previously configured accounting server. If a port is already configured for the accounting server then the new port will replace the previously configured value. The port must be a value in the range 1 - 65535, with 1813 being the default value.

Format radius server host {auth | acct} <ipaddr> [<port>]

Mode Global Config

no radius server host

This command is used to remove the configured RADIUS authentication server or the RADIUS accounting server. If the 'auth' token is used, the previously configured RADIUS authentication server is removed from the configuration. Similarly, if the 'acct' token is used, the previously configured RADIUS accounting server is removed from the configuration. The <ipaddr> parameter must match the IP address of the previously configured RADIUS authentication / accounting server.

Format no radius server host {auth | acct} <ipaddress>

Mode `Global Config`

radius server key

This command is used to configure the shared secret between the RADIUS client and the RADIUS accounting / authentication server. Depending on whether the 'auth' or 'acct' token is used, the shared secret will be configured for the RADIUS authentication or RADIUS accounting server. The IP address provided must match a previously configured server. When this command is executed, the secret will be prompted. The secret must be an alphanumeric value not exceeding 20 characters.

Format radius server key {auth | acct} <ipaddr>

Mode Global Config

radius server msgauth

This command enables the message authenticator attribute for a specifiedserver.

Default `radius server msgauth <ipaddr>`

Mode `Global Config`

radius server primary

This command is used to configure the primary RADIUS authentication server for this RADIUS client. The primary server is the one that is used by default for handling RADIUS requests. The remaining configured servers are only used if the primary server cannot be reached. A maximum of three servers can be configured on each client. Only one of these servers can be configured as the primary. If a primary server is already configured prior to this command being executed, the server specified by the IP address specified used in this command will become the new primary server. The IP address must match that of a previously configured RADIUS authentication server.

Format radius server primary <ipaddr>

Mode Global Config

radius server retransmit

This command sets the maximum number of times a request packet is re-transmitted when no response is received from the RADIUS server. The retries value is an integer in the range of 1 to 15.

Default 10

Format `radius server retransmit <retries>`

Mode `Global Config`

no radius server retransmit

This command sets the maximum number of times a request packet is re-transmitted, when no response is received from the RADIUS server, to the default value, i.e. 10.

Format `no radius server retransmit`

Mode `Global Config`

radius server timeout

This command sets the timeout value (in seconds) after which a request must be retransmitted to the RADIUS server if no response is received. The timeout value is an integer in the range of 1 to 30.

Default 6

Format radius server timeout <seconds>

Mode Global Config

no radius server timeout

This command sets the timeout value (in seconds) after which a request must be retransmitted to the RADIUS server if no response is received, to the default value, i.e. 6.

Format no radius server timeout

Mode `Global Config`

show accounting

This command is used to display the configured RADIUS accounting mode, accounting server and the statistics for the configured accounting server.

Format show accounting [statistics <ipaddr>]

Mode Privileged EXEC

If the optional token 'statistics <ipaddr>' is not included, then only the accounting mode and the RADIUS accounting server details are displayed.

Mode	Enabled or disabled
IP Address	The configured IP address of the RADIUS accounting server
Port	The port in use by the RADIUS accounting server
Secret Configured	Yes or No

If the optional token 'statistics <ipaddr>' is included, the statistics for the configured RADIUS accounting server are displayed. The IP address parameter must match that of a previously configured RADIUS accounting server. The following information regarding the statistics of the RADIUS accounting server is displayed.

Accounting Server IP Address	IP Address of the configured RADIUS accounting server
Round Trip Time	The time interval, in hundredths of a second, between the most recent Accounting-Response and the Accounting-Request that matched it from the RADIUS accounting server.
Requests	The number of RADIUS Accounting-Request packets sent to this accounting server. This number does not include retransmissions.
Retransmission	The number of RADIUS Accounting-Request packets retransmitted to this RADIUS accounting server.
Responses	The number of RADIUS packets received on the accounting port from this server.
Malformed Responses	The number of malformed RADIUS Accounting-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators and unknown types are not included as malformed accounting responses.
Bad Authenticators	The number of RADIUS Accounting-Response packets containing invalid authenticators received from this accounting server.
Pending Requests	The number of RADIUS Accounting-Request packets sent to this server that have not yet timed out or received a response.
Timeouts	The number of accounting timeouts to this server.
Unknown Types	The number of RADIUS packets of unknown types, which were received from this server on the accounting port.
Packets Dropped	The number of RADIUS packets received from this server on the accounting port and dropped for some other reason.

show authentication

This command displays the ordered authentication methods for all authentication login lists.

Format `show authentication`

Mode `Privileged EXEC`

Authentication Login List This displays the authentication login listname.

Method 1 This displays the first method in the specified authentication login list, if any.

Method 2 This displays the second method in the specified authentication login list, if any.

Method 3 This displays the third method in the specified authentication login list, if any.

show authentication users

This command displays information about the users assigned to the specified authentication login list. If the login is assigned to non-configured users, the user "default" will appear in the user column.

Format `show authentication users <listname>`

Mode `Privileged EXEC`

User This field displays the user assigned to the specified authentication login list.

Component This field displays the component (User or 802.1x) for which the authentication login list is assigned.

show dot1x

This command is used to show a summary of the global dot1x configuration, summary information of the dot1x configuration for a specified port or all ports, the detailed dot1x configuration for a specified port and the dot1x statistics for a specified port - depending on the tokens used.

Format show dot1x [{summary {<slot/port> | all}} | {detail <slot/port>} | {statistics <slot/port>}]

Mode Privileged EXEC

If none of the optional parameters are used, the global dot1x configuration summary is displayed.

Administrative mode Indicates whether authentication control on the switch is enabled or disabled.

If the optional parameter 'summary {<slot/port> | all}' is used, the dot1x configuration for the specified port or all ports are displayed.

Port The interface whose configuration is displayed.

Control Mode The configured control mode for this port. Possible values are force-unauthorized / force-authorized / auto

Operating Control Mode The control mode under which this port is operating. Possible values are authorized / unauthorized

Reauthentication Enabled Indicates whether re-authentication is enabled on this port

Key Transmission Enabled Indicates if the key is transmitted to the supplicant for the specified port

If the optional parameter 'detail <slot/port>' is used, the detailed dot1x configuration for the specified port are displayed.

Port The interface whose configuration is displayed

Protocol Version The protocol version associated with this port. The only possible value is 1, corresponding to the first version of the dot1x specification.

PAE Capabilities The port access entity (PAE) functionality of this port. Possible values are Authenticator or Supplicant.

Authenticator PAE State Current state of the authenticator PAE state machine. Possible values are Initialize, Disconnected, Connecting, Authenticating, Authenticated, Aborting, Held, ForceAuthorized, and ForceUnauthorized.

Backend Authentication State Current state of the backend authentication state machine. Possible values are Request, Response, Success, Fail, Timeout, Idle, and Initialize.

Quiet Period The timer used by the authenticator state machine on this port to define periods of time in which it will not attempt to acquire a supplicant. The value is expressed in seconds and will be in the range 0 and 65535.

Transmit Period The timer used by the authenticator state machine on the specified port to determine when to send an EAPOL EAP Request/ Identity frame to the supplicant. The value is expressed in seconds and will be in the range of 1 and 65535.

Supplicant Timeout The timer used by the authenticator state machine on this port to timeout the supplicant. The value is expressed in seconds and will be in the range of 1 and 65535.

Server Timeout The timer used by the authenticator on this port to timeout the authentication server. The value is expressed in seconds and will be in the range of 1 and 65535.

Maximum Requests The maximum number of times the authenticator state machine on this port will retransmit an EAPOL EAP Request/Identity before timing out the supplicant. The value will be in the range of 1 and 10.

Reauthentication Period The timer used by the authenticator state machine on this port to determine when reauthentication of the supplicant takes place. The value is expressed in seconds and will be in the range of 1 and 65535.

Reauthentication Enabled Indicates if reauthentication is enabled on this port. Possible values are True or False.

Key Transmission Enabled Indicates if the key is transmitted to the supplicant for the specified port. Possible values are True or False.

Control Direction Indicates the control direction for the specified port or ports. Possible values are both or in.

If the optional parameter 'statistics <slot/port>' is used, the dot1x statistics for the specified port are displayed.

Port The interface whose statistics are displayed.

EAPOL Frames Received The number of valid EAPOL frames of any type that have been received by this authenticator.

EAPOL Frames Transmitted The number of EAPOL frames of any type that have been transmitted by this authenticator.

EAPOL Start Frames Received The number of EAPOL start frames that have been received by this authenticator.

EAPOL Logoff Frames Received The number of EAPOL logoff frames that have been received by this authenticator.

Last EAPOL Frame Version The protocol version number carried in the most recently received EAPOL frame.

Last EAPOL Frame Source The source MAC address carried in the most recently received EAPOL frame.

EAP Response/Id Frames Received The number of EAP response/identity frames that have been received by this authenticator.

EAP Response Frames Received The number of valid EAP response frames (other than resp/id frames) that have been received by this authenticator.

EAP Request/Id Frames Transmitted The number of EAP request/identity frames that have been transmitted by this authenticator.

EAP Request Frames Transmitted The number of EAP request frames (other than request/identity frames) that have been transmitted by this authenticator.

Invalid EAPOL Frames Received The number of EAPOL frames that have been received by this authenticator in which the frame type is not recognized.

EAP Length Error Frames Received The number of EAPOL frames that have been received by this authenticator in which the frame type is not recognized.

show dot1x users

This command displays 802.1x port security user information for locally configured users.

Format	show dot1x users <slot/port>
Mode	Privileged EXEC
User	Users configured locally to have access to the specified port.

show radius

This command is used to display the various RADIUS configuration items for the switch as well as the configured RADIUS servers. If the optional token 'servers' is not included, the following RADIUS configuration items will be displayed.

Format	show radius [servers]
Mode	Privileged EXEC

Primary Server IP Address Indicates the configured server currently in use for authentication

Number of configured servers The configured IP address of the authentication server

Max number of retransmits The configured value of the maximum number of times a request packet is retransmitted

Timeout Duration The configured timeout value, in seconds, for request re-transmissions

Accounting Mode Yes or No

If the optional token 'servers' is included, the following information regarding the configured RADIUS servers is displayed.

IP Address IP Address of the configured RADIUS server

Port The port in use by this server

Type Primary or secondary

Secret Configured Yes / No

show radius statistics

This command is used to display the statistics for RADIUS or configured server. To show the confifured RADIUS server statistic, the IP Address specified must match that of a previously configured RADIUS server. On execution, the following fields are displayed.

Format show radius statistics [ipaddr]

Mode Privileged EXEC

If ip address is not specified than only Invalis Server Address filed is displayed. Otherwise other listed fields are displayed.

Invalid Server Addresses The number of RADIUS Access-Response packets received from unknown addresses.

Server IP Address

Round Trip Time The time interval, in hundredths of a second, between the most recent Access-Reply/Access-Challenge and the Access-Request that matched it from the RADIUS authentication server.

Access Requests The number of RADIUS Access-Request packets sent to this server. This number does not include retransmissions.

Access Retransmission The number of RADIUS Access-Request packets retransmitted to this RADIUS authentication server.

Access Accepts The number of RADIUS Access-Accept packets, including both valid and invalid packets, which were received from this server.

Access Rejects The number of RADIUS Access-Reject packets, including both valid and invalid packets, which were received from this server.

Access Challenges The number of RADIUS Access-Challenge packets, including both valid and invalid packets, which were received from this server.

Malformed Access Responses The number of malformed RADIUS Access-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or signature attributes or unknown types are not included as malformed access responses.

Bad Authenticators The number of RADIUS Access-Response packets containing invalid authenticators or signature attributes received from this server.

Pending Requests The number of RADIUS Access-Request packets destined for this server that have not yet timed out or received a response.

Timeouts The number of authentication timeouts to this server.

Unknown Types The number of RADIUS packets of unknown types, which were received from this server on the authentication port.

Packets Dropped The number of RADIUS packets received from this server on the authentication port and dropped for some other reason.

show users authentication

This command displays all user and all authentication login information. It also displays the authentication login list assigned to the default user.

Format `show users authentication`

Mode `Privileged EXEC`

User This field lists every user that has an authentication login list assigned.

System Login This field displays the authentication login list assigned to the user for system login.

802.1x Port Security This field displays the authentication login list assigned to the user for 802.1x port security.

users defaultlogin

This command assigns the authentication login list to use for non-configured users when attempting to log in to the system. This setting is overridden by the authentication login list assigned to a specific user if the user is configured locally. If this value is not configured, users will be authenticated using local authentication only.

Format `users defaultlogin <listname>`

Mode `Global Config`

users login

This command assigns the specified authentication login list to the specified user for system login. The <**user**> must be a configured <**user**> and the <**listname**> must be a configured login list.

If the user is assigned a login list that requires remote authentication, all access to the interface from all CLI, web, and telnet sessions will be blocked until the authentication is complete.

Note that the login list associated with the ‘admin’ user can not be changed to prevent accidental lockout from the switch.

Format `users login <user> <listname>`

Mode `Global Config`

System Utilities

This section describes system utilities.

clear config

This command resets the configuration to the factory defaults without powering off the switch. The switch is automatically reset when this command is processed. You are prompted to confirm that the reset should proceed.

Format `clear config`

Mode **Privileged EXEC**

clear counters

This command clears the stats for a specified <slot/port> or for all the ports or for the entire switch based upon the argument.

Format **clear counters [{***<slot/port>* | *all}]*

Mode **Privileged EXEC**

clear igmpsnooping

This command clears the tables managed by the IGMP Snooping function and will attempt to delete these entries from the Multicast Forwarding Database.

Format **clear igmpsnooping**

Mode **Privileged EXEC**

clear pass

This command resets all user passwords to the factory defaults without powering off the switch. You are prompted to confirm that the password reset should proceed.

Format **clear pass**

Mode **Privileged EXEC**

clear port-channel

This command clears all port-channels (LAGs).

Format **clear port-channel**

Mode **Privileged EXEC**

clear traplog

This command clears the trap log.

Format **clear traplog**

Mode **Privileged EXEC**

clear vlan

This command resets VLAN configuration parameters to the factory defaults.

Format `clear vlan`

Mode `Privileged EXEC`

copy

This command uploads and downloads to/from the switch. Local URLs can be specified using tftp or xmodem. The following can be specified as the source file for uploading from the switch: startup config (***nvram:startup-config***), error log (***nvram:errorlog***), message log (***nvram:msglog***) and trap log (***nvram:traplog***). A URL is specified for the destination.

The command can also be used to download the startup config or code image by specifying the source as a URL and destination as ***nvram:startup-config*** or .***system:image*** respectively.

The command can be used to the save the running config to nvram by specifying the source as ***system:running-config*** and the destination as ***nvram:startup-config***

The command can also be used to download ssh key files as nvram:sshkey-rsa, nvram:sshkey-rsa2, and nvram:sshkey-dsa and http secure-server certificates as nvram:sslpem-root, nvram:sslpem-server, nvram:sslpem-dhweak, and nvram:sslpem-dhstrong.

Default none

Format **`copy nvram:startup-config <url>`**

`copy nvram:errorlog <url>`

`copy nvram:msglog <url>`

copy **`nvram:traplog <url>`**

copy **`<url> nvram:startup-config`**

copy <url> **`system:image`**

copy **`system:running-config nvram:startup-config`**

copy <url> nvram:sslpem-root

copy <url> nvram:sslpem-server

copy <url> nvram:sslpem-dhweak

copy <url> nvram:sslpem-dhstrong

copy <url> nvram:sshkey-rsa1

copy <url> nvram:sshkey-rsa2

copy <url> nvram:sshkey-dsa

Mode **Privileged EXEC**

logout

This command closes the current telnet connection or resets the current serial connection.

Note: Save configuration changes before logging out.

Format **logout**

Mode Privileged EXEC

ping

This command checks if another computer is on the network and listens for connections. To use this command, configure the switch for network (in-band) connection (as described in the *7300 Series L3 Switch 2402/4802 Hardware User Guide*). The source and target devices must have the ping utility enabled and running on top of TCP/IP. The switch can be pinged from any IP workstation with which the switch is connected through the default VLAN (VLAN 1), as long as there is a physical path between the switch and the workstation. The terminal interface sends, three pings to the target station.

Format **ping <*ipaddr*>**

Mode **Privileged EXEC and User EXEC**

reload

This command resets the switch without powering it off. Reset means that all network connections are terminated and the boot code executes. The switch uses the stored configuration to initialize the switch. You are prompted to confirm that the reset should proceed. A successful reset is indicated by the LEDs on the switch.

Format **reload**

Mode **Privileged EXEC**

Chapter 9
Routing Commands

This chapter provides detailed explanation of the Routing commands. The switch commands are divided by functionality into these different groups:

- Show commands are used to display switch settings, statistics and other information.
- Configuration Commands are used to configure features and options of the switch. For every configuration command there is a show command that will display the configuration setting.
- Copy commands are used to transfer configuration and informational files to and from the switch.

Syntax conventions are described in Chapter 5, “Command Line Interface Structure.

Routing Commands

1583compatibility

This command enables OSPF 1583 compatibility.

Note: 1583 compatibility mode is enabled by default. If all OSPF routers in the routing domain are capable of operating according to RFC 2328, OSPF 1583 compatibility mode should be disabled.

Default `Enabled`

Format **`1583compatibility`**

Mode **`Router OSPF Config`**

no 1583compatibility

This command disables OSPF 1583 compatibility.

Format **`no 1583compatibility`**

Mode **`Router OSPF Config`**

area authentication

This command specifies the authentication type to be used for the specified area id.

Default *none*

Format **area <*areaid*> authentication {*none* | *simple* | *encrypt*}**

Mode **Router OSPF Config**

no area authentication

This command sets the default authentication type to be used for the specified area id.

Format **no area <*areaid*> authentication**

Mode **Router OSPF Config**

area default-cost

This command configures the monetary default cost for the stub area. The operator must specify the area id and an integer value between 1-16777215.

Format **area <*areaid*> default-cost <*1-16777215*>**

Mode **Router OSPF Config**

area nssa

This command configures the specified areaid to function as an NSSA.

Format **area <*areaid*> nssa**

Mode **Router OSPF Config**

no area nssa

This command disables nssa from the specified area id.

Format **no area <*areaid*> nssa**

Mode **Router OSPF Config**

area nssa default-info-originate

This command configures the metric value and type for the default route advertised into the NSSA. The optional metric parameterspecifieds the metric of the default route and is to be in a range of 1-16777215. If no metric is specified, the default valueis ****. The metric type can be comparable (nssa-external 1) or non-comparable (nssa-external 2).

Format `area <areaid> nssa default-info-originate [<metric>] [{comparable | non-comparable}]`

Mode `Router OSPF Config`

area nssa no-redistribute (OSPF)

This command configures the NSSA ABR so that learned external routes will not be redistributed to the NSSA.

Format `area <areaid> nssa no-redistribute`

Mode `Router OSPF Config`

area nssa no-summary (OSPF)

This command configures the NSSA so that summary LSAs are not advertised into the NSSA

Format `area <areaid> nssa no-summary`

Mode `Router OSPF Config`

area nssa translator-role (OSPF)

This command configures the translator role of the NSSA. A value of *always* will cause the router to assume the role of the translator the instant it becomes a border router and a value of *candidate* will cause the router to participate in the translator election process when it attains border router status

Format `area <areaid> nssa translator-role {always | candidate}`

Mode `Router OSPF Config`

area nssa translator-stab-intv

This command configures the translator stability interval of the NSSA. The stabilityinterval is the period of time that an elected translator continues to perform its duties after it determines that its translator status has been deposed by another router.

Format **area <*areaid*> *nssa translator-stab-intv* <*stability-interval*>**

Mode Router OSPF Config

area range

This command creates a specified area range for a specified NSSA. The <ipaddr> is a valid IP address. The <subnetmask> is a valid subnet mask. The lsdb type must be specified by either *summarylink* or *nssaexternallink*, and the advertising of the area range can be optionally allowed or suppressed.

Format **area <*areaid*> range <ipaddr> <*subnetmask*> *{summa-rylink | nssaexternallink} [advertise/not-advertise]***

Mode **Router OSPF Config**

no area range

This command deletes a specified area range.

The <ipaddr> is a valid IP address.

The <subnetmask> is a valid subnet mask.

Format **no area <*areaid*> range <ipaddr> <*subnetmask*>**

Mode **Router OSPF Config**

area stub

This command creates a stub area for the specified area ID. A stub area is characterized by the fact that AS External LSAs are not propagated into the area. Removing AS External LSAs and Summary LSAs can significantly reduce the link state database of routers within the stub area.

Format **area <*areaid*> stub**

Mode **Router OSPF Config**

no area stub

This command deletes a stub area for the specified area ID.

Format	`no area <areaid> stub`
Mode	`Router OSPF Config`

area stub summarylsa

This command configures the Summary LSA mode for the stub area identified by <areaid>. The Summary LSA mode is configured as enabled.

Default	Disabled
Format	`area <areaid> stub summarylsa`
Mode	`Router OSPF Config`

no area stub summarylsa

This command configures the default Summary LSA mode for the stub area identified by <areaid>.

Format	`no area <areaid> stub summarylsa`
Mode	`Router OSPF Config`

area virtual-link

This command creates the OSPF virtual interface for the specified <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor.

Format	`area <areaid> virtual-link <neighbor>`
Mode	`Router OSPF Config`

no area virtual-link

This command deletes the OSPF virtual interface from the given interface, identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor.

Format	`no area <areaid> virtual-link <neighbor>`
Mode	`Router OSPF Config`

area virtual-link authentication

This command configures the authentication type and key for the OSPF virtual interface identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor. The value for <type> is either none, simple, or encrypt. The [key] is composed of standard displayable, non-control keystrokes from a Standard 101/102-key keyboard. The authentication key must be 8 bytes or less if the authentication type is simple. If the type is encrypt, the key may be up to 256 bytes. Unauthenticated interfaces do not need an authentication key. If the type is encrypt, a key id in the range of 0 and 255 must be specified.

Default The default value for authentication type is none. Neither the default password key nor the default key id are configured.

Format `area <areaid> virtual-link <neighbor> authentication {none | {simple <key>} | {encrypt <key> <keyid>}}`

Mode `Router OSPF Config`

no area virtual-link authentication

This command configures the default authentication type for the OSPF virtual interface identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor.

Format `no area <areaid> virtual-link <neighbor> authentication`

Mode `Router OSPF Config`

area virtual-link dead-interval

This command configures the dead interval for the OSPF virtual interface on the virtual interface identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor. The range for <seconds> is 1 to 65535.

Default 40

Format `area <areaid> virtual-link <neighbor> dead-interval <1-65535>`

Mode `Router OSPF Config`

no area virtual-link dead-interval

This command configures the default dead interval for the OSPF virtual interface on the virtual interface identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor.

Format `no area <areaid> virtual-link <neighbor> dead-interval`

Mode `Router OSPF Config`

area virtual-link hello-interval

This command configures the hello interval for the OSPF virtual interface on the virtual interface identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor. The range for <seconds> is 1 to 65535.

Default 10

Format `area <areaid> virtual-link <neighbor> hello-interval <1-65535>`

Mode `Router OSPF Config`

no area virtual-link hello-interval

This command configures the default hello interval for the OSPF virtual interface on the virtual interface identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor.

Format `no area <areaid> virtual-link <neighbor> hello-interval`

Mode `Router OSPF Config`

area virtual-link retransmit-interval

This command configures the retransmit interval for the OSPF virtual interface on the virtual interface identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor. The range for <seconds> is 0 to 3600.

Default 5

Format `area <areaid> virtual-link <neighbor> retransmit-interval <0-3600>`

Mode `Router OSPF Config`

no area virtual-link retransmit-interval

This command configures the default retransmit interval for the OSPF virtual interface on the virtual interface identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor.

Format `no area <areaid> virtual-link <neighbor> retransmit-interval`

Mode `Router OSPF Config`

area virtual-link transmit-delay

This command configures the transmit delay for the OSPF virtual interface on the virtual interface identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor. The range for <seconds> is 0 to 3600 (1 hour).

Default 1

Format `area <areaid> virtual-link <neighbor> transmit-delay <0-3600>`

Mode `Router OSPF Config`

no area virtual-link transmit-delay

This command configures the default transmit delay for the OSPF virtual interface on the virtual interface identified by <areaid> and <neighbor>. The <neighbor> parameter is the IP address of the neighbor.

Format `no area <areaid> virtual-link <neighbor> transmit-delay`

Mode `Router OSPF Config`

arp

This command creates an ARP entry. The value for <ipaddress> is the IP address of a device on a subnet attached to an existing routing interface. <macaddr> is a unicast MAC address for that device.

The format is 6 two-digit hexadecimal numbers that are separated by colons, for example 00:06:29:32:81:40.

Format	**arp <ipaddress> <*macaddr*>**
Mode	**Global Config**

no arp

This command deletes an ARP entry. The value for <arpentry> is the IP address of the interface. The value for <ipaddress> is the IP address of a device on a subnet attached to an existing routing interface. <macaddr> is a unicast MAC address for that device.

Format	**no arp <ipaddress> <*macaddr*>**
Mode	**Global Config**

arp cachesize

This command configures the ARP cache size. The value for <cachesize> is a platform specific integer value.

Format	**arp cachesize <*Platform specific integer value*>**
Mode	**Global Config**

no arp cachesize

This command configures the default ARP cache size.

Format	**no arp cachesize**
Mode	**Global Config**

arp dynamicrenew

This command enables ARP component to automatically renew ARP entries of type dynamic when they age out.

Format	**arp dynamicrenew**
Mode	**Privileged Exec**

no arp dynamicrenew

This command disables ARP component from automatically renewing ARP entries of type dynamic when they age out.

Format	**no arp dynamicrenew**
Mode	**Privileged Exec**

arp purge

This command causes the specified IP address to be removed from the ARP cache. Only entries of type dynamic or gateway are affected by this command.

Format	**arp purge <ipaddr>**
Mode	**Privileged EXEC**

arp resptime

This command configures the ARP request response timeout.

The value for <seconds> is a valid positive integer, which represents the IP ARP entry response timeout time in seconds. The range for <seconds> is between 1-10 seconds.

Default	l
Format	**arp resptime *<1-10>***
Mode	**Global Config**

no arp resptime

This command configures the default ARP request response timeout.

Format	**no arp resptime**
Mode	**Global Config**

arp retries

This command configures the ARP count of maximum request for retries.

The value for <retries> is an integer, which represents the maximum number of request for retries. The range for <retries> is an integer between 0-10 retries.

Default 4

Format `arp retries <0-10>`

Mode `Global Config`

no arp retries

This command configures the default ARP count of maximum request for retries.

Format `no arp retries`

Mode `Global Config`

arp timeout

This command configures the ARP entry ageout time.

The value for <seconds> is a valid positive integer, which represents the IP ARP entry ageout time in seconds. The range for <seconds> is between 15-21600 seconds.

Default 1200

Format `arp timeout <15-21600>`

Mode `Global Config`

no arp timeout

This command configures the default ARP entry ageout time.

Format `no arp timeout`

Mode `Global Config`

auto-summary

This command enables the RIP auto-summarization mode.

Default Enabled

Format `auto-summary`

Mode `Router RIP Config`

no auto-summary

This command disables the RIP auto-summarization mode.

Format	`no auto-summary`
Mode	`Router RIP Config`

bootpdhcprelay cidoptmode

This command enables the circuit ID option mode for BootP/DHCP Relay on the system.

Default	Disabled
Format	`bootpdhcprelay cidoptmode`
Mode	`Global Config`

no bootpdhcprelay cidoptmode

This command disables the circuit ID option mode for BootP/DHCP Relay on the system.

Format	`no bootpdhcprelay cidoptmode`
Mode	`Global Config`

bootpdhcprelay disable

This command disables the forwarding of relay requests for BootP/DHCP Relay on the system.

Default	Disabled
Format	`bootpdhcprelay disable`
Mode	`Global Config`

no bootpdhcprelay disable

This command enables the forwarding of relay requests for BootP/DHCP Relay on the system.

Format	`no bootpdhcprelay disable`
Mode	`Global Config`

bootpdhcprelay maxhopcount

This command configures the maximum allowable relay agent hops for BootP/DHCP Relay on the system. The <hops> parameter has a range of 1 to 16.

Default 4

Format **bootpdhcprelay maxhopcount *<1-16>***

Mode **Global Config**

no bootpdhcprelay maxhopcount

This command configures the default maximum allowable relay agent hops for BootP/DHCP Relay on the system.

Format **no bootpdhcprelay maxhopcount**

Mode **Global Config**

bootpdhcprelay minwaittime

This command configures the minimum wait time in seconds for BootP/DHCP Relay on the system. When the BOOTP relay agent receives a BOOTREQUEST message, it MAY use the seconds-since-client-began-booting field of the request as a factor in deciding whether to relay the request or not. The parameter has a range of 0 to 100 seconds.

Default 0

Format **bootpdhcprelay minwaittime *<0-100>***

Mode **Global Config**

no bootpdhcprelay minwaittime

This command configures the default minimum wait time in seconds for BootP/DHCP Relay on the system.

Format **no bootpdhcprelay minwaittime**

Mode **Global Config**

bootpdhcprelay serverip

This command configures the server IP Address for BootP/DHCP Relay on the system. The <ipaddr> parameter is an IP address in a 4-digit dotted decimal format.

Default 0.0.0.0

Format `bootpdhcprelay serverip <ipaddr>`

Mode `Global Config`

no bootpdhcprelay serverip

This command configures the default server IP Address for BootP/DHCP Relay on the system.

Format `no bootpdhcprelay serverip`

Mode `Global Config`

clear arp-cache

This command causes all ARP entries of type dynamic to be removed from the ARP cache. If the *gateway* parameter is specified, the dynamic entries of type gateway are purged as well.

Format `clear arp-cache [gateway]`

Mode `Privileged Exec`

default-information originate (OSPF)

This command is used to control the advertisement of default routes.

Default value for metric unspecified

Default value for type 2

Format `default-information originate [always] [metric <0-16777215>] [metric-type {1 | 2}]`

Mode `Router OSPF Config`

no default-information originate (OSPF)

This command is used to control the advertisement of default routes.

Format `no default-information originate [metric] [metric-type]`

Mode `Router OSPF Config`

default-information originate (RIP)

This command is used to control the advertisement of default routes.

Format `default-information originate`

Mode `Router RIP Config`

no default-information originate (RIP)

This command is used to control the advertisement of default routes.

Format `no default-information originate`

Mode `Router RIP Config`

default-metric (OSPF)

This command is used to set a default for the metric of distributed routes.

Format `default-metric <1-16777215>`

Mode `Router OSPF Config`

no default-metric (OSPF)

This command is used to set a default for the metric of distributed routes.

Format `no default-metric`

Mode `Router OSPF Config`

default-metric (RIP)

This command is used to set a default for the metric of distributed routes.

Format `default-metric <0-15>`

Mode `Router RIP Config`

no default-metric (RIP)

This command is used to reset the default metric of distributed routes to its default value.

Format `no default-metric`

Mode `Router RIP Config`

enable (OSPF)

This command resets the default administrative mode of OSPF in the router (active).

Default Enabled

Format `enable`

Mode `Router OSPF Config`

no enable (OSPF)

This command sets the administrative mode of OSPF in the router to inactive.

Format `no enable`

Mode `Router OSPF Config`

enable (RIP)

This command resets the default administrative mode of RIP in the router (active).

Default Enabled

Format `enable`

Mode `Router RIP Config`

no enable (RIP)

This command sets the administrative mode of RIP in the router to inactive.

Format `no enable`

Mode `Router RIP Config`

distance ospf

This command sets the route preference value of OSPF in the router. Lower route preference values are preferred when determining the best route. The type of OSPF can be intra, inter, type-1, or type-2. The OSPF specification (RFC 2328) requires that preferences must be given to the routes learned via OSPF in the following order: intra < inter < type-1 < type-2.

The range of preference is 0 to 255.

Default	Intra -- 8; Inter -- 10; Type-1 -- 13; Type-2 -- 150.
Format	**distance ospf {*intra* | *inter* | *type1* | *type2}* <*0-255*>**
Mode	**Router OSPF Config**

no distance ospf

This command sets the default route preference value of OSPF in the router. The type of OSPF can be intra, inter, type-1, or type-2. Format

Format	**no distance ospf {*intra* | *inter* | *type1* | *type2}***
Mode	**Router OSPF Config**

distance rip

This command sets the route preference value of RIP in the router. Lower route preference values are preferred when determining the best route.

Default	15
Format	**distance rip <*0-255*>**
Mode	**Router RIP Config**

no distance rip

This command sets the default route preference value of RIP in the router.

Format	**no distance rip**
Mode	**Router RIP Config**

distribute-list out

This command is used to specify the access list to filter routes received from the source protocol.

Format	**distribute-list <1-199> out {rip | bgp | static | connected}**
Mode	**Router OSPF Config**

no distribute-list out

This command is used to specify the access list to filter routes received from the source protocol.

Format `no distribute-list <1-199> out {rip | bgp | static | connected}`

Mode `Router OSPF Config`

distribute-list out

This command is used to specify the access list to filter routes received from the source protocol.

Default 0

Format `distribute-list <1-199> out {ospf | bgp | static | connected}`

Mode `Router RIP Config`

no distribute-list out

This command is used to specify the access list to filter routes received from the source protocol.

Format `no distribute-list <1-199> out {ospf | bgp | static | connected}`

Mode `Router RIP Config`

no default-information originate

This command is used to control the advertisement of default routes.

Format `no default-information originate`

Mode `Router RIP Config`

encapsulation

This command configures the link layer encapsulation type for the packet. Acceptable values for <encapstype> are Ethernet and SNAP. The default is Ethernet.

Format `encapsulation {ethernet | snap}`

Mode `Interface Config`

Restrictions Routed frames are always Ethernet encapsulated when a frame is routed to a VLAN.

exit-overflow-interval

This command configures the exit overflow interval for OSPF. It describes the number of seconds after entering Overflow state that a router will wait before attempting to leave the Overflow State. This allows the router to again originate non-default AS-external-LSAs. When set to 0, the router will not leave Overflow State until restarted. The range for <seconds> is 0 to 2147483647 seconds.

Default 0

Format `exit-overflow-interval <0-2147483647>`

Mode `Router OSPF Config`

no exit-overflow-interval

This command configures the default exit overflow interval for OSPF.

Format `no exit-overflow-interval`

Mode `Router OSPF Config`

external-lsdb-limit

This command configures the external LSDB limit for OSPF. If the value is -1, then there is no limit. When the number of non-default AS-external-LSAs in a router's link-state database reaches the external LSDB limit, the router enters overflow state. The router never holds more than the external LSDB limit non-default AS-external-LSAs in it database. The external LSDB limit MUST be set identically in all routers attached to the OSPF backbone and/or any regular OSPF area. The range for <limit> is -1 to 2147483647.

Default -1

Format `external-lsdb-limit <-1-2147483647>`

Mode `Router OSPF Config`

no external-lsdb-limit

This command configures the default external LSDB limit for OSPF.

Format `no external-lsdb-limit`

Mode `Router OSPF Config`

hostroutesaccept

This command enables the RIP hostroutesaccept mode.

Default	Enabled
Format	**hostroutesaccept**
Mode	**Router RIP Config**

no hostroutesaccept

This command disables the RIP hostroutesaccept mode.

Format	**no hostroutesaccept**
Mode	**Router RIP Config**

ip address

This command configures an IP address on an interface.

The value for <ipaddr> is the IP Address of the interface.

The value for <subnetmask> is a 4-digit dotted-decimal number which represents the Subnet Mask of the interface. This changes the label "IP address" in "show ip interface."

Format	**ip address *<ipaddr> <subnetmask>***
Mode	**Interface Config**

no ip address

This command deletes an IP address from an interface.

The value for <ipaddr> is the IP Address of the interface.

The value for <subnetmask> is a 4-digit dotted-decimal number which represents the Subnet Mask of the interface.

Format	**no ip address *<ipaddr> <subnetmask>***
Mode	**Interface Config**

ip ecmpmode

This command enables ECMP mode on the router.

Default	Disabled
Format	`ip ecmpmode`
Mode	`Global Config`

no ip ecmpmode

This command disables ECMP mode on the router.

Format	`no ip ecmpmode`
Mode	`Global Config`

ip forwarding

This command enables forwarding of IP frames.

Default	Enabled
Format	`ip forwarding`
Mode	`Global Config`

no ip forwarding

This command disables forwarding of IP frames.

Format	`no ip forwarding`
Mode	`Global Config`

ip irdp

This command enables Router Discovery on an interface.

Default	Enabled
Format	`ip irdp`
Mode	`Interface Config`

no ip irdp

This command disables Router Discovery on an interface.

Format	`no ip irdp`
Mode	`Interface Config`

ip irdp address

This command configures the address to be used to advertise the router for the interface. The valid values for ipaddr are 224.0.0.1 and 255.255.255.255.

Default	224.0.0.1
Format	`ip irdp address <ipaddr>`
Mode	`Interface Config`

no ip irdp address

This command configures the default address to be used to advertise the router for the interface.

Format	`no ip irdp address`
Mode	`Interface Config`

ip irdp holdtime

This command configures the value, in seconds, of the holdtime field of the router advertisement sent from this interface. The range is the maxadvertinterval to 9000 seconds.

Default	3 * maxinterval
Format	`ip irdp holdtime <maxadvertinterval-9000>`
Mode	`Interface Config`

no ip irdp holdtime

This command configures the default value, in seconds, of the holdtime field of the router advertisement sent from this interface.

Format	`no ip irdp holdtime`
Mode	`Interface Config`

ip irdp maxadvertinterval

This command configures the maximum time, in seconds, allowed between sending router advertisements from the interface. The range for maxadvertinterval is 4 to 1800 seconds.

Default	600
Format	**ip irdp maxadvertinterval <*4-1800*>**
Mode	**Interface Config**

no ip irdp maxadvertinterval

This command configures the default maximum time, in seconds.

Format	**no ip irdp maxadvertinterval**
Mode	**Interface Config**

ip irdp minadvertinterval

This command configures the minimum time, in seconds, allowed between sending router advertisements from the interface. The range for minadvertinterval is 3 to the value of maxadvertinterval.

Default	0.75 * maxadvertinterval
Format	**ip irdp minadvertinterval <*3-maxadvertinterval*>**
Mode	**Interface Config**

no ip irdp minadvertinterval

This command configures thedefault minimum time, in seconds.

Format	**no ip irdp minadvertinterval**
Mode	**Interface Config**

ip irdp preference

This command configures the preferability of the address as a default router address, relative to other router addresses on the same subnet. The range is -2147483648 to -1 to 0 to 1 to 2147483647.

Default	0

Format `ip irdp preference <-2147483648-2147483647>`

Mode `Interface Config`

no ip irdp preference

This command configures the default preferability of the address as a default router address, relative to other router addresses on the same subnet.

Format `no ip irdp preference`

Mode `Interface Config`

ip netdirbcast

This command enables the forwarding of network-directed broadcasts. When enabled, network directed broadcasts are forwarded. When disabled they are dropped.

Default Disabled

Format `ip netdirbcast`

Mode `Interface Config`

no ip netdirbcast

This command disables the forwarding of network-directed broadcasts. When disabled, network directed broadcasts are dropped.

Format `no ip netdirbcast`

Mode `Interface Config`

ip ospf

This command enables OSPF on a router interface.

Default Disabled

Format `ip ospf`

Mode `Interface Config`

no ip ospf

This command disables OSPF on a router interface.

Format	`no ip ospf`
Mode	`Interface Config`

ip ospf areaid

This command sets the OSPF area to which the specified router interface belongs. The value for <areaid> is an IP address, formatted as a 4-digit dotted-decimal number that uniquely identifies the area to which the interface connects. Assigning an area id, which does not exist on an interface, causes the area to be created with default values.

Format	`ip ospf areaid <areaid>`
Mode	`Interface Config`

ip ospf authentication

This command sets the OSPF Authentication Type and Key for the specified interface.

The value of <type> is either none, simple or encrypt. The [key] is composed of standard displayable, non-control keystrokes from a Standard 101/102-key keyboard. The authentication key must be 8 bytes or less if the authentication type is simple. If the type is encrypt, the key may be up to 256 bytes. If the type is encrypt a <keyid> in the range of 0 and 255 must be specified.

Default	The default authentication type is none.
Default	The default password key is not configured. Unauthenticated interfaces do not need an authentication key.
Default	The default keyid is not configured. Unauthenticated interfaces do not need an authentication key id.
Format	`ip ospf authentication {none | {simple <key>} | {encrypt <key> <keyid>}}`
Mode	`Interface Config`

no ip ospf authentication

This command sets the default OSPF Authentication Type for the specified interface.

Format	`no ip ospf authentication`
Mode	`Interface Config`

ip ospf cost

This command configures the cost on an OSPF interface. The <cost> parameter has a range of 1 to 65535.

Default 10

Format `ip ospf cost <1-5535>`

Mode `Interface Config`

no ip ospf cost

This command configures the default cost on an OSPF interface. The <cost> parameter has a range of 1 to 65535.

Default 10

Format `no ip ospf cost`

Mode `Interface Config`

ip ospf dead-interval

This command sets the OSPF dead interval for the specified interface.

The value for <seconds> is a valid positive integer, which represents the length of time in seconds that a router's Hello packets have not been seen before its neighbor routers declare that the router is down. The value for the length of time must be the same for all routers attached to a common network. This value should be some multiple of the Hello Interval (i.e. 4).

Valid values range for <seconds> is from 1 to 2147483647.

Default 40

Format `ip ospf dead-interval <1-2147483647>`

Mode `Interface Config`

no ip ospf dead-interval

This command sets the default OSPF dead interval for the specified interface.

Format `no ip ospf dead-interval`

Mode `Interface Config`

ip ospf hello-interval

This command sets the OSPF hello interval for the specified interface.

The value for <seconds> is a valid positive integer, which represents the length of time in seconds. The value for the length of time must be the same for all routers attached to a network.

Valid values range from 1 to 65535.

Default 10

Format `ip ospf hello-interval <1-65535>`

Mode `Interface Config`

no ip ospf hello-interval

This command sets the default OSPF hello interval for the specified interface.

Format `no ip ospf hello-interval`

Mode `Interface Config`

ip ospf priority

This command sets the OSPF priority for the specified router interface. The priority of the interface is a priority integer from 0 to 255.

A value of '0' indicates that the router is not eligible to become the designated router on this network.

Default 1, which is the highest router priority.

Format `ip ospf priority <0-255>`

Mode `Interface Config`

no ip ospf priority

This command sets thedefault OSPF priority for the specified router interface.

Format `no ip ospf priority`

Mode `Interface Config`

ip ospf retransmit-interval

This command sets the OSPF retransmit Interval for the specified interface.

The value for <seconds> is the number of seconds between link-state advertisement retransmissions for adjacencies belonging to this router interface. This value is also used when retransmitting database desctions and link-state request packets.

Valid values range from 0 to 3600 (1 hour).

Default 5

Format `ip ospf retransmit-interval <0-3600>`

Mode `Interface Config`

no ip ospf retransmit-interval

This command sets the default OSPF retransmit Interval for the specified interface.

Format `no ip ospf retransmit-interval`

Mode `Interface Config`

ip ospf transmit-delay

This command sets the OSPF Transit Delay for the specified interface. In addition, it sets the estimated number of seconds it takes to transmit a link state update packet over this interface.

Valid values for <seconds> range from 1 to 3600 (1 hour).

Default 1

Format `ip ospf transmit-delay <1-3600>`

Mode `Interface Config`

no ip ospf transmit-delay

This command sets the default OSPF Transit Delay for the specified interface.

Format `no ip ospf transmit-delay`

Mode `Interface Config`

ip rip

This command enables RIP on a router interface.

Default	Disabled
Format	`ip rip`
Mode	`Interface Config`

no ip rip

This command disables RIP on a router interface.

Format	`no ip rip`
Mode	`Interface Config`

ip rip authentication

This command sets the RIP Version 2 Authentication Type and Key for the specified interface. The value of <type> is either none, simple, or encrypt.

The value for authentication key [key] must be 16 bytes or less. The [key] is composed of standard displayable, non-control keystrokes from a Standard 101/102-key keyboard. If the value of <type> is encrypt, a keyid in the range of 0 and 255 must be specified.

Default	The default authentication type is none.
Default	The default password key is an empty string. Unauthenticated interfaces do not need an authentication key.
Default	The default key id is not defined. Unauthenticated interfaces do not need an authentication key id.
Format	`ip rip authentication {none | {simple <key>} | {encrypt <key> <keyid>}}`
Mode	`Interface Config`

no ip rip authentication

This command sets the default RIP Version 2 Authentication Type.

Format	`no ip rip authentication`
Mode	`Interface Config`

ip rip receive version

This command configures the interface to allow RIP control packets of the specified version(s) to be received.

The value for <mode> is one of: rip1 to receive only RIP version 1 formatted packets, rip2 for RIP version 2, both to receive packets from either format, or none to not allow any RIP control packets to be received.

Default both

Format `ip rip receive version {rip1 | rip2 | both | none}`

Mode `Interface Config`

no ip rip receive version

This command configures the interface to allow RIP control packets of the default version(s) to be received.

Format `no ip rip receive version`

Mode `Interface Config`

ip rip send version

This command configures the interface to allow RIP control packets of the specified version to be sent.

The value for <mode> is one of: rip1 to broadcast RIP version 1 formatted packets, rip1c (RIP version 1 compatibility mode) which sends RIP version 2 formatted packets via broadcast, rip2 for sending RIP version 2 using multicast, or none to not allow any RIP control packets to be sent.

Default rip1c

Format `ip rip send version {rip1 | rip1c | rip2 | none}`

Mode `Interface Config`

no ip rip send version

This command configures the interface to allow RIP control packets of the default version to be sent.

Format `no ip rip send version`

Mode `Interface Config`

ip route

This command configures a static route. The <networkaddr> and <nexthopip> are valid ip addresses. The <subnetmask> is a valid subnet mask. The [metric] parameter is an integer value from 0 to 255. The default value is 1.

Format `ip route <networkaddr> <subnetmask> <nexthopip> [metric]`

Mode `Global Config`

no ip route

This command causes a static route to be deleted. The <networkaddr> and <nexthopip> are valid IP address. The <subnetmask> is a 4-digit dotted-decimal number representing a valid Subnet Mask.

Format `no ip route <networkaddr> <subnetmask> <nexthopip>`

ip route default

This command configures the default route. The value for <nexthopip> is a valid IP address of the next hop router.

Format `ip route default <nexthopip>`

Mode `Global Config`

no ip route default

This command causes the static default route to be deleted.

Format `no ip route default`

Mode `Global Config`

ip route distance

This command sets the static route preference value in the router. Lower route preference values are preferred when determining the best route.

Default 60

Format `ip route distance <1-255>`

Mode `Global Config`

no ip route distance

This command sets the default static route preference value in the router. Lower route preference values are preferred when determining the best route.

Format `no ip route distance`

Mode `Global Config`

ip routing

This command enables the IP Router Admin Mode for the master switch.

Format `ip routing`

Mode `Global Config`

no ip routing

This command disables the IP Router Admin Mode for the master switch.

Format `no ip routing`

Mode `Global Config`

redistribute

This command configures OSPF protocol to redistribute routes from the specified source protocol/ routers.

Default value for metric `unspecified`

Default value for type `2`

Default value for tag `0`

Format `redistribute {rip | bgp | static | connected} [metric <0-16777215>] [metric-type {1 | 2}] [tag <0-4294967295>] [subnets]`

Mode `Router OSPF Config`

no redistribute

This command configures OSPF protocol to redistribute routes from the specified source protocol/ routers.

Format `no redistribute {rip | bgp | static | connected} [metric] [metric-type] [tag] [subnets]`

Mode `Router OSPF Config`

redistribute

This command configures RIP protocol to redistribute routes from the specified source protocol/ routers. There are five possible match options. When you submit the command redistribute ospf match <match-type> the match-type or types specified are added to any match types presently being redistributed. Internal routes are redistributed by default.

Default value for metric `not-configured`

Default value for match `internal`

Format for OSPF as source protocol

`redistribute <ospf> [metric <0-15>] [match [internal] [external 1] [external 2] [nssa-external 1] [nssa-external-2]]`

Format for other source protocol

`redistribute {bgp | static | connected} [metric <0-15>]`

Mode `Router RIP Config`

no redistribute

This command de-configures RIP protocol to redistribute routes from the specified source protocol/routers.

Format `no redistribute {ospf | bgp | static | connected} [metric] [match [internal] [external 1] [external 2] [nssa-external 1] [nssa-external-2]]`

Mode `Router RIP Config`

redistribute (RIP)

This command configures RIP protocol to redistribute routes from the specified source protocol/ routers.

Default value for metric not-configured

Default value for match internal

Format for OSPF as source protocol

```
redistribute ospf [metric <0-15>] [match [internal] [external 1] [external 2] [nssa-external 1] [nssa-external-2]]
```

Format for other source protocol

```
redistribute {bgp | static | connected} [metric <0-15>]
```

Mode `Router RIP Config`

no redistribute (RIP)

This command de-configures RIP protocol to redistribute routes from the specified source protocol/routers.

Format

```
no redistribute {ospf | bgp | static | connected} [metric] [match [internal] [external 1] [external 2] [nssa-external 1] [nssa-external-2]]
```

Mode `Router RIP Config`

router-id

This command sets a 4-digit dotted-decimal number uniquely identifying the router ospf id. The <ipaddress> is a configured value.

Format `router-id <ipaddress>`

Mode `Router OSPF Config`

routing

This command enables routing for an interface.

The current value for this function is displayed under "show ip interface" labeled as "Routing Mode".

Default Disabled

Format `routing`

Mode `Interface Config`

no routing

This command disables routing for an interface.

The current value for this function is displayed under "show ip interface" labeled as "Routing Mode".

Format `no routing`

Mode `Interface Config`

show arp

This command displays the Address Resolution Protocol (ARP) cache. The displayed results are not the total ARP entries. To view the total ARP entries, the operator should view the **`show arp`** results in conjunction with the **`show arp switch`** results.

Format `show arp`

Mode `Privileged EXEC`

Age Time (seconds) Is the time it takes for an ARP entry to age out. This value was configured into the unit. Age time is measured in seconds.

Response Time (seconds) Is the time it takes for an ARP request timeout. This value was configured into the unit. Response time is measured in seconds.

Retries Is the maximum number of times an ARP request is retried. This value was configured into the unit.

Cache Size Is the maximum number of entries in the ARP table. This value was configured into the unit.

Dynamic Renew Mode Displays whether the ARP component automatically attempts to renew dynamic ARP entries when they age out.

Total Entry Count Current / Peak Field listing the total entries in the ARP table and the peak entry count in the ARP table.

Static Entry Count Current / Max Field listing the static entry count in the ARP table and maximum static entry count in the ARP table.

The following are displayed for each ARP entry.

IP Address	Is the IP address of a device on a subnet attached to an existing routing interface.
MAC Address	Is the hardware MAC address of that device.
Interface	Is the routing slot/port associated with the device ARP entry.
Type	Is the type that was configured into the unit. The possible values are Local, Gateway, Dynamic and Static.
Age	This field displays the current age of the ARP entry since last refresh (in hh:mm:ss format

show arp brief

This command displays the brief Address Resolution Protocol (ARP) table information.

Format	`show arp brief`
Mode	`Privileged EXEC`

Age Time (seconds) Is the time it takes for an ARP entry to age out. This value was configured into the unit. Age time is measured in seconds.

Response Time (seconds) Is the time it takes for an ARP request timeout. This value was configured into the unit. Response time is measured in seconds.

Retries Is the maximum number of times an ARP request is retried. This value was configured into the unit.

Cache Size Is the maximum number of entries in the ARP table. This value was configured into the unit.

Dynamic Renew Mode Displays whether the ARP component automatically attempts to renew dynamic ARP entries when they age out.

Total Entry Count Current / Peak Field listing the total entries in the ARP table and the peak entry count in the ARP table.

Static Entry Count Current / Max Field listing the static entry count in the ARP table and maximum static entry count in the ARP table.

show bootpdhcprelay

This command displays the BootP/DHCP Relay information.

Format	`show bootpdhcprelay`
Mode	`Privileged EXEC and User EXEC`
Maximum Hop Count	Is the maximum allowable relay agent hops.
Minimum Wait Time (Seconds)	Is the minimum wait time.
Admin Mode	Represents whether relaying of requests is enabled or disabled.
Server IP Address	Is the IP Address for the BootP/DHCP Relay server.
Circuit Id Option Mode	Is the DHCP circuit Id option which may be enabled or disabled.
Requests Received	Is the number or requests received.
Requests Relayed	Is the number of requests relayed.
Packets Discarded	Is the number of packets discarded.

show ip brief

This command displays all the summary information of the IP. This command takes no options.

Format	`show ip brief`
Mode	`Privileged EXEC and User EXEC`
Default Time to Live	The computed TTL (Time to Live) of forwarding a packet from the local router to the final destination.
Router ID	Is a 32 bit integer in dotted decimal format identifying the router, about which information is displayed. This is a configured value.
Routing Mode	Shows whether the routing mode is enabled or disabled.
IP Forwarding Mode	Shows whether forwarding of IP frames is enabled or disabled. This is a configured value.

show ip interface

This command displays all pertinent information about the IP interface.

Format	`show ip interface <slot/port>`
Mode	`Privileged EXEC and User EXEC`

IP Address	Is an IP address representing the subnet configuration of the router interface. This value was configured into the unit.
Subnet Mask	Is a mask of the network and host portion of the IP address for the router interface. This value was configured into the unit.
Routing Mode	Is the administrative mode of router interface participation. The possible values are enable or disable. This value was configured into the unit.
Administrative Mode	Is the administrative mode of the specified interface. The possible values of this field are enable or disable. This value was configured into the unit.
Forward Net Directed Broadcasts	Displays whether forwarding of network-directed broadcasts is enabled or disabled. This value was configured into the unit.
Active State	Displays whether the interface is active or inactive. An interface is considered active if its link is up and it is in forwarding state.
Link Speed Data Rate	Is an integer representing the physical link data rate of the specified interface. This is measured in Megabits per second (Mbps).
MAC Address	Is the burned in physical address of the specified interface. The format is 6 two-digit hexadecimal numbers that are separated by colons.
Encapsulation Type	Is the encapsulation type for the specified interface. The types are: Ethernet or SNAP.

show ip interface brief

This command displays summary information about IP configuration settings for all ports in the router. This command takes no options.

Format	`show ip interface brief`
Mode	`Privileged EXEC and User EXEC`
Slot/Port	The interface being displayed on the row.
IP Address	The IP address of the routing interface in 32-bit dotted decimal format.
IP Mask	The IP mask of the routing interface in 32-bit dotted decimal format.

Netdir Bcast	Indicates if IP forwards net-directed broadcasts on this interface. Possible values are Enable or Disable.
MultiCast Fwd	Indicates the multicast forwarding administrative mode on the interface. Possible values are Enable or Disable.
In Access Mode	Indicates the inbound access list checking administrative mode on this interface. Possible values are Enable or Disable.
Out Access Mode	Indicates the outbound access list checking administrative mode on this interface. Possible values are Enable or Disable.

show ip irdp

This command displays the router discovery information for all interfaces, or a specified interface.

Format	**show ip irdp <*slot/port* | *all*>**
Mode	**Privileged EXEC and User EXEC**
Ad Mode	Displays the advertise mode which indicates whether router discovery is enabled or disabled on this interface.
Max Int	Displays the maximum advertise interval which is the maximum time allowed between sending router advertisements from the interface in seconds.
Min Int	Displays the minimum advertise interval which is the minimum time allowed between sending router advertisements from the interface in seconds.
Adv Life	Displays advertise lifetime which is the value of the lifetime field of the router advertisement sent from the interface in seconds.
Preferences	Displays the preference of the address as a default router address, relative to other router addresses on the same subnet.

show ip ospf

This command displays information relevant to the OSPF router. This command takes no options.

Format	**show ip ospf**
Mode	**Privileged EXEC and User EXEC**
Router ID	Is a 32 bit integer in dotted decimal format identifying the router, about which information is displayed. This is a configured value.

OSPF Admin Mode	The administrative mode of OSPF in the router. This is a configured value.
ASBR Mode	Reflects whether the ASBR mode is enabled or disabled. Enable implies that the router is an autonomous system border router. Router automatically becomes an ASBR when it is configured to redistribute routes learnt from other protocol. The possible values for the ASBR status is enabled (if the router is configured to redistribute routes learnt by other protocols) or disabled (if the router is not configured for the same).
RFC 1583 Compatibility	Reflects whether 1583 compatibility is enabled or disabled. This is a configured value.
Default-metric	RDefault value for redistributed routes.
Source	Source protocol/routes that are being redistributed.
Metric-value	Metric of the routes being redistributed.
Match-value	The criteria by which OSPF routes are redistributed into other routing domains.
Type-value	External Type 1 or External Type 2 routes.
Tag-value	Decimal value attached to each external route.
Subnets	For redistributing routes into OSPF, the scope of redistribution for the specified protocol.
Distribute-list	TAccess list used to filter redistributed routes.
Default-info originate	Indicates whether the default routes received from other source protocols are advertised or not

The information below will only be displayed if OSPF is enabled.

ABR Status	Reflects the whether or not the router is an OSPF Area Border Router.
Exit Overflow Interval	The number of seconds that, after entering OverflowState, a router will attempt to leave OverflowState.
External LSA count	The number of external (LS type 5) link-state advertisements in the link-state database.
External LSA Checksum	A number which represents the sum of the LS checksums of external link-state advertisements contained in the link-state database.

New LSAs Originated	The number of new link-state advertisements that have been originated.
LSAs Received	The number of link-state advertisements received determined to be new instantiations.
External LSDB Limit	The maximum number of non-default AS-external-LSAs entries that can be stored in the link-state database.

show ip ospf area

This command displays information about the area. The <areaid> identifies the OSPF area that is being displayed.

Format	`show ip ospf area <areaid>`
Mode	`Privileged EXEC and User EXEC`
AreaID	Is the area id of the requested OSPF area.
Aging Interval	Is a number representing the aging interval for this area.
External Routing	Is a number representing the external routing capabilities for this area.
Authentication Type	Is the configured authentication type to use for this area.
Spf Runs	Is the number of times that the intra-area route table has been calculated using this area's link-state database.
Area Border Router Count	The total number of area border routers reachable within this area.
Area LSA Count	Total number of link-state advertisements in this area's link-state database, excluding AS External LSA's.
Area LSA Checksum	A number representing the Area LSA Checksum for the specified AreaID excluding the external (LS type 5) link-state advertisements.
Stub Mode	Represents whether the specified Area is a stub area or not. The possible values are enabled and disabled. This is a configured value.
Import Summary LSAs	
Metric Value	Is a number representing the Metric Value for the specified area.
Metric Type	Is the Default Metric Type for the specified Area.

show ip ospf database

This command displays the link state database. This command takes no options. The information below will only be displayed if OSPF is enabled.

Format	`show ip ospf database`
Mode	`Privileged EXEC and User EXEC`
Router ID	Is a 32 bit dotted decimal number representing the LSDB interface.
Area ID	Is the IP address identifying the router ID.
LSA Type	The types are: router, network, ipnet sum, asbr sum, as external, group member, tmp 1, tmp 2, opaque link, opaque area.
LS ID	Is a number that "uniquely identifies an LSA that a router originates from all other self originated LSA's of the same LS type."
Age	Is a number representing the age of the link state advertisement in seconds.
Sequence	Is a number that represents which LSA is more recent.
Checksum	Is to total number LSA checksum.
Options	This is an integer. It indicates that the LSA receives special handling during routing calculations.

show ip ospf interface

This command displays the information for the IFO object or virtual interface tables.

Format	`show ip ospf interface <slot/port>`
Mode	`Privileged EXEC and User EXEC`
IP Address	Represents the IP address for the specified interface. This is a configured value.
Subnet Mask	Is a mask of the network and host portion of the IP address for the OSPF interface. This value was configured into the unit. This is a configured value.
OSPF Admin Mode	States whether OSPF is enabled or disabled on a router interface. This is a configured value.
OSPF Area ID	Represents the OSPF Area Id for the specified interface. This is a configured value.

Router Priority	A number representing the OSPF Priority for the specified interface. This is a configured value.
Retransmit Interval	A number representing the OSPF Retransmit Interval for the specified interface. This is a configured value.
Hello Interval	A number representing the OSPF Hello Interval for the specified interface. This is a configured value.
Dead Interval	A number representing the OSPF Dead Interval for the specified interface. This is a configured value.
LSA Ack Interval	A number representing the OSPF LSA Acknowledgement Interval for the specified interface.
Transit Delay Interval	A number representing the OSPF Transit Delay for the specified interface. This is a configured value.
Authentication Type	The OSPF Authentication Type for the specified interface are: none, simple, and encrypt. This is a configured value.

The information below will only be displayed if OSPF is enabled.

OSPF Interface Type	Broadcast LANs, such as Ethernet and IEEE 802.5, take the value 'broadcast'. The OSPF Interface Type will be 'broadcast'.
State	The OSPF Interface States are: down, loopback, waiting, point-to-point, designated router, and backup designated router. This is the state of the OSPF interface.
Designated Router	Is the router ID representing the designated router.
Backup Designated Router	Is the router ID representing the backup designated router.
Number of Link Events	The number of link events.
Metric Cost	Is the cost of the ospf interface. This is a configured value.

show ip ospf interface brief

This command displays brief information for the IFO object or virtual interface tables. This command takes no options.

Format	`show ip ospf interface brief`
Mode	`Privileged EXEC and User EXEC`
Slot/Port	Is the unit slot/port identifying each interface.
OSPF Admin Mode	States whether OSPF is enabled or disabled on a router interface. This is a configured value.

OSPF Area ID	Represents the OSPF Area Id for the specified interface. This is a configured value.
Router Priority	A number representing the OSPF Priority for the specified interface. This is a configured value.
Hello Interval	A number representing the OSPF Hello Interval for the specified interface. This is a configured value.
Dead Interval	A number representing the OSPF Dead Interval for the specified interface. This is a configured value.
Retransmit Interval	A number representing the OSPF Retransmit Interval for the specified interface. This is a configured value.
Transit Delay Interval	A number representing the OSPF Transit Delay for the specified interface. This is a configured value.
LSA Ack Interval	A number representing the OSPF LSA Acknowledgement Interval for the specified interface.

show ip ospf interface stats

This command displays the statistics for a specific interface. The information below will only be displayed if OSPF is enabled.

Format	`show ip ospf interface stats <slot/port>`
Mode	`Privileged EXEC and User EXEC`
OSPF Area ID	The area id of this OSPF interface.
Spf Runs	The number of times that the intra-area route table has been calculated using this area's link-state database.
Area Border Router Count	The total number of area border routers reachable within this area. This is initially zero, and is calculated in each SPF pass.
AS Border Router Count	The total number of Autonomous System border routers reachable within this area.
Area LSA Count	The total number of link-state advertisements in this area's link-state database, excluding AS External LSAs.
IP Address	The IP address associated with this OSPF interface.
OSPF Interface Events	The number of times the specified OSPF interface has changed its state, or an error has occurred.
Virtual Events	The number of state changes or errors that occurred on this virtual link.

Neighbor Events	The number of times this neighbor relationship has changed state, or an error has occurred.
External LSA Count	The number of external (LS type 5) link-state advertisements in the link-state database.
LSAs Received	The number of LSAs received.
Originate New LSAs	The number of LSAs originated.

show ip ospf neighbor

This command displays the OSPF neighbor table list. When a particular neighbor ID is specified, detailed information about a neighbor is given. The information below will only be displayed if OSPF is enabled and the interface has a neighbor. The IP address is the IP address of the neighbor.

Format	`show ip ospf neighbor <ipaddr> <slot/port>`
Mode	`Privileged EXEC and User EXEC`
Interface	Is the slot/port identifying the internal interface number of the OSPF neighbor.
Router Id	Is a 4-digit dotted-decimal number identifying neighbor router.
Options	An integer value that indicates the optional OSPF capabilities supported by the neighbor. The neighbor's optional OSPF capabilities are also listed in its Hello packets. This enables received Hello Packets to be rejected (i.e., neighbor relationships will not even start to form) if there is a mismatch in certain crucial OSPF capabilities.
Router Priority	Displays the OSPF priority for the specified interface. The priority of an interface is a priority integer from 0 to 255. A value of '0' indicates that the router is not eligible to become the designated router on this network.
State	The types are: Down- initial state of the neighbor conversation - no recent information has been received from the neighbor. Attempt - no recent information has been received from the neighbor but a more concerted effort should be made to contact the neighbor. Init - an Hello packet has recently been seen from the neighbor, but bi-directional communication has not yet been established. 2 way - communication between the two routers is bi-directional.

Exchange start - the first step in creating an adjacency between the two neighboring routers, the goal is to decide which router is the master and to decide upon the initial DD sequence number.

Exchange - the router is describing its entire link state database by sending Database Description packets to the neighbor.

Loading - Link State Request packets are sent to the neighbor asking for the more recent LSAs that have been discovered (but not yet received) in the Exchange state.

Full - the neighboring routers are fully adjacent and they will now appear in router-LSAs and network-LSAs.

Events The number of times this neighbor relationship has changed state, or an error has occurred.

Permanence This variable displays the status of the entry, either dynamic or permanent. This refers to how the neighbor became known.

Hellos Suppressed This indicates whether Hellos are being suppressed to the neighbor. The types are enabled and disabled.

Retransmission Queue Length Is an integer representing the current length of the retransmission queue of the specified neighbor router Id of the specified interface.

show ip ospf neighbor brief

This command displays the OSPF neighbor table list. When a particular neighbor ID is specified, detailed information about a neighbor is given. The information below will only be displayed if OSPF is enabled.

Format `show ip ospf neighbor brief <slot/port | all>`

Mode `Privileged EXEC and User EXEC`

Router ID Is 4 digit dotted decimal number representing the neighbor interface.

IP Address Is an IP address representing the neighbor interface.

Neighbor Interface Index Is a slot/port identifying the neighbor interface index.

show ip ospf range

This command displays information about the area ranges for the specified <areaid>. The <areaid> identifies the OSPF area whose ranges are being displayed.

Format	`show ip ospf range <areaid>`
Mode	`Privileged EXEC and User EXEC`
Area ID	Is the area id of the requested OSPF area.
IP Address	Is an IP Address which represents this area range.
Subnet Mask	Is a valid subnet mask for this area range.
Lsdb Type	Is the type of link advertisement associated with this area range.
Advertisement	This indicates whether the advertisement status is enabled or disabled.

show ip ospf stub table

This command displays the OSPF stub table. The information below will only be displayed if OSPF is initialized on the switch.

Format	`show ip ospf stub table`
Mode	`Privileged EXEC and User EXEC`
Area ID	Is a 32-bit identifier for the created stub area.
Type of Service	Is the type of service associated with the stub metric. The 7300 Series L3 Switch only supports Normal TOS.
Metric Val	The metric value is applied based on the TOS. It defaults to the least metric of the type of service among the interfaces to other areas. The OSPF cost for a route is a function of the metric value.
Metric Type	Is the type of metric advertised as the default route.
Import Summary LSA	Controls the import of summary LSAs into stub areas.

show ip ospf virtual-link

This command displays the OSPF Virtual Interface information for a specific area and neighbor. The <areaid> parameter identifies the area and the <neighbor> parameter identifies the neighbor's IP Address.

Format	`show ip ospf virtual-link <areaid> <neighbor>`
Mode	`Privileged EXEC and User EXEC`
Area ID	Is the area id of the requested OSPF area.
Neighbor IP Address	Is the neighbor IP Address that is entered.

Hello Interval	Is the configured hello interval for the OSPF virtual interface.
Dead Interval	Is the configured dead interval for the OSPF virtual interface.
Iftransit Delay Interval	Is the configured transit delay for the OSPF virtual interface.
Retransmit Interval	Is the configured retransmit interval for the OSPF virtual interface.
Authentication Type	Is the configured authentication type of the OSPF virtual interface.
State	The OSPF Interface States are: down, loopback, waiting, point-to-point, designated router, and backup designated router. This is the state of the OSPF interface.
Neighbor State	Displays the neighbor state.

show ip ospf virtual-link brief

This command displays the OSPF Virtual Interface information for all areas in the system.

Format	`show ip ospf virtual-link brief`
Mode	`Privileged EXEC and User EXEC`
Area Id	Is the area id of the requested OSPF area.
Neighbor	Is the neighbor interface of the OSPF virtual interface.
Hello Interval	Is the configured hello interval for the OSPF virtual interface.
Dead Interval	Is the configured dead interval for the OSPF virtual interface.
Retransmit Interval	Is the configured retransmit interval for the OSPF virtual interface.
Transit Delay	Is the configured transit delay for the OSPF virtual interface.

show ip rip

This command displays information relevant to the RIP router.

Format	`show ip rip`
Mode	`Privileged EXEC and User EXEC`
Router ID	Is a 32 bit dotted decimal number representing the interface.

RIP Admin Mode	RIP administrative mode of router RIP operation; enable activates and disable de-activates the RIP ability for the switch. This is a configured value.
Global Route Changes	The number of route changes made by RIP to the IP Route Database.
Global queries	The number of responses sent to RIP queries from other systems.
Default-metric	Source protocol/routes that are being redistributed.
Source	Source protocol/routes that are being redistributed.
Metric-value	Metric of the routes being redistributed.
Match-value	The criteria by which OSPF routes are redistributed into other routing domains.
Distribute-list	TAccess list used to filter redistributed routes.
Default-info originate	Indicates whether the default routes received from other source protocols are advertised or not

show ip rip interface brief

This command displays general information for each RIP interface. For this command to display successful results routing must be enable per interface (i.e. config router rip interface <slot/port> enable).

Format	`show ip rip interface brief`
Mode	`Privileged EXEC and User EXEC`
Slot/Port	Is the unit slot/port identifying each interface.
IP Address	The IP source address used by the specified RIP interface.
Send Version	The RIP version(s) used when sending updates on the specified interface. The types are none, RIP-1, RIP-1c, RIP-2.
Receive Version	The RIP version(s) allowed when receiving updates from the specified interface. The types are none, RIP-1, RIP-2, Both
RIP Mode	RIP administrative mode of router RIP operation; enable activates, disable de-activates it.
Link State	The mode of the interface (up or down).

show ip route

This command causes the entire route table to be displayed. This commands takes no options.

Format	`show ip route`
Mode	`Privileged EXEC and User EXEC`
Network Address	Is an IP address identifying the network on the specified interface.
Subnet Mask	Is a mask of the network and host portion of the IP address for the router interface.
Protocol	Tells which protocol added the specified route. The possibilities are: local, static, OSPF or RIP.
Next Hop Intf	The outgoing router interface to use when forwarding traffic to the next destination.
Next Hop IP Address	The outgoing router IP address to use when forwarding traffic to the next router (if any) in the path toward the destination.
Total Number of Routes	The total number of routes.

show ip route bestroutes

This command causes the entire route table to be displayed. This commands takes no options.

Format	`show ip route bestroutes`
Mode	`Privileged EXEC and User EXEC`
Network Address	Is an IP route prefix for the destination.
Subnet Mask	Is a mask of the network and host portion of the IP address for the specified interface.
Protocol	Tells which protocol added the specified route. The possibilities are: local, static, OSPF or RIP.
Next Hop Intf	The outgoing router interface to use when forwarding traffic to the next destination.
Next Hop IP Address	The outgoing router IP address to use when forwarding traffic to the next router (if any) in the path toward the destination. The next router will always be one of the adjacent neighbors or the IP address of the local interface for a directly attached network.
Total Number of Routes	The total number of routes in the route table.

show ip route entry

This command displays detailed information about the route to a specific network to be displayed. The value for <networkaddr> is a valid IP address.

Format	`show ip route entry <networkaddr>`
Mode	`Privileged EXEC and User EXEC`
Network Address	Is a valid network address identifying the network on the specified interface.
Subnet Mask	Is a mask of the network and host portion of the IP address for the attached network.
Protocol	Tells which protocol added the specified route. The possibilities are: local, static, OSPF or RIP.
Next Hop Interface	The outgoing router interface to use when forwarding traffic to the next destination.
Next Hop IP Address	The outgoing router IP address to use when forwarding traffic to the next router (if any) in the path toward the destination.
Metric	The metric value that is used for this route entry.

show ip route preferences

This command displays detailed information about the route preferences. Route preferences are used in determining the best route. Lower router preference values are preferred over higher router preference values.

Format	`show ip route preferences`
Mode	`Privileged EXEC and User EXEC`
Local	This field displays the local route preference value.
Static	This field displays the static route preference value.
OSPF Intra	This field displays the OSPF Intra route preference value.
OSPF Inter	This field displays the OSPF Inter route preference value.
OSPF Type-1	This field displays the OSPF Type-1 route preference value.
OSPF Type-2	This field displays the OSPF Type-2 route preference value.
RIP	This field displays the RIP route preference value.
BGP4	This field displays the BGP-4 route preference value.

show ip stats

This command displays IP statistical information. Refer to RFC 1213 for more information about the fields that are displayed. This command takes no options.

Format `show ip stats`

Mode `Privileged EXEC and User EXEC`

show ip vlan

This command displays the VLAN routing information for all VLANs with routing enabled in the system.

Format `show ip vlan`

Mode `Privileged EXEC and User EXEC`

MAC Address used by Routing VLANs Is the MAC Address associated with the internal bridge-router interface (IBRI). The same MAC Address is used by all VLAN routing interfaces. It will be displayed above the per-VLAN information.

VLAN ID	Is the identifier of the VLAN.
Logical Interface	Indicates the logical slot and port associated with the VLAN routing interface.
IP Address	Displays the IP Address associated with this VLAN.
Subnet Mask	Indicates the subnet mask that is associated with this VLAN.

show router rip interface

This command displays information related to a particular RIP interface.

Format `show ip rip interface <slot/port>`

Mode `Privileged EXEC and User EXEC`

Interface	Is the unit slot/port identifying each interface. This is a configured value.
IP Address	The IP source address used by the specified RIP interface. This is a configured value.
Send version	The RIP version(s) used when sending updates on the specified interface. The types are none, RIP-1, RIP-1c, RIP-2. This is a configured value.

Receive version	The RIP version(s) allowed when receiving updates from the specified interface. The types are none, RIP-1, RIP-2, Both. This is a configured value.
RIP Admin Mode	RIP administrative mode of router RIP operation; enable activates, disable de-activates it. This is a configured value.
Link State	Indicates whether the RIP interface is up or down. This is a configured value.
Authentication Type	The RIP Authentication Type for the specified interface. The types are none, simple, and encrypt. This is a configured value.
Authentication Key	The RIP Authentication Key for the specified interface. The actual key will be **** to avoid compromising privacy. This is a configured value.
Authentication Key ID	The RIP Authentication Key ID for the specified interface. This is a configured value.
Default Metric	A number which represents the metric used for default routes in RIP updates originated on the specified interface. This is a configured value.

The following information will be invalid if the link state is down.

Bad Packets Received	The number of RIP response packets received by the RIP process which were subsequently discarded for any reason.
Bad Routes Received	The number of routes contained in valid RIP packets that were ignored for any reason.
Updates Sent	The number of triggered RIP updates actually sent on this interface.

show ip vrrp

This command displays whether VRRP functionality is enabled or disabled on the 7300 Series L3 Switch. It also displays some global parameters which are required for monitoring This command takes no options.

Format	`show ip vrrp`
Mode	`Privileged EXEC and User EXEC`
VRRP Admin Mode	Displays the admin mode for VRRP functionality on the switch.
Router Checksum Errors	Represents the total number of VRRP packets received with an invalid VRRP checksum value.

Router Version Errors	Represents the total number of VRRP packets received with Unknown or unsupported version number.
Router VRID Errors	Represents the total number of VRRP packets received with invalid VRID for this virtual router.

show ip vrrp interface

This command displays all configuration information and VRRP router statistics of a virtual router configured on a specific interface.

Format	`show ip vrrp interface <slot/port> <vrID>`
Mode	`Privileged EXEC and User EXEC`
IP Address	This field represents the configured IP Address for the Virtual router.
VMAC address	Represents the VMAC address of the specified router.
Authentication type	Represents the authentication type for the specific virtual router.
Priority	Represents the priority value for the specific virtual router.
Advertisement interval	Represents the advertisement interval for the specific virtual router.
Pre-Empt Mode	Is the preemption mode configured on the specified virtual router.
Administrative Mode	Represents the status (Enable or Disable) of the specific router.
State	Represents the state (Master/backup) of the specific virtual

show ip vrrp interface brief

This command displays information about each virtual router configured on the 7300 Series L3 Switch. This command takes no options. It displays information about each virtual router.

Format	`show ip vrrp interface brief`
Mode	`Privileged EXEC and User EXEC`
Slot/port	Represents the slot/port combination of the virtual router
VRID	Represents the router ID of the virtual router.
IP Address	Is the IP Address that was configured on the virtual router
Mode	Represents whether the virtual router is enabled or disabled.
State	Represents the state (Master/backup) of the virtual router.

show ip vrrp interface stats

This command displays the statistical information about each virtual router configured on the 7300 Series L3 Switch.

Format `show ip vrrp interface stats <slot/port> <vrID>`

Mode `Privileged EXEC and User EXEC`

Is the time that the virtual router has been up, in days, hours, minutes and seconds.

State Transitioned to Master Represents the total number of times virtual router state has changed to MASTER.

Advertisement Received Represents the total number of VRRP advertisements received by this virtual router.

Advertisement Interval Errors Represents the total number of VRRP advertisements received for which advertisement interval is different than the configured value for this virtual router.

Authentication Failure Represents the total number of VRRP packets received that don't pass the authentication check.

IP TTL errors Represents the total number of VRRP packets received by the virtual router with IP TTL (time to live) not equal to 255.

Zero Priority Packets Received Represents the total number of VRRP packets received by virtual router with a priority of '0'.

Zero Priority Packets Sent Represents the total number of VRRP packets sent by the virtual router with a priority of '0'

Invalid Type Packets Received Represents the total number of VRRP packets received by the virtual router with invalid 'type' field.

Address List Errors Represents the total number of VRRP packets received for which address list does not match the locally configured list for the virtual router.

Invalid Authentication Type Represents the total number of VRRP packets received with unknown authentication type.

Authentication Type Mismatch Represents the total number of VRRP advertisements received for which 'auth type' not equal to locally configured one for this virtual router.

Packet Length Errors Represents the total number of VRRP packets received with packet length less than length of VRRP header

split-horizon

This command sets the RIP split horizon mode.

Default simple

Format **split-horizon {*none* | *simple* | *poison*}**

Mode **Router RIP Config**

no split-horizon

This command sets the default RIP split horizon mode.

Format **no split-horizon**

Mode **Router RIP Config**

trapflags

This command enables OSPF traps.

Default Enabled

Format **trapflags**

Mode **Router OSPF Config**

no trapflags

This command disables OSPF traps.

Format **no trapflags**

Mode **Router OSPF Config**

vlan routing

This command creates routing on a VLAN. The <vlanid> value has a range from 1 to 4094.

Format **vlan routing <*vlanid*>**

Mode **VLAN Database**

no vlan routing

This command deletes routing on a VLAN. The <vlanid> value has a range from 1 to 4094.

Format `no vlan routing <vlanid>`

Mode `VLAN Database`

ip vrrp

This command sets the virtual router ID on an interface for Virtual router configuration in the router. The parameter <vrID> is the virtual router ID which has an integer value range from 1 to 255.

Default There is no default value for vrID.

Format `ip vrrp <vrID>`

Mode `Interface Config`

no ip vrrp

This command removes all VRRP configuration details of the virtual router configured on a specific interface. The parameter <vrID> is the virtual router ID which has an integer value ranges from 1 to 255.

Format `no ip vrrp <vrID>`

Mode `Interface Config`

ip vrrp authentication

This command sets the authorization details value for the virtual router configured on a specified interface. The parameter {none | simple} specifies the authorization type for virtual router configured on the specified interface. The parameter [key] is optional, it is only required when authorization type is simple text password. The parameter <vrID> is the virtual router ID which has an integer value ranges from 1 to 255.

Default The default value for authorization type is No authorization.

Format `ip vrrp <vrID> authentication {none | simple <key>}`

Mode `Interface Config`

no ip vrrp authentication

This command sets the default authorization details value for the virtual router configured on a specified interface.

Format `no ip vrrp <vrID> authentication`

Mode `Interface Config`

ip vrrp

This command enables the administrative mode of VRRP in the router.

Default Enabled

Format `ip vrrp`

Mode `Global Config`

no ip vrrp

This command disables the default administrative mode of VRRP in the router.

Format `no ip vrrp`

Mode `Global Config`

ip vrrp mode

This command enables the virtual router configured on the specified interface. Enabling the status field starts a virtual router. The parameter <vrID> is the virtual router ID which has an integer value ranging from 1 to 255.

Default Disabled

Format `ip vrrp <vrID> mode`

Mode `Interface Config`

no ip vrrp mode

This command disables the virtual router configured on the specified interface. Disabling the status field stops a virtual router.

Format `no ip vrrp <vrID> mode`

Mode `Interface Config`

ip vrrp ip

This command sets the ipaddress value for a virtual router. The value for <ipaddr> is the IP Address which is to be configured on that interface for VRRP. The parameter <vrID> is the virtual router ID which has an integer value range from 1 to 255.

Default There is no default value for ipaddress.

Format `ip vrrp <vrID> ip <ipaddr>`

Mode `Interface Config`

ip vrrp preempt

This command sets the preemption mode value for the virtual router configured on a specified interface. The parameter <vrID> is the virtual router ID which has an integer value range from 1 to 255

Default Enabled

Format `ip vrrp <vrID> preempt`

Mode `Interface Config`

no ip vrrp preempt

This command sets the default preemption mode value for the virtual router configured on a specified interface.

Default Enabled

Format `no ip vrrp <vrID> preempt`

Mode `Interface Config`

ip vrrp priority

This command sets the priority value for the virtual router configured on a specified interface. The priority of the interface is a priority integer from 1 to 254. The parameter <vrID> is the virtual router ID which has an integer value ranges from 1 to 255.

Default 100

Format `ip vrrp <vrID> priority <1-254>`

Mode `Interface Config`

no ip vrrp priority

This command sets the default priority value for the virtual router configured on a specified interface.

Format `no ip vrrp <vrID> priority`

Mode `Interface Config`

ip vrrp timers advertise

This command sets the advertisement value for a virtual router. The value for advinterval is time used for VRRP advertisement in seconds. The parameter <vrID> is the virtual router ID which has an integer value range from 1 to 255.

Default 1

Format `ip vrrp <vrID> timers advertise <1-255>`

Mode `Interface Config`

no ip vrrp timers advertise

This command sets the default advertisement value for a virtual router.

Format `no ip vrrp <vrID> timers advertise`

Mode `Interface Config`

Chapter 10
CLI Commands: Differentiated Services

This chapter contains the CLI commands used for the QOS Differentiated Services (DiffServ) package.

The user configures DiffServ in several stages by specifying:

1. Class
    - creating and deleting classes
    - defining match criteria for a class.

Note: The only way to remove an individual match criterion from an existing class definition is to delete the class and re-create it.

2. Policy
    - creating and deleting policies
    - associating classes with a policy
    - defining policy statements for a policy/class combination
3. Service
    - adding and removing a policy to/from a directional (i.e., inbound, outbound) interface

Packets are filtered and processed based on defined criteria. The filtering criteria is defined by a class. The processing is defined by a policy's attributes. Policy attributes may be defined on a per-class instance basis, and it is these attributes that are applied when a match occurs.

Packet processing begins by testing the match criteria for a packet. A policy is applied to a packet when a class match within that policy is found.

Note that the type of class - all, any, or acl - has a bearing on the validity of match criteria specified when defining the class. A class type of 'any' processes its match rules in an ordered sequence; additional rules specified for such a class simply extend this list. A class type of ‘acl’ obtains its rule list by interpreting each ACL rule definition at the time the Diffserv class is created. Differences arise when specifying match criteria for a class type 'all', since only one value for each non-excluded match field is allowed within a class definition. If a field is already specified for a class, all subsequent attempts to specify the same field fail, including the cases where a field can be specified multiple ways through alternative formats. The exception to this is when the 'exclude' option is specified, in which case this restriction does not apply to the excluded fields.

The following class restrictions are imposed by the 7300 Series L3 Switch DiffServ design:

- nested class support limited to:
  - 'all' within 'all'
  - no nested 'not' conditions
  - no nested 'acl' class types
  - each class contains at most one referenced class
- hierarchical service policies not supported in a class definition
- access list matched by reference only, and must be sole criterion in a class
  - i.e., ACL rules copied as class match criteria at time of class creation, with class type 'any'
  - implicit ACL 'deny all' rule also copied
  - no nesting of class type 'acl'

Regarding nested classes, referred to here as class references, a given class definition can contain at most one reference to another class, which can be combined with other match criteria. The referenced class is truly a reference and not a copy, since additions to a referenced class affect all classes that reference it. Changes to any class definition currently referenced by any other class must result in valid class definitions for all derived classes otherwise the change is rejected. A class reference may be removed from a class definition.

The user can display summary and detailed information for classes, policies and services. All configuration information is accessible via the CLI, Web, and SNMP user interfaces.

General Commands

The following characteristics are configurable for the platform as a whole.

diffserv

This command sets the DiffServ operational mode to active. While disabled, the DiffServ configuration is retained and can be changed, but it is not activated. When enabled, Diffserv services are activated.

Format `diffserv`

Mode `Global Config`

no diffserv

This command sets the DiffServ operational mode to inactive. While disabled, the DiffServ configuration is retained and can be changed, but it is not activated. When enabled, Diffserv services are activated.

Format `no diffserv`

Mode `Global Config`

Class Commands

The 'class' command set is used in DiffServ to define:

Traffic Classification Specify Behavior Aggregate (BA), based on DSCP, and Multi-Field (MF) classes of traffic (name, match criteria)

Service Levels Specify the BA forwarding classes / service levels. Conceptually, DiffServ is a two-level hierarchy of classes: 1. Service/PHB, 2. Traffic Class

This set of commands consists of class creation/deletion and matching, with the class match commands specifying layer 3, layer 2, and general match criteria. The class match criteria are also known as class rules, with a class definition consisting of one or more rules to identify the traffic belonging to the class. Note that once a class match criterion is created for a class, it cannot be changed or deleted - the entire class must be deleted and re-created.

The CLI command root is ***class-map***.

class-map

This command defines a new DiffServ class of type match-all, match-any or match-access-group. The <**classname**> parameter is a case sensitive alphanumeric string from 1 to 31 characters uniquely identifying the class.

Note: Tthe class name 'default' is reserved and must not be used here.

When used without any match condition, this command enters the class-map mode. The <**classname**> is the name of an existing DiffServ class.

Note: The class name 'default' is reserved and is not allowed here.

The class type of **match-all** indicates all of the individual match conditions must be true for a packet to be considered a member of the class.

The class type of **match-access-group** indicates the individual class match criteria are evaluated based on an access list (ACL). The <**aclid**> parameter is an integer specifying an existing ACL number (refer to the appropriate ACL documentation for the valid ACL number range). A **match-access-group** class type copies its set of match criteria from the current rule definition of the specified ACL number. All elements of a single ACL Rule are treated by DiffServ as a grouped set, similar to class type all. For any class, at least one class match condition must be specified for the class to be considered valid.

Note: The class match conditions are obtained from the referenced access list **at the time of class creation**. Thus, any subsequent changes to the referenced ACL definition do not affect the DiffServ class. To pick up the latest ACL definition, the DiffServ class must be deleted and re-created.

This command may be used without specifying a class type to enter the Class-Map Config mode for an existing DiffServ class.

Note: The CLI mode is changed to Class-Map Config when this command is successfully executed.

Format	`class-map [ match-all ] <classmapname>`
Mode	`Global Config`

no class-map

This command eliminates an existing DiffServ class. The <**classname**> is the name of an existing DiffServ class.

Note: The class name 'default' is reserved and is not allowed here.

This command may be issued at any time; if the class is currently referenced by one or more policies or by any other class, this deletion attempt shall fail.

Format `no class-map <classname>`

Mode `Global Config`

class-map rename

This command changes the name of a DiffServ class. The ***<classname>*** is the name of an existing DiffServ class. The ***<newclassname>*** parameter is a case-sensitive alphanumeric string from 1 to 31 characters uniquely identifying the class.

Note: The class name 'default' is reserved and must not be used here.

Default None

Format `class-map rename <classname> <newclassname>`

Mode `Global Config`

match any

This command adds to the specified class definition a match condition whereby all packets are considered to belong to the class. The optional [**not**] parameter has the effect of negating this match condition for the class (i.e., none of the packets are considered to belong to the class).

Default `None`

Format `match [not] any`

Mode `Class-Map Config`

match class-map

This command adds to the specified class definition the set of match conditions defined for another class. The <**refclassname**> is the name of an existing DiffServ class whose match conditions are being referenced by the specified class definition.

Note: There is no [**not**] option for this match command.

Default `None`

Format `match class-map <refclassname>`

Mode `Class-Map Config`

Restrictions

The class types of both <***classname***> and <***refclassname***> must be identical (i.e., any vs. any, or all vs. all). A class type of acl is not supported by this command.

Cannot specify <***refclassname***> the same as <***classname***> (i.e., self-referencing of class name not allowed).

At most one other class may be referenced by a class.

Any attempt to delete the <***refclassname***> class while still referenced by any <***classname***> shall fail.

The combined match criteria of <***classname***> and <***refclassname***> must be an allowed combination based on the class type. Any subsequent changes to the <***refclassname***> class match criteria must maintain this validity, or the change attempt shall fail.

The total number of class rules formed by the complete reference class chain (includes both predecessor and successor classes) must not exceed a platform-specific maximum.

In some cases, each removal of a refclass rule reduces the maximum number of available rules in the class definition by one.

no match class-map

This command removes from the specified class definition the set of match conditions defined for another class. The <**refclassname**> is the name of an existing DiffServ class whose match conditions are being referenced by the specified class definition.

Note: There is no [**not**] option for this match command.

Default `None`

Format `no match class-map <refclassname>`

Mode `Class-Map Config`

match destination-address mac

This command adds to the specified class definition a match condition based on the destination MAC address of a packet. The <macaddr> parameter is any layer 2 MAC address formatted as six, two-digit hexadecimal numbers separated by colons (e.g., 00:11:22:dd:ee:ff). The <**macmask**> parameter is a layer 2 MAC address bit mask, which need not be contiguous, and is formatted as six, two-digit hexadecimal numbers separated by colons (e.g., ff:07:23:ff:fe:dc). The optional [**not**] parameter has the effect of negating this match condition for the class (i.e., match all destination MAC addresses except for what is specified here).

Default	`None`
Format	`match [not] destination-address mac <macaddr> <mac-mask>`
Mode	`Class-Map Config`

match dstip

This command adds to the specified class definition a match condition based on the destination IP address of a packet. The <ipaddr> parameter specifies an IP address. The <**ipmask**> parameter specifies an IP address bit mask; note that although similar to a standard subnet mask, this bit mask need not be contiguous. The optional [**not**] parameter has the effect of negating this match condition for the class (i.e., match all destination IP addresses except for what is specified here).

Default	`None`
Format	`match [not] dstip <ipaddr> <ipmask>`
Mode	`Class-Map Config`

match dstl4port

This command adds to the specified class definition a match condition based on the destination layer 4 port of a packet using a single keyword or numeric notation or a numeric range notation.

To specify the match condition as a single keyword, the value for <**portkey**> is one of the supported port name keywords. The currently supported <**portkey**> values are: **domain, echo, ftp, ftpdata, http, smtp, snmp, telnet, tftp, www.** Each of these translates into its equivalent port number, which is used as both the start and end of a port range.

To specify the match condition using a numeric notation, one layer 4 port number is required. The port number is an integer from 0 to 65535.

To specify the match condition using a numeric range notation, two layer 4 port numbers are required and together they specify a contiguous port range. Each port number is an integer from 0 to 65535, but with the added requirement that the second number be equal to or greater than the first.

The optional [not] parameter has the effect of negating this match condition for the class (i.e., match all destination layer 4 port numbers except for the one specified here).

Default	`None`

Format	`match [not] dstl4port {<portkey> | <0-65535> [<0-65535>]}`
Mode	`Class-Map Config`

match ip dscp

This command adds to the specified class definition a match condition based on the value of the IP DiffServ Code Point (DSCP) field in a packet, which is defined as the high-order six bits of the Service Type octet in the IP header (the low-order two bits are not checked). The optional [**not**] parameter has the effect of negating this match condition for the class (i.e., match all IP DSCP values except for what is specified here). The <**dscpval**> value is specified as either an integer from 0 to 63, or symbolically through one of the following keywords: **af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, be, cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, ef**.

Note: The ip dscp, ip precedence, and ip tos match conditions are alternative ways to specify a match criterion for the same Service Type field in the IP header, but with a slightly different user notation.

Note: To specify a match on all DSCP values, use the match [not] ip tos <tosbits> <tosmask> command with <**tosbits**> set to 0 and <**tosmask**> set to 03 (hex).

Default	`None`
Format	`match [not] ip dscp <dscpval>`
Mode	`Class-Map Config`

match ip precedence

This command adds to the specified class definition a match condition based on the value of the IP Precedence field in a packet, which is defined as the high-order three bits of the Service Type octet in the IP header (the low-order five bits are not checked). The precedence value is an integer from 0 to 7. The optional [**not**] parameter has the effect of negating this match condition for the class (i.e., match all IP Precedence values except for what is specified here).

Note: The ip dscp, ip precedence, and ip tos match conditions are alternative ways to specify a match criterion for the same Service Type field in the IP header, but with a slightly different user notation.

Note: To specify a match on all Precedence values, use the match [not] ip tos <tosbits> <tosmask> command with <**tosbits**> set to 0 and <**tosmask**> set to 1F (hex).

Default	`None`
Format	`match [not] ip precedence <0-7>`

Mode `Class-Map Config`

match ip tos

This command adds to the specified class definition a match condition based on the value of the IP TOS field in a packet, which is defined as all eight bits of the Service Type octet in the IP header. The value of <**tosbits**> is a two-digit hexadecimal number from 00 to ff. The value of <**tosmask**> is a two-digit hexadecimal number from 00 to ff. The optional [**not**] parameter has the effect of negating this match condition for the class (i.e., match all IP Precedence values except for what is specified here). The <**tosmask**> denotes the bit positions in <**tosbits**> that are used for comparison against the IP TOS field in a packet. For example, to check for an IP TOS value having bits 7 and 5 set and bit 1 clear, where bit 7 is most significant, use a <**tosbits**> value of a0 (hex) and a <**tosmask**> of a2 (hex).

Note: The ip dscp, ip precedence, and ip tos match conditions are alternative ways to specify a match criterion for the same Service Type field in the IP header, but with a slightly different user notation.

Note: In essence, this the “free form” version of the IP DSCP/Precedence/TOS match specification in that the user has complete control of specifying which bits of the IP Service Type field are checked.

Default `None`

Format `match [not] ip tos <tosbits> <tosmask>`

Mode `Class-Map Config`

match protocol

This command adds to the specified class definition a match condition based on the value of the IP Protocol field in a packet using a single keyword notation or a numeric value notation.

To specify the match condition using a single keyword notation, the value for <**protocol-name**> is one of the supported protocol name keywords. The currently supported values are: **icmp, igmp, ip, tcp, udp**. Note that a value of **ip** is interpreted to match all protocol number values.

To specify the match condition using a numeric value notation, the protocol number is a standard value assigned by IANA and is interpreted as an integer from 0 to 255.

Note: This command does not validate the protocol number value against the current list defined by IANA.

The optional **[not]** parameter has the effect of negating this match condition for the class (i.e., match all IP Protocol numbers except for the one specified here).

Default	`None`
Format	`match [not] protocol {<protocol-name> | <0-255>}`
Mode	`Class-Map Config`

match source-address mac

This command adds to the specified class definition a match condition based on the source MAC address of a packet. The <**address**> parameter is any layer 2 MAC address formatted as six, two-digit hexadecimal numbers separated by colons (e.g., 00:11:22:dd:ee:ff). The <**macmask**> parameter is a layer 2 MAC address bit mask, which need not be contiguous, and is formatted as six, two-digit hexadecimal numbers separated by colons (e.g., ff:07:23:ff:fe:dc). The optional **[not]** parameter has the effect of negating this match condition for the class (i.e., match all source MAC addresses except for what is specified here).

Default	`None`
Format	`match [not] source-address mac <address> <macmask>`
Mode	`Class-Map Config`

match srcip

This command adds to the specified class definition a match condition based on the source IP address of a packet. The <ipaddr> parameter specifies an IP address. The <**ipmask**> parameter specifies an IP address bit mask; note that although it resembles a standard subnet mask, this bit mask need not be contiguous. The optional [**not**] parameter has the effect of negating this match condition for the class (i.e., match all source IP addresses except for what is specified here).

Default	`None`
Format	`match [not] srcip <ipaddr> <ipmask>`
Mode	`Class-Map Config`

match srcl4port

This command adds to the specified class definition a match condition based on the source layer 4 port of a packet using a single keyword or numeric notation or a numeric range notation.

To specify the match condition as a single keyword notation, the value for <**portkey**> is one of the supported port name keywords (listed below).

The currently supported <**portkey**> values are: **domain, echo, ftp, ftpdata, http, smtp, snmp, telnet, tftp, www.** Each of these translates into its equivalent port number, which is used as both the start and end of a port range.

To specify the match condition as a numeric value, one layer 4 port number is required. The port number is an integer from 0 to 65535.

To specify the match condition as a range, two layer 4 port numbers are required and together they specify a contiguous port range. Each port number is an integer from 0 to 65535, but with the added requirement that the second number be equal to or greater than the first. The optional [**not]** parameter has the effect of negating this match condition for the class (i.e., match all source layer 4 ports except for those within the range specified here).

The optional [**not]** parameter has the effect of negating this match condition for the class (i.e., match all source layer 4 port numbers except for the one specified here).

Default	`None`
Format	`match [not] srcl4port {<portkey> | <0-65535> [<0-65535>]}`
Mode	`Class-Map Config`

match vlan

This command adds to the specified class definition a match condition based on the value of the layer 2 VLAN Identifier field of a packet. The VLAN ID is an integer from 1 to 4094. The optional [**not]** parameter has the effect of negating this match condition for the class (i.e., match all VLAN Identifier values except for what is specified here).

Default	`None`
Format	`match [not] vlan <1-4094>`
Mode	`Class-Map Config`

Policy Commands

The 'policy' command set is used in DiffServ to define:

Traffic Conditioning	Specify traffic conditioning actions (policing, marking, shaping) to apply to traffic classes
Service Provisioning	Specify bandwidth and queue depth management requirements of service levels (EF, AF, etc.)

The policy commands are used to associate a traffic class, which was defined by the class command set, with one or more QoS policy attributes. This association is then assigned to an interface in a particular direction to form a service. The user specifies the policy name when the policy is created.

The DiffServ CLI does not necessarily require that users associate only one traffic class to one policy. In fact, multiple traffic classes can be associated with a single policy, each defining a particular treatment for packets that match the class definition. When a packet satisfies the conditions of more than one class, preference is based on the order in which the classes were added to the policy, with the foremost class taking highest precedence.

This set of commands consists of policy creation/deletion, class addition/removal, and individual policy attributes. Note that the only way to remove an individual policy attribute from a class instance within a policy is to remove the class instance and re-add it to the policy. The values associated with an existing policy attribute can be changed without removing the class instance.

The CLI command root is ***policy-map***.

bandwidth kbps

This command identifies a minimum amount of bandwidth to be reserved for the specified class instance within the named policy using an absolute rate notation. The committed information rate is specified in kilobits-per-second (Kbps) and is an integer from 1 to 4294967295.

Note: The actual bandwidth allocation does not occur until the policy is attached to an interface in a particular direction.

Note: The bandwidth kbps and percent commands are alternative ways to specify the same bandwidth policy attribute.

Note: This command is only supported for GSM7324 and GSM7312.

Format	`bandwidth kbps <1-4294967295>`
Mode	`Policy-Class-Map Config`
Restrictions	The sum of the committed information rate values for all bandwidth and expedite commands defined within a policy must not exceed the available link bandwidth of the interface to which that policy is assigned. Violation of this requirement shall prevent

	successful attachment of a policy to the interface, or shall cause this command to fail if the policy is already in service on one or more interfaces.
Policy Type	Out
Incompatibilities	Expedite (all forms)

bandwidth percent

This command identifies a minimum amount of bandwidth to be reserved for the specified class instance within the named policy using a relative rate notation. The committed information rate is specified as a percentage of total link capacity and is an integer from 1 to 100.

Note: The actual bandwidth allocation does not occur until the policy is attached to an interface in a particular direction.

Note: The bandwidth kbps and percent commands are alternative ways to specify the same bandwidth policy attribute.

Note: This command is only supported for GSM7324 and GSM7312.

Format	`bandwidth percent <1-100>`
Mode	`Policy-Class-Map Config`
Restrictions	The sum of the committed information rate values for all bandwidth and expedite commands defined within a policy must not exceed the available link bandwidth of the interface to which that policy is assigned. Violation of this requirement shall prevent successful attachment of a policy to the interface, or shall cause this command to fail if the policy is already in service on one or more interfaces.
Policy Type	Out
Incompatibilities	Expedite (all forms)

class

This command creates an instance of a class definition within the specified policy for the purpose of defining treatment of the traffic class through subsequent policy attribute statements. The <***classname***> is the name of an existing DiffServ class. Note that this command causes the specified policy to create a reference to the class definition.

Note: The CLI mode is changed to Policy-Class-Map Config when this command is successfully executed.

Format	`class <classname>`
Mode	`Policy-Map Config`

no class

This command deletes the instance of a particular class and its defined treatment from the specified policy. <**classname**> is the names of an existing DiffServ class. Note that this command removes the reference to the class definition for the specified policy.

Format	`no class <classname>`
Mode	`Policy-Map Config`

mark ip-dscp

This command marks all packets for the associated traffic stream with the specified IP DSCP value.

The <dscpval> value is specified as either an integer from 0 to 63, or symbolically through one of the following keywords: ***af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, be, cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, ef.***

Format	`mark ip-dscp <dscpval>`
Mode	`Policy-Class-Map Config`
Policy Type	In
Incompatibilities	Mark IP Precedence, Police (all forms)

mark ip-precedence

This command marks all packets for the associated traffic stream with the specified IP Precedence value. The IP Precedence value is an integer from 0 to 7.

Format	`mark ip-precedence <0-7>`
Mode	`Policy-Class-Map Config`
Policy Type	In
Incompatibilities	Mark IP DSCP, Police (all forms)

police-simple

This command is used to establish the traffic policing style for the specified class. The simple form of the police command uses a single data rate and burst size, resulting in two outcomes: conform and nonconform. The conforming data rate is specified in kilobits-per-second (Kbps) and is an integer from 1 to 4294967295. The conforming burst size is specified in kilobytes (KB) and is an integer from 1 to 128.

For each outcome, the only possible actions are drop, set-dscp-transmit, set-prec-transmit, or transmit. In this simple form of the police command, the conform action defaults to transmit and the violate action defaults to drop. These actions can be set with this command once the style has been configured.

For set-dscp-transmit, a <**dscpval**> value is required and is specified as either an integer from 0 to 63, or symbolically through one of the following keywords: **af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, be, cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, ef**.

For set-prec-transmit, an IP Precedence value is required and is specified as an integer from 0-7.

Format	`police-simple {<1-4294967295> <1-128> conform-action {drop | set-prec-transmit <0-7> | set-dscp-transmit <0-63> | transmit} [violate-action {drop | set-prec-transmit <0-7> | set-dscp-transmit <0-63> | transmit}]}`
Mode	`Policy-Class-Map Config`
Restrictions	Only one style of police command (simple, singlerate, tworate) is allowed for a given class instance in a particular policy.
Policy Type	In
Incompatibilities	Mark IP DSCP, Mark IP Precedence

Service Commands

The 'service' command set is used in DiffServ to define:

Traffic Conditioning	Assign a DiffServ traffic conditioning policy (as specified by the policy commands) to an interface in the incoming direction
Service Provisioning	Assign a DiffServ service provisioning policy (as specified by the policy commands) to an interface in the outgoing direction

The service commands attach a defined policy to a directional interface. Only one policy may be assigned at any one time to an interface in a particular direction. The policy type (in, out) must match the interface direction to which it is attached.

This set of commands consists of service addition/removal.

The CLI command root is ***service-policy***

service-policy

This command attaches a policy to an interface in a particular direction. The command can be used in the **Interface Config** mode to attach a policy to a specific interface. Alternatively, the command can be used in the **Global Config** mode to attach this policy to all system interfaces. The direction value is either in or out. The <***policyname***> parameter is the name of an existing DiffServ policy, whose type must match the interface direction. Note that this command causes a service to create a reference to the policy.

Note: This command effectively enables DiffServ on an interface (in a particular direction). There is no separate interface administrative 'mode' command for DiffServ.
Note: This command shall fail if any attributes within the policy definition exceed the capabilities of the interface. Once a policy is successfully attached to an interface, any attempt to change the policy definition such that it would result in a violation of said interface capabilities shall cause the policy change attempt to fail.

Format	`service-policy {in | out} <policymapname>`
Mode	`Global Config (for all system interfaces)`
Mode	`Interface Config (for a specific interface)`
Restrictions	Only a single policy may be attached to a particular interface in a particular direction at any one time.

no service-policy

This command detaches a policy from an interface in a particular direction. The command can be used in the Interface Config mode to detach a policy from a specific interface. Alternatively, the command can be used in the Global Config mode to detach this policy from all system interfaces to which it is currently attached. The direction value is either in or out. The <***policyname***> parameter is the name of an existing DiffServ policy. Note that this command causes a service to remove its reference to the policy.

Note: This command effectively disables DiffServ on an interface (in a particular direction). There is no separate interface administrative 'mode' command for DiffServ.

Format	`no service-policy {in | out} <policymapname>`
Mode	`Global Config (for all system interfaces)`
Mode	`Interface Config (for a specific interface)`

Show Commands

The 'show' command set is used in DiffServ to display configuration and status information for:

- Classes
- Policies
- Services

This information can be displayed in either summary or detailed formats. The status information is only shown when the DiffServ administrative mode is enabled; it is suppressed otherwise.

There is also a 'show' command for general DiffServ information that is available at any time.

show class-map

This command displays all configuration information for the specified class. The ***<classname>*** is the name of an existing DiffServ class.

Format	`show class-map [<classname>]`
Mode	`Privileged EXEC and User EXEC`

If the Class Name is specified the following fields are displayed:

Class Name	The name of this class.
Class Type	The class type (all, any, or acl) indicating how the match criteria are evaluated for this class. A class type of all means every match criterion defined for the class is evaluated simultaneously they must all be true to indicate a class match. For a type of any each match criterion is evaluated sequentially and only one need be true to indicate a class match. Class type acl rules are evaluated in a hybrid manner, with those derived from each ACL Rule grouped and evaluated simultaneously, while each such grouping is evaluated sequentially.

Match Criteria	The Match Criteria fields will only be displayed if they have been configured. They will be displayed in the order entered by the user. These are evaluated in accordance with the class type. The possible Match Criteria fields are: Class of Service, Destination IP Address, Destination Layer 4 Port, Destination MAC Address, Every, IP DSCP, IP Precedence, IP TOS, Protocol Keyword, Reference Class, Source IP Address, Source Layer 4 Port, Source MAC Address, and VLAN.
Values	This field displays the values of the Match Criteria.
Excluded	This field indicates whether or not this Match Criteria is excluded.

If the Class Name is not specified, this command displays a list of all defined DiffServ classes. The following fields are displayed:

Class Name	The name of this class. (Note that the order in which classes are displayed is not necessarily the same order in which they were created.)
Class Type	The class type (all, any, or acl) indicating how the match criteria are evaluated for this class. A class type of all means every match criterion defined for the class is evaluated simultaneously they must all be true to indicate a class match.For a type of any each match criterion is evaluated sequentially and only one need be true to indicate a class match. Class type acl rules are evaluated in a hybrid manner, with those derived from each ACL Rule grouped and evaluated simultaneously, while each such grouping is evaluated sequentially.
ACL Number	The ACL number used to define the class match conditions at the time the class was created. This field is only meaningful if the class type is acl. (Note that the contents of the ACL may have changed since this class was created.)
Ref Class Name	The name of an existing DiffServ class whose match conditions are being referenced by the specified class definition.

show diffserv

This command displays the DiffServ General Status Group information, which includes the current administrative mode setting as well as the current and maximum number of rows in each of the main DiffServ private MIB tables. This command takes no options.

Format	`show diffserv`
Mode	`Privileged EXEC`
DiffServ Admin mode	The current value of the DiffServ administrative mode.
Class Table Size	The current number of entries (rows) in the Class Table.
Class Table Max	The maximum allowed entries (rows) for the Class Table.
Class Rule Table Size	The current number of entries (rows) in the Class Rule Table.
Class Rule Table Max	The maximum allowed entries (rows) for the Class Rule Table.
Policy Table Size	The current number of entries (rows) in the Policy Table.
Policy Table Max	The maximum allowed entries (rows) for the Policy Table.
Policy Instance Table Size	The current number of entries (rows) in the Policy Instance Table.
Policy Instance Table Max	The maximum allowed entries (rows) for the Policy Instance Table.
Policy Attribute Table Size	The current number of entries (rows) in the Policy Attribute Table.
Policy Attribute Table Max	The maximum allowed entries (rows) for the Policy Attribute Table.
Service Table Size	The current number of entries (rows) in the Service Table.
Service Table Max	The maximum allowed entries (rows) for the Service Table.

show policy-map

This command displays all configuration information for the specified policy. The <policyname> is the name of an existing DiffServ policy.

Format	`show policy-map [<policyname>]`
Mode	`Privileged EXEC`

If the Policy Name is specified the following fields are displayed:

Policy Name	The name of this policy.
Type	The policy type, namely whether it is an inbound or outbound policy definition.

The following information is repeated for each class associated with this policy (only those policy attributes actually configured are displayed):

Class Name	The name of this class.
Mark CoS	Denotes the class of service value that is set in the 802.1p header of outbound packets. This is not displayed if the mark cos was not specified.
Mark IP DSCP	Denotes the mark/re-mark value used as the DSCP for traffic matching this class. This is not displayed if mark ip description is not specified using the police-two-rate command, or if policing is in use for the class under this policy.
Mark IP Precedence	Denotes the mark/re-mark value used as the IP Precedence for traffic matching this class. This is not displayed if precedence is not specified using police-two-rate command, or if either mark DSCP or policing is in use for the class under this policy.
Policing Style	This field denotes the style of policing, if any, used (simple, single rate, or two rate).
Committed Rate (Kbps)	This field displays the committed rate, used in simple policing, single-rate policing, and two-rate policing.
Committed Burst Size (KB)	This field displays the committed burst size, used in simple policing, single-rate policing, and two-rate policing.
Excess Burst Size (KB)	This field displays the excess burst size, used in single-rate policing.
Peak Rate (Kbps)	This field displays the peak rate, used in two-rate policing.
Peak Burst Size (KB)	This field displays the peak burst size, used in two-rate policing.
Conform Action	The current setting for the action taken on a packet considered to conform to the policing parameters. This is not displayed if policing is not in use for the class under this policy.
Conform DSCP Value	This field shows the DSCP mark value if the conform action is markdscp.
Conform IP Precedence Value	This field shows the IP Precedence mark value if the conform action is markprec.

Exceed Action The current setting for the action taken on a packet considered to exceed to the policing parameters. This is not displayed if policing not in use for the class under this policy.

Exceed DSCP Value This field shows the DSCP mark value if this action is markdscp.

Exceed IP Precedence Value This field shows the IP Precedence mark value if this action is markprec.

Non-Conform Action The current setting for the action taken on a packet considered to not conform to the policing parameters. This is not displayed if policing not in use for the class under this policy.

Non-Conform DSCP Value This field displays the DSCP mark value if this action is markdscp.

Non-Conform IP Precedence Value This field displays the IP Precedence mark value if this action is markprec.

Bandwidth This field displays the minimum amount of bandwidth reserved in either percent or kilobits-per-second.

Expedite Burst Size (KBytes) This field displays the maximum guaranteed amount of bandwidth reserved in either percent or kilobits-per-second format.

Shaping Average This field is displayed if average shaping is in use. Indicates whether average or peak rate shaping is in use, along with the parameters used to form the traffic shaping criteria, such as CIR and PIR. This is not displayed if shaping is not configured for the class under this policy.

Shape Committed Rate (Kbps) This field is displayed if average or peak rate shaping is in use. It displays the shaping committed rate in kilobits-per-second.

Shape Peak Rate (Kbps) This field is displayed if peak rate shaping is in use. It displays the shaping peak rate in kilobits-per-second.

Random Drop Minimum Threshold This field displays the RED minimum threshold.This is not displayed if the queue depth management scheme is not RED.

Random Drop Maximum Threshold This field displays the RED maximum threshold.This is not displayed if the queue depth management scheme is not RED.

Random Drop Maximum Drop Probability This field displays the RED maximum drop probability.This is not displayed if the queue depth management scheme is not RED.

Random Drop Sampling Rate This field displays the RED sampling rate.This is not displayed if the queue depth management scheme is not RED.

Random Drop Decay Exponent This field displays the RED decay exponent.This is not displayed if the queue depth management scheme is not RED.

If the Policy Name is not specified this command displays a list of all defined DiffServ policies. The following fields are displayed:

Policy Name	The name of this policy. (Note that the order in which the policies are displayed is not necessarily the same order in which they were created.)
Policy Type	The policy type, namely whether it is an inbound or outbound policy definition.
Class Members	List of all class names associated with this policy.

show diffserv service

This command displays policy service information for the specified interface and direction. The <***slot/port***> parameter specifies a valid slot number and port number for the system. The direction parameter indicates the interface direction of interest.

Format	`show diffserv service <slot/port> {in | out}`
Mode	`Privileged EXEC`
DiffServ Admin Mode	The current setting of the DiffServ administrative mode. An attached policy is only in effect on an interface while DiffServ is in an enabled mode.
Interface	The slot number and port number of the interface (slot/port).
Direction	The traffic direction of this interface service, either in or out
Operational Status	The current operational status of this DiffServ service interface.
Policy Name	The name of the policy attached to the interface in the indicated direction.
Policy Details	Attached policy details, whose content is identical to that described for the show policy-map <policymapname> command (content not repeated here for brevity).

show diffserv service brief

This command displays all interfaces in the system to which a DiffServ policy has been attached. The direction parameter is optional; if specified, only services in the indicated direction are shown, otherwise service information is shown for both directions, where applicable.

Format `show diffserv service brief [in | out]`

Mode `Privileged EXEC`

DiffServ Mode The current setting of the DiffServ administrative mode. An attached policy is only active on an interface while DiffServ is in an enabled mode.

The following information is repeated for interface and direction (only those interfaces configured with an attached policy are shown):

Interface The slot number and port number of the interface (slot/port).

Direction The traffic direction of this interface service, either in or out

OperStatus The current operational status of this DiffServ service interface.

Policy Name The name of the policy attached to the interface in the indicated direction.

show policy-map interface

This command displays policy-oriented statistics information for the specified interface and direction. The <***slot/port***> parameter specifies a valid slot number and port number for the system. The direction parameter indicates the interface direction of interest.

Note: This command is only allowed while the DiffServ administrative mode is enabled.

Format `show policy-map interface <slot/port> <in | out>`

Interface The slot number and port number of the interface (slot/port).

Direction The traffic direction of this interface service, either in or out.

Operational Status The current operational status of this DiffServ service interface.

Policy Name The name of the policy attached to the interface in the indicated direction.

Interface Offered Octets/Packets A cumulative count of the octets/packets offered to this service interface in the specified direction before the defined DiffServ treatment is applied.

Interface Discarded Octets/Packets A cumulative count of the octets/packets discarded by this service interface in the specified direction for any reason due to DiffServ treatment.

Interface Sent Octets/Packets A cumulative count of the octets/packets forwarded by this service interface in the specified direction after the defined DiffServ treatment was applied. In this case, forwarding means the traffic stream was passed to the next functional element in the data path, such as the switching or routing function or an outbound link transmission element.

The following information is repeated for each class instance within this policy: Class Name The name of this class instance.

In Offered Octets/Packets A count of the octets/packets offered to this class instance before the defined DiffServ treatment is applied. Only displayed for the 'in' direction.

In Discarded Octets/Packets A count of the octets/packets discarded for this class instance for any reason due to DiffServ treatment of the traffic class. Only displayed for the 'in' direction.

Tail Dropped Octets/Packets A count of the octets/packets discarded due to tail dropping from a transmission queue, typically due to the effects of traffic shaping. These counts may not be supported on all platforms. Only displayed for the 'out' direction.

Random Dropped Octets/Packets A count of the octets/packets discarded due to WRED active queue depth management, typically due to the effects of traffic shaping. These counts are only applicable for a class instance whose policy attributes includes random dropping, and may not be supported on all platforms. Only displayed for the 'out' direction.

Shape Delayed Octets/Packets A count of the octets/packets that were delayed due to traffic shaping. These counts are only applicable for a class instance whose policy attributes includes shaping, and may not be supported on all platforms. Only displayed for the 'out' direction.

Sent Octets/Packets A count of the octets/packets forwarded for this class instance after the defined DiffServ treatment was applied. In this case, forwarding means the traffic stream was passed to the next functional element in the data path, such as the switching or routing function or an outbound link transmission element. Only displayed for the 'out' direction.

Note: None of the counters listed here are guaranteed to be supported on all platforms. Only supported counters are shown in the display output.

show service-policy

This command displays a summary of policy-oriented statistics information for all interfaces in the specified direction. The direction parameter indicates the interface direction of interest.

This command enables or disables the route reflector client. A route reflector client relies on a route reflector to re-advertise its routes to the entire AS. The possible values for this field are ***enable*** and ***disable.***

Format	`show service-policy [in | out]`
Mode	`Privileged EXEC`
The following information is repeated for each interface and direction (only those interfaces configured with an attached policy are shown):	
Interface	The slot number and port number of the interface (slot/port).
Dir	The traffic direction of this interface service, either in or out.
Operational Status	The current operational status of this DiffServ service interface.
Offered Packets	A count of the total number of packets offered to all class instances in this service before their defined DiffServ treatment is applied. These are overall per-interface per-direction counts.
Discarded Packets	A count of the total number of packets discarded for all class instances in this service for any reason due to DiffServ treatment. These are overall per-interface per-direction counts.
Sent Packets	A count of the total number of packets forwarded for all class instances in this service after their defined DiffServ treatments were applied. In this case, forwarding means the traffic stream was passed to the next functional element in the data path, such as the switching or routing function or an outbound link transmission element. These are overall per-interface per-direction counts.
Policy Name	The name of the policy attached to the interface.

Note: None of the counters listed here are guaranteed to be supported on all platforms. Only supported counters are shown in the display output.

Chapter 11
CLI Commands: ACL

Show Commands

show ip access-lists

This command displays an Access Control List (ACL) and all of the rules that are defined for the ACL. The <*accesslistnumber*> is the number used to identify the ACL.

Format	`show ip access-lists <accesslistnumber>`
Mode	`Privileged EXEC and User EXEC`
Rule Number	This displays the number identifier for each rule that is defined for the ACL.
Action	This displays the action associated with each rule. The possible values are Permit or Deny.
Protocol	This displays the protocol to filter for this rule.
Source IP Address	This displays the source IP address for this rule.
Source IP Mask	This field displays the source IP Mask for this rule.
Source Ports	This field displays the source port range for this rule.
Destination IP Address	This displays the destination IP address for this rule.
Destination IP Mask	This field displays the destination IP Mask for this rule.
Destination Ports	This field displays the destination port range for this rule.
Service Type Field Match	This field indicates whether an IP DSCP, IP Precedence, or IP TOS match condition is specified for this rule.
Service Type Field Value	This field indicates the value specified for the Service Type Field Match (IP DSCP, IP Precedence, or IP TOS).

Configuration Commands

access-list

This command creates an Access Control List (ACL) that is identified by the parameter <*accesslistnumber*>. The ACL number is an integer from 1 to 199. The range 1 to 99 is for normal ACL List and 100 to 199 is extended ACL List. The ACL rule is created with the option of *permit or deny.* The protocol to filter for an ACL rule is specified by giving the protocol to be used like *cmp,igmp,ip,tcp,udp.* The command specifies a source ip address and source mask for match condition of the ACL rule specified by the *srcip* and *srcmask* parameters.The source layer 4 port match condition for the ACL rule are specified by the *port value* parameter.The <*startport*> and <*endport*> parameters identify the first and last ports that are part of the port range. They have values from 0 to 65535. The ending port must have a value equal or greater than the starting port. The starting port, ending port, and all ports in between will be part of the destination port range.The <*portvalue*> parameter uses a single keyword notation and currently has the values of *domain, echo, ftp, ftpdata, http, smtp, snmp, telnet, tftp*, and *www*. Each of these values translates into its equivalent port number, which is used as both the start and end of a port range. The command specifies a destination ip address and destination mask for match condition of the ACL rule specified by the *dstip* and *dstmask* parameters.The command specifies the TOS for an ACL rule depending on a match of precedence or DSCP values using the parameters *tos, tosmask, dscp*.

Default none

Format
```
access-list {( <1-99> {deny | permit} <srcip> <src-
mask>) | ( {<100-199> {deny | permit} {evry | {{icmp |
igmp | ip | tcp | udp | <number>} <srcip> <srcmask>
[{eq {<portkey> | <portvalue>} | range <startport>
<endport>}] <dstip> <dstmask> [{eq {<portkey> |
<portvalue>} | range <startport> <endport>}] [prece-
dence <precedence>] [tos <tos> <tosmask>] [dscp
<dscp>]}})}
```

Mode `Global Config`

no access-list

This command deletes an ACL that is identified by the parameter <*accesslistnumber*> from the system.

Format
```
no access-list <accesslistnumber>
```

Mode `Global Config`

ip access-group

This command attach a specified access-control list to an interface.

Default none

Format `ip access-group <accesslistnumber> [in | out]`

Mode `Interface config`

ip access-group all

This command attach a specified access-control list to all interfaces.

Default none

Format `ip access-group all <accesslistnumber> [in | out]`

Mode `Global config`

Chapter 12
DHCP Server Commands

DHCP Server Configuration Commands

These commands configure the DHCP Server parameters and address pools.

client-identifier

This command specifies the unique identifier for a DHCP client. Unique-identifier is a valid notation in hexadecimal format.

Default	None
Format	**client-identifier <uniqueidentifier>**
Mode	**DHCP Pool Config Mode**

no client-identifier

This command deletes the client identifier.

Format	**no client-identifier**
Mode	**DHCP Pool Config Mode**

client-name

This command specifies the name for a DHCP client. Name is a string consisting of standard ASCII characters.

Default	None
Format	**client-name <name>**
Mode	**DHCP Pool Config Mode**

no client-name

This command removes the client name.

Format `no client-name`

Mode `DHCP Pool Config Mode`

default-router

This command specifies the default router list for a DHCP client. {address1, address2… address8} are valid IP addresses, each made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid.

Default None

Format `default-router <address1> [<address2>....<address8>]`

Mode `DHCP Pool Config`

no default-router

This command removes the default router list.

Format `no default-router`

Mode `DHCP Pool Config`

dns-server

This command specifies the IP servers available to a DHCP client. address1, address2… address8 are valid IP addresses; each made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid.

Default None

Format `dns-server <address1> [<address2>....<address8>]`

Mode `DHCP Pool Config Mode`

no dns-server

This command removes the DNS Server list.

Format `no dns-server`

Mode `DHCP Pool Config Mode`

hardware-address

This command specifies the hardware address of a DHCP client.

Hardware-address is the MAC address of the hardware platform of the client consisting of 6 bytes in dotted hexadecimal format.

Type indicates the protocol of the hardware platform. It is 1 for 10 MB Ethernet and 6 for IEEE 802.

Default	Ethernet
Format	**hardware-address <hardwareaddress> [type]**
Mode	**DHCP Pool Config Mode**

no hardware-address

This command removes the hardware address of the DHCP client.

Format	**no hardware-address**
Mode	**DHCP Pool Config Mode**

host

This command specifies the IP address and network mask for a manual binding to a DHCP client. Address and Mask are valid IP addresses; each made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid.

The prefix-length is an integer from 0 to 32

Default	None
Format	**host <address> [mask | prefix-length]**
Mode	**DHCP Pool Config Mode**

no host

This command removes the IP address of the DHCP client.

Format	**no host**
Mode	**DHCP Pool Config Mode**

ip dhcp excluded-address

This command specifies the IP addresses that a DHCP server should not assign to DHCP clients.

Low-address and high-address are valid IP addresses; each made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid.

Default	None
Format	`ip dhcp excluded-address <lowaddress> [highaddress]`
Mode	`Global Config`

no ip dhcp excluded-address

This command removes the excluded IP addresses for a DHCP client.

Low-address and high-address are valid IP addresses; each made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid.

Format	`no ip dhcp excluded-address <lowaddress> [highaddress]`
Mode	`Global Config`

ip dhcp ping packets

This command is used to specify the number in a range from 2-10, of packets a DHCP server sends to a pool address as part of a ping operation. Setting the number of ping packets to 0 is the same as ‘no ip dhcp ping packets’ and will prevent the server from pinging pool addresses.

Default	2
Format	`ip dhcp ping packets <0,2-10>`
Mode	`Global Config`

no ip dhcp ping packets

This command prevents the server from pinging pool addresses and will set the number of packets to 0.

Default	0
Format	`no ip dhcp ping packets`
Mode	`Global Config`

ip dhcp pool

This command configures a DHCP address pool name on a DHCP server and enters DHCP pool configuration mode.

Default	None
Format	**ip dhcp pool <name>**
Mode	**Global Config Mode**

no ip dhcp pool

This command removes the DHCP address pool. The name should be previously configured pool name.

Format	**no ip dhcp pool <name>**
Mode	**Global Config Mode**

lease

This command configures the duration of the lease for an IP address that is assigned from a DHCP server to a DHCP client. The overall lease time should be between 1-86400 minutes. If infinite is specified, lease is set for 60 days. Days is an integer from 0 to 59. Hours is an integer from 0 to 1339. Minutes is an integer from 0 to 86399.

Default	1 (day)
Format	**lease [<days> [hours] [minutes]] | [infinite]**
Mode	**DHCP Pool Config**

no lease

This command restores the default value of the lease time for DHCP Server.

Format	**no lease**
Mode	**DHCP Pool Config**

network

This command is used to configure the subnet number and mask for a DHCP address pool on the server. Network-number is a valid IP address, made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid. Mask is the IP subnet mask for the specified address pool. The prefix-length is an integer from 0 to 32.

Default	None
Format	**network <networknumber> [mask | prefixlength]**
Mode	**DHCP Pool Config**

no network

This command removes the subnet number and mask.

Format	**no network**
Mode	**DHCP Pool Config**

service dhcp

This command enables the DHCP server and relay agent features on the router.

Default	Disabled
Format	**service dhcp**
Mode	**Global Config**

no service dhcp

This command disables the DHCP server and relay agent features.

Format	**no service dhcp**
Mode	**Global Config**

DHCP Server Show Commands

These commands display the DHCP Server address bindings, and statistics.

show ip dhcp binding

This command displays address bindings for the specific IP address on the DHCP server. If no IP address is specified, the bindings corresponding to all the addresses are displayed.

Format	`show ip dhcp binding [address]`
Mode	`Privileged EXEC and User EXEC`
IP address	The IP address of the client.
Hardware Address	The MAC Address or the client identifier.
Lease expiration	The lease expiration time of the IP Address assigned to the client.
Type	The manner in which IP Address was assigned to the client.

show ip dhcp global configuration

This command displays address bindings for the specific IP address on the DHCP server. If no IP address is specified, the bindings corresponding to all the addresses are displayed.

Format	`show ip dhcp global configuration`
Mode	`Privileged EXEC and User EXEC`
Service DHCP	The field to display the status of dhcp protocol.
Number of Ping Packets	The maximum number of Ping Packets that will be sent to verify that an ip address id not already assigned.
Excluded Address	The ranges of IP addresses that a DHCP server should not assign to DHCP clients.

show ip dhcp pool configuration

This command displays pool configuration. If '*' is specified, configuration for all the pools is displayed.

Format	`show ip dhcp pool configuration {<name> | *}`
Mode	`Privileged EXEC and User EXEC`
Pool Name	The name of the configured pool.
Pool Type	The pool type.
Lease Time	The lease expiration time of the IP Address assigned to the client.
DNS Servers	The list of DNS servers available to the DHCP client
Default Routers	The list of the default routers available to the DHCP client

Following additional field is displayed for Dynamic pool type

Network	The network number and the mask for the DHCP address pool.

Following additional fields are displayed for Manual pool type

Client Name	The name of a DHCP client.
Client Identifier	The unique identifier of a DHCP client.
Hardware Address	The hardware address of a DHCP client.
Hardware Address Type	The protocol of the hardware platform.
Host	The IP address and the mask for a manual binding to a DHCP client.

show ip dhcp server statistics

This command displays DHCP server statistics.

Format	`show ip dhcp server statistics`
Mode	`Privileged EXEC and User EXEC`
Address Pool	The number of configured address pools in the DHCP server.
Automatic bindings	The number of IP addresses that have been automatically mapped to the MAC addresses of hosts that are found in the DHCP database.
Manual bindings	The number of IP addresses that have been manually mapped to the MAC addresses of hosts that are found in the DHCP database.
Expired bindings	The number of expired leases.
Malformed messages	The number of truncated or corrupted messages that were received by the DHCP server.
Message Received	
DHCPREQUEST	The number of DHCPREQUEST messages that were received by the server.
DHCPDECLINE	The number of DHCPDECLINE messages that were received by the server.
DHCPRELEASE	The number of DHCPRELEASE messages that were received by the server.
DHCPINFORM	The number of DHCPINFORM messages that were received by the server.
Message Sent	

DHCPOFFER	The number of DHCPOFFER messages that were sent by the server.
DHCPACK	The number of DHCPPACK messages that were sent by the server.
DHCPNACK	The number of DHCPNACK messages that were sent by the server.

DHCP Server Clear Commands

These commands clears the DHCP Server address bindings, and statistics.

clear ip dhcp binding

This command deletes an automatic address binding from the DHCP server database. If "*" is specified, the bindings corresponding to all the addresses are deleted. <address> is a valid IP address made up of four decimal bytes ranging from 0 to 255. IP address 0.0.0.0 is invalid.

Default	None
Format	`clear ip dhcp binding <address|*>`
Mode	`Privileged EXEC`

clear ip dhcp server statistics

This command clear DHCP server statistics counters.

Format	`clear ip dhcp server statistics`
Mode	`Privileged EXEC`

Chapter 13
FSM7326P Power Over Ethernet Commands

This chapter provides information on the Power Over Ethernet Commands available in the FSM7326P Switch software.

The IEEE 802.3 Ethernet standard body has a task force called the 802.3af, which specifies the method to deliver power over the LAN. 802.3af, also known as Power over Ethernet, defines a way to build Ethernet power-sourcing equipment and powered terminals. The specification involves delivering 48 volts of AC power over unshielded twisted-pair (UTP/FTP) wiring.

Power over Ethernet (PoE) is a technology that can integrate data, voice and power on a LAN. PoE supplies reliable, uninterrupted power to Internet Protocol (IP) telephones, wireless LAN access points, and other Ethernet devices that use existing Cat5 cables.

Power over Ethernet, when used in conjunction with an uninterrupted power supply (UPS), ensures continuous operation during power failures. PoE saves time and eliminates the cost of installing separate power cabling and AC outlets.

The power delivered over the Ethernet cabling is automatically activated when a compatible device is identified. The power is injected by either new generation Ethernet switches (end-Span) or by a dedicated patch-panel like device, residing between an ordinary Ethernet switch or hub and the terminals (mid-span). Mid-span devices are available with 1,6,12 or 24 ports. PoE technology does not degrade the network data communication performance or decrease the network reach.

Wireless Access points often need to be located in high places, like the ceiling, where the necessary power lines and data access are not readily available. An integrated power-data network solves that problem and allows greater flexibility and range in wireless networking.

In order for the network to carry power, you need to add power sourcing equipment (PSE). This is the source of power and the means to integrate that power onto the network. The PSE also provides a detection method for determining whether the Ethernet device on the other end of the cable, the Powered Device (PD), is 802.3af compliant or not.

Most vendors today implement the PSE technology outside of the existing switch, a technique called a midspan solution. AVAYA and Cisco also implement this technology inside the switch, called an end-span solution.

Attached to the PSE is the UPS. A UPS is connected to each device that requires alternative power. With Power over Ethernet, this function is centralized in a UPS connected to the PSE. Note that this may require further changes in the environmental conditions of the room needing to support this UPS with all of its electrical and cooling requirements.

The current delivered to each node is limited to 350 milliamps. The total amount of continuous power that can be delivered to each node, taking into account some power loss over the cable run, is 12.95 watts. IP phones and wireless LAN access points typically consume 3.5 to 10 watts. Power is carried on two wire pairs, to comply with safety standards and existing cable limitations.

Management may also be added to monitor and control the PSE. This management function may be integrated into a standard network management platform using the simple network management protocol (SNMP) or through a custom platform. Beyond the basic control of the PSE, the management stations provides additional power management functions, like power quality of service (QoS) where key users are given higher priority to power in the event of a outage.

Voice-over IP (VoIP), is the transmission of telephone calls over a data network like one of the many networks that make up the Internet.

Other NETGEAR products that work with 7300 Series L3 Switch:

- WG302
- WG602
- WAG302

Power Over Ethernet (POE) Commands

This section shows the additional CLI commands required to provide the management interface to the Power-over-Ethernet (PoE) function. The commands only applies to FSM7326P model.

Note: For the FSM7326P, only ports 0.1-0.24 are eligible to participate in the PoE function.

poe

This command enables or disables the Power over Ethernet function on the specified port(s).

Default	enable
Format	**poe**
Mode	Global Config

poe priority

This command sets the priority level for the delivery of power to an attached device. The switch may not be able to supply power to all connected devices, so the port priority is used to determine which ports will supply power if adequate power capacity is not available for all enabled ports. For ports that have the same priority level, the lower numbered port will have higher priority.

Default	low
Format	**poe priority <high/medium/low>**
Mode	Global Config

poe limit

This command sets the power limit (in watts) for the port. The port will not supply more power than the value specified as the limit.

For the FSM7326P, the valid range is 3 - 18.

Default	18
Format	**poe limit**
Mode	Global Config

poe usagethreshold

This command sets the power threshold level at which a trap will be generated. If the total power consumed is greater than or equal to the specified percentage of the total power available, a trap will be sent. The switch will continue to provide power even if the threshold is exceeded. The threshold value is for providing a warning. It does not interrupt the power. Valid values are 0 - 100.

Default	80
Format	**poe usagethreshold <0-100>**
Mode	Global Config

show poe port info

This command displays a summary for the ports that support the PoE function.

Format	**show poe port <slot/port, All>**
Mode	Privilege

The following fields are displayed for each port. If a port does not have link, or is not enabled for PoE, the following fields display a value of "N/A".

Class

The Class field reports the class of the powered device according to IEEE802.3af definition.

Table 13-1. Class of the Powered Device

Class	Usage	Max Power
0	Default	0.44-12.95
1	Optional	0.44-3.84
2	Optional	3.84-6.49
3	Optional	6.49-12.95
4	Not Allowed	Reserved

Output

The Output field reports the power supplied to the powered device (in watts).

Limit

The LIMIT field is the preset limit defined by the "config poe port limit" command. This value is stated in watts.

Status

The Status field reports the state of power supplied to the associated port. Possible values are:

- **Disabled** — the POE function is disabled on this port
- **Searching** — the port is detecting POE device
- **Delivering Power** — the port is providing power to POE device
- **Fault** — the POE device is not IEEE compliance, no power is provided
- **Test** — the port is in testing state
- **Other Fault** — the port has experience problems other than compliance issue

When a port begins to deliver power, there will be a trap indicating so. When a port stops delivering power, there will be a trap indicating so.

show poe

This command displays the total power available and the total power consumed in the system.

Format	**show poe**
Mode	Privilege

Appendix A
IS CLI Mapping

This chapter illustrates the mapping between CLI commands and the previous 7300 Series L3 Switch commands. The Package column indicates the 7300 Series L3 Switch package in which the command is located.

Table 13-2. IS CLI Mapping

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
QOS	show acl detailed <aclid>	Privileged EXEC	show ip access-lists [<1-199>]
QOS	show acl summary	Privileged EXEC and User EXEC	
QOS	config acl create <aclid>	Global Config	access-list {(<1-99> {deny | permit} <srcip> <srcmask>) | ({<100-199> {deny | permit} {every | {{icmp | igmp | ip | tcp | udp | <number>} <srcip> <srcmask> [{eq {<0-65535> | <portkey>} | range <startport> <endport>}] <dstip> <dstmask> [{eq {<0-65535> | <portkey>} | range <startport> <endport>}] {[precedence <precedence>] | [tos <tos> <tosmask>] | [dscp <dscp>]}}}}}
QOS	config acl delete <aclid>	Global Config	no access-list {<1-99> | <100-199>}
QOS	config acl rule create <aclid> <rulenum>		
QOS	config acl rule delete <aclid> <rulenum>		

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
QOS	config acl rule action <aclid> <rulenum> <permit/deny>		
QOS	config acl rule match dstip <aclid> <rulenum> <ipaddr> <ipmask>		
QOS	config acl rule match dstl4port keyword <aclid> <rulenum> <portkey>		
QOS	config acl rule match dstl4port range <aclid> <rulenum> <startport> <endport>		
QOS	config acl rule match every <aclid> <rulenum> <true/false>		
QOS	config acl rule match ipdscp <aclid> <rulenum> <dscpval>		
QOS	config acl rule match ipprecedence <aclid> <rulenum> <precedenceval>		
QOS	config acl rule match iptos <aclid> <rulenum> <tosbits> <tosmask>		
QOS	config acl rule match protocol keyword <aclid> <rulenum> <protocolkey>		
QOS	config acl rule match protocol number <aclid> <rulenum> <protocolnum>		
QOS	config acl rule match srcip <aclid> <rulenum> <ipaddr> <ipmask>		
QOS	config acl rule match srcl4port keyword <aclid> <rulenum> <portkey>		

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
QOS	config acl rule match srcl4port range <aclid> <rulenum> <startport> <endport>		
QOS	config acl interface add <slot/port> <direction> <aclid>	Interface Config	ip access-group <1-199> {in | out}
QOS	config acl interface remove <slot/port> <direction> <aclid>	Interface Config	no ip access-group <1-199> {in | out}
QOS	config acl rule match dstl4port number <aclid> <rulenum> <portnumber>	Interface Config	ip access-group <1-199> {in | out}
QOS	config acl rule match srcl4port number <aclid> <rulenum> <portnumber>	Interface Config	
QOS	config diffserv adminmode <enable/disable>	Global Config	diffserv
		Global Config	no diffserv
QOS	show diffserv info	Privileged EXEC	show diffserv
QOS	show diffserv service info detailed <slot/port> <in/out>	Privileged EXEC	show diffserv service <slot/port> {in | out}
QOS	show diffserv service info summary [in/out]	Privileged EXEC	show diffserv service brief [in | out]
QOS	show diffserv policy detailed <policyname>	Privileged EXEC	show policy-map <policymapname>
QOS	show diffserv policy summary	Privileged EXEC	show policy-map
QOS	show diffserv service stats detailed <slot/port> [in/out]	Privileged EXEC	show policy-map interface <slot/port> {in | out}
QOS	config diffserv policy create <policyname> <in/out>	Global Config	policy-map <policyname> {in | out}

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
QOS	config diffserv policy delete <policyname>	Global Config	no policy-map <policyname>
QOS	config diffserv policy rename <policyname> <newpolicyname>	Global Config	policy-map rename <policyname> <newpolicyname>
QOS	config diffservpolicy class add <policyname> <classname>	Policy-Map Config	class <classname>
QOS	config diffserv policy class remove <policyname> <classname>	Policy-Map Config	no class <classname>
QOS	config diffserv policy bandwidth kbps <policyname> <classname> <1-4294967295>	Policy-Class-Map Config	bandwidth {kbps <1-4294967295> | percent <1-100>}
QOS	config diffserv policy bandwidth percent <policyname> <classname> <1-100>	Policy-Class-Map Config	
QOS	config diffserv policy expedite kbps <policyname> <classname> <1-4294967295> [1-128]	Policy-Class-Map Config	expedite kbps <1-4294967295> [1-128]
QOS	config diffserv policy expedite percent <policyname> <classname> <1-100> [1-128]	Policy-Class-Map Config	expedite percent <1-100> [1-128]
QOS	config diffserv policy shape average <policyname> <classname> <1-4294967295>	Policy-Class-Map Config	shape {bps-average <1-4294967295> | bps-peak <1-4294967295> <1-4294967295>}
QOS	config diffserv policy shape peak <policyname> <classname> <1-4294967295> <1-4294967295>	Policy-Class-Map Config	
QOS	config diffserv policy randomdrop <policyname> <classname> <1-250000> <1-500000> <0-100> [<0-1000000> [0-16>]]	Policy-Class-Map Config	randomdrop <1-250000> <1-500000> <1-100> [<1-1000000> [<0-16>]]
QOS	config diffserv policy mark cos <policyname> <classname> <0-7>	Policy-Class-Map Config	mark {cos <0-7> | ip-dscp <0-63> | ip-precedence <0-7>}

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
QOS	config diffserv policy police style simple <policyname> <classname> <1-4294967295> <1-128>	Policy-Class-Map Config	police-simple {<1-4294967295> <1-128> conform-action {drop | set-prec-transmit <0-7> | set-dscp-transmit <0-63> | transmit} [violate-action {drop | set-prec-transmit <0-7> | set-dscp-transmit <0-63> | transmit}]}
QOS	config diffserv policy police style singlerate <policyname> <classname> <1-4294967295> <1-128> <1-128>	Policy-Class-Map Config	police-single-rate {<1-4294967295> <1-128> <1-128> conform-action {drop | set-prec-transmit <0-7> | set-dscp-transmit <0-63> | transmit} exceed-action {drop | set-prec-transmit <0-7> | set-dscp-transmit <0-63> | transmit} [violate-action {drop | set-prec-transmit <0-7> | set-dscp-transmit <0-63> | transmit}]}
QOS	config diffserv policy police style tworate <policyname> <classname> <1-4294967295> <1-128> <1-4294967295> <1-128>	Policy-Class-Map Config	police-two-rate {<1-4294967295> <1-128> <1-4294967295> <1-128> conform-action {drop | set-prec-transmit <0-7> | set-dscp-transmit <0-63> | transmit} exceed-action {drop | set-prec-transmit <0-7> | set-dscp-transmit <0-63> | transmit} [violate-action {drop | set-prec-transmit <0-7> | set-dscp-transmit <0-63> | transmit}]}
QOS	config diffserv policy mark ipdscp <policyname> <class-name> <0-63>	Policy-Class-Map Config	
QOS	config diffserv policy mark ipprecedence <policyname> <classname> <0-7>	Policy-Class-Map Config	
QOS	config diffserv policy police action conform markdscp <policyname> <classname> <dscpval>	Policy-Class-Map Config	

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
QOS	config diffserv policy police action conform markprec <policyname> <classname> <0-7>	Policy-Class-Map Config	
QOS	config diffserv policy police action conform send <policyname> <classname>	Policy-Class-Map Config	
QOS	config diffserv policy police action exceed drop <policyname> <classname>	Policy-Class-Map Config	
QOS	config diffserv policy police action exceed markdscp <policyname> <classname> <dscpval>	Policy-Class-Map Config	
QOS	config diffserv policy police action exceed markprec <policyname> <classname>	Policy-Class-Map Config	
QOS	config diffser policy police action exceed send <policyname> <classname>	Policy-Class-Map Config	
QOS	config diffserv policy police action nonconform drop <policyname> <classname>	Policy-Class-Map Config	
QOS	config diffserv policy police action nonconform markdscp <policyname> <classname> <dscpval>	Policy-Class-Map Config	
QOS	config diffserv policy police action nonconform markprec <policyname> <classname> <0-7>	Policy-Class-Map Config	
QOS	config diffserv policy police action nonconform send <policyname> <classname>	Policy-Class-Map Config	
QOS	config diffserv policy police action conform drop <policyname> <classname>	Policy-Class-Map Config	

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
QOS	show diffserv service stats summary [in/out]	Privileged EXEC	show service-policy [in | out]
QOS	config diffserv service add <in/out> <slot/port/all> <policyname>	Interface Config	service-policy {in | out} <policymapname>
QOS	config diffserv service remove <in/out> <slot/port/all> <policyname>	Interface Config	no service-policy {in | out} <policymapname>
QOS	config diffserv service add <in/out> <slot/port/all> <policyname>	Global Config	service-policy {in | out} <policymapname>
QOS	config diffserv service remove <in/out> <slot/port/all> <policyname>	Global Config	no service-policy {in | out} <policymapname>
QOS	show diffserv class detailed <classname>	Privileged EXEC and User EXEC	show class-map [<classname>]
QOS	show diffserv class summary	Privileged EXEC and User EXEC	
QOS	config diffserv class create any <classname>	Global Config	class-map {{match-all} <classmapname>} | {match-access-group <classmapname> <aclid>}
QOS	config diffserv class create all <classname>	Global Config	class-map {{match-all} <classmapname>} | {match-access-group <classmapname> <aclid>}
QOS	config diffserv class delete <classname>	Global Config	no class-map <classmapname>
QOS	config diffserv class rename <classname> <newclassname>	Global Config	class-map rename <classmapname> <newclassmapname>
QOS	config diffserv class match cos <classname> <0-7> [exclude]	Class-Map Config	match cos <0-7>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Class-Map Config	match not cos <0-7>
QOS	config diffserv class match dstip <classname> <ipaddr> <ipmask> [exclude]	Class-Map Config	match dstip <ipaddr> <ipmask>
		Class-Map Config	match not dstip <ipaddr> <ipmask>
QOS	config diffserv class match dstl4port keyword <classname> <port-key> [exclude]	Class-Map Config	match dstl4port {<portkey> | <0-65535> [<0-65535>]}
QOS	config diffserv class match dstl4port number <classname> <0-65535> [exclude]	Class-Map Config	match not dstl4port {<portkey> | <0-65535> [<0-65535>]}
QOS	config diffserv class match dstl4port range <classname> <0-65535> <0-65535> [exclude]		
QOS	config diffserv class match dstmac <classname> <macaddr> <mac-mask> [exclude]	Class-Map Config	match destination-address mac <address> <macmask>
		Class-Map Config	match not destination-address mac <address> <macmask>
QOS	config diffserv class match ipdscp <classname> <dscpval> [exclude]	Class-Map Config	match ip dscp <value>
		Class-Map Config	match not ip dscp <value>
QOS	config diffserv class match ipprecedence <classname> <0-7> [exclude]	Class-Map Config	match ip precedence <0-7>
		Class-Map Config	match not ip precedence <0-7>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
QOS	config diffserv class match iptos <classname> <tosbits> <tosmask> [exclude]	Class-Map Config	match ip tos <tosbits> <tosmask>
		Class-Map Config	match not ip tos <tosbits> <tosmask>
QOS	config diffserv class match protocol keyword <classname> <protocolkey> [exclude]	Class-Map Config	match protocol {<protocol-name> | <0-255>}
QOS	config diffserv class match protocol number <classname> <0-255> [exclude]	Class-Map Config	match not protocol {<protocol-name> | <0-255>}
QOS	config diffserv class match refclass <add/remove> <classname> <refclassname>	Class-Map Config	match class-map <refclassname>
		Class-Map Config	no match class-map <refclassname>
QOS	config diffserv class match srcip <classname> <ipaddr> <ipmask> [exclude]	Class-Map Config	match srcip <ipaddr> <ipmask>
		Class-Map Config	match not srcip <ipaddr> <ipmask>
QOS	config diffserv class match srcl4port keyword <classname> <portkey> [exclude]	Class-Map Config	match srcl4port {<portkey> | <0-65535> [<0-65535>]}
QOS	config diffserv class match srcl4port number <classname> <0-65535> [exclude]	Class-Map Config	match not srcl4port {<portkey> | <0-65535> [<0-65535>]}
QOS	config diffserv class match srcl4port range <classname> <0-65535> <0-65535> [exclude]		
QOS	config diffserv class match srcmac <classname> <macaddr> <macmask> [exclude]	Class-Map Config	match source-address mac <address> <macmask>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Class-Map Config	match not source-address mac <address> <macmask>
QOS	config diffserv class match vlan <classname> <1-4094> [exclude]	Class-Map Config	match vlan <1-4094>
		Class-Map Config	match not vlan <1-4094>
Routing	show arp table	Privileged EXEC	show arp
Routing	show arp switch	Privileged EXEC	show arp switch
Routing	show ip interface <slot/port>	Privileged EXEC	show ip interface <slot/port>
Routing	show router ip interface summary	Privileged EXEC	show ip interface brief
Routing	show ip summary	Privileged EXEC	show ip brief
Routing	show ip stats	Privileged EXEC	show ip stats
Routing	show ip vlan	Privileged EXEC	show ip vlan
Routing	show router ospf info	Privileged EXEC and User EXEC	show ip ospf
Routing	show router ospf interface info <slot/port>	Privileged EXEC and User EXEC	show ip ospf interface <slot/port>
Routing	show router ospf interface stats <slot/port>	Privileged EXEC and User EXEC	show ip ospf interface stats <slot/port>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Routing	show router ospf interface summary	Privileged EXEC and User EXEC	show ip ospf interface brief
Routing	show router ospf area info <areaid>	Privileged EXEC	show ip ospf area <areaid>
Routing	show router ospf area range <areaid>	Privileged EXEC	show ip ospf range <areaid>
Routing	show router ospf neighbor detailed <slot/port> <ipaddr>	Privileged EXEC and User EXEC	show ip ospf neighbor <ipaddr> <slot/port>
Routing	show router ospf neighbor table <slot/port>	Privileged EXEC and User EXEC	show ip ospf neighbor brief {<slot/port> | all}
Routing	show router ospf stub table	Privileged EXEC and User EXEC	show ip ospf stub table
Routing	show router ospf lsdb summary	Privileged EXEC and User EXEC	show ip ospf database
Routing	show router rip info	Privileged EXEC and User EXEC	show ip rip
Routing	show router rip interface detailed <slot/port>	Privileged EXEC and User EXEC	show ip rip interface <slot/port>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Routing	show router rip interface summary	Privileged EXEC and User EXEC	show ip rip interface brief
Routing	show router ospf virtif detailed <areaid> <neighbor>	Privileged EXEC and User EXEC	show ip ospf virtual-link <areaid> <neighbor>
Routing	show router ospf virtif summary	Privileged EXEC and User EXEC	show ip ospf virtual-link {brief | <areaid> <neighbor>}
Routing	show router route table	Privileged EXEC and User EXEC	show ip route
Routing	show router route bestroutes	Privileged EXEC and User EXEC	show ip route bestroutes
Routing	show router route entry <networkaddr>	Privileged EXEC and User EXEC	show ip route entry <networkaddr>
Routing	show router route prefrences	Privileged EXEC and User EXEC	show ip route preferences
Routing	show router vrrp info	Privileged EXEC and User EXEC	show ip vrrp

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Routing	show router vrrp interface stats <slot/port> <VrID>	Privileged EXEC and User EXEC	show ip vrrp interface stats <slot/port> <VrID>
Routing	show router vrrp interface detailed <slot/port> <VrID>	Privileged EXEC and User EXEC	show ip vrrp interface <slot/port> <VrID>
Routing	show router vrrp interface summary	Privileged EXEC and User EXEC	show ip vrrp interface brief
Routing	show router rtrdiscovery <slot/port/all>	Privileged EXEC and User EXEC	show ip irdp {<slot/port> | all}
Routing	show router bootpdhcprelay	Privileged EXEC and User EXEC	show bootpdhcprelay
Routing	config arp agetime <15-3600seconds>	Global Config	arp timeout <15-21600>
		Global Config	no arp timeout
Routing	config arp cachesize <10-128>	Global Config	arp cachesize <48-112>
		Global Config	no arp cachesize
Routing	config arp create <arpentry> <macaddr>	Global Config	arp <ipaddress> <macaddress>
Routing	config arp delete <arpentry> <macaddr>	Global Config	no arp <ipaddress> <macaddress>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
Routing	config arp resptime <seconds>	Global Config	arp resptime <1-10>
		Global Config	no arp resptime
Routing	config arp retries	Global Config	arp retries <0-10>
		Global Config	no arp retries
Routing	config interface encaps <slot/port> <ethernet/snap>	Interface Config	encapsulation {<ethernet> | <snap>}
Routing	config interface routing <slot/port> <enable/disable>	Interface Config	routing
		Interface Config	no routing
Routing	config ip interface mtu <slot/port> <576-1500>	Interface Config	mtu <1522-9216>
Routing	config ip interface netdirbcast <slot/port> <enable/disable>	Interface Config	ip netdirbcast
		Interface Config	no ip netdirbcast
Routing	config ip interface create <slot/port> <ipaddr> <subnetmask>	Global Config	ip address <slot/port> <ipaddr> <subnetmask>
Routing	config ip forwarding <enable | disable>	Global Config	ip forwarding
		Global Config	no ip forwarding
Routing	config routing <enable | disable>	Global Config	ip routing
		Global Config	no ip routing

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Routing	config ip vlan routing create <vlan>	VLAN database	vlan routing <vlanid>
Routing	config ip vlan routing delete <vlan>	VLAN database	no vlan routing <vlanid>
Routing	config trapflags ospf <enable | disable>	Router OSPF Config	trapflags
		Router OSPF Config	no trapflags
Routing	config router ospf adminmode <enable | disable>	Router OSPF Config	enable
		Router OSPF Config	no enable
Routing	config router ospf asbr <enable | disable>		Removed
Routing	config router ospf prefrence <intra/ inter/type1/type2> <0-255>	Router OSPF Config	distance ospf {intra | inter | type1 | type2} <1-255>
		Router OSPF Config	no distance ospf {intra | inter | type1 | type2}
Routing	config router ospf interface areaid <slot.prot> <areaid>	Interface Config	ip ospf areaid <areaid>
Routing	config router ospf interface authentication <slot/port> <none / simple> [key]	Interface Config	ip ospf authentication {none | {simple <key>} | {encrypt <key> <keyid>}}
		Interface Config	no ip ospf authentication

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
Routing	config router ospf interface interval dead <slot/port> <1-2147483647>	Interface Config	ip ospf dead-interval <1-2147483647>
		Interface Config	no ip ospf dead-interval
Routing	config router ospf interface interval hello <slot/port> <1-65535>	Interface Config	ip ospf hellointerval <1-65535>
		Interface Config	no ip ospf hellointerval
Routing	config router ospf interface interval retransmit <slot/port> <0-3600>	Interface Config	ip ospf retransmit-interval <0-3600>
		Interface Config	no ip ospf retransmit-interval
Routing	config router ospf interface iftransitdelay <slot/port> <1-3600>	Interface Config	ip ospf transmit-delay <1-3600>
		Interface Config	no ip ospf transmit-delay <1-3600>
Routing	config router ospf interface mode <slot/port> <enable | disable>	Interface Config	ip ospf
		Interface Config	no ip ospf
Routing	config router ospf interface priority <slot/port> <0-255>	Interface Config	ip ospf priority <0-255>
		Interface Config	no ip ospf priority
Routing	config router ospf interface cost <ipaddr> <slot/port> <1-65535>	Interface Config	ip ospf cost <1-65535>
		Interface Config	no ip ospf cost

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Routing	config router ospf area range create <areaid> <ipaddr> <subnetmask> [summ] [enable/ disable]	Router OSPF Config	area <areaid> range <ipaddr> <subnetmask> {summarylink | nssaexternallink} [advertise | not-advertise]
Routing	config router ospf area range delete <areaid> <ipaddr> <subnetmask> [summ]	Router OSPF Config	no area <areaid> range <ipaddr> <subnetmask> {summarylink | nssaexternallink}
Routing	config router ospf area stub metric value <areaid> <1-16777215>	Router OSPF Config	area <areaid> default-cost <1-16777215>
Routing	config router ospf area stub summarylsa <areaid> <enable/ disable>	Router OSPF Config	area <areaid> stub summarylsa
		Router OSPF Config	no area <areaid> stub summarylsa
Routing	config router ospf area stub create <areaid>	Router OSPF Config	area <areaid> stub
Routing	config router ospf area stub delete <areaid>	Router OSPF Config	no area <areaid> stub
Routing	config router rip adminmode <enable | disable>	Router RIP Config	enable
		Router RIP Config	no enable
Routing	config router rip prefrence <0-255>	Router RIP Config	distance rip <1-255>
Routing	config router rip interface authentication <slot/port> <none | simple> [key]	Interface Config	ip rip authentication {none | {simple <key>} | {encrypt <key> <keyid>}}

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Interface Config	no ip rip authentication
Routing	config router rip interface defaultmetric <slot/port> <0-15>	Router RIP Config	default-information originate
Routing	config router rip interface mode <enable | disable>	Interface Config	ip rip
		Interface Config	no ip rip
Routing	config router rip interface version receive <slot/port> <rip1 | rip2 | both | none>	Interface Config	ip rip receive version {rip1 | rip2 | both | none}
		Interface Config	no ip rip receive version
Routing	config router rip interface version send <slot/port> <rip1 | rip1c | rip2 | none>	Interface Config	ip rip send version {rip1 | rip1c | rip2 | none}
		Interface Config	no ip rip send version
Routing	config router ospf virtif create <areaid> <neighbor>	Router OSPF Config	area <areaid> virtual-link <neighborid> [authentication [none | {simple <key>} | {encrypt <key> <keyid>}]] [hello-interval <1-65535>] [retransmit-interval <0-3600>] [transmit-delay <0-3600>] [dead-interval <1-65535>]
Routing	config router ospf virtif interval transdelay <areaid> <neighbor> <0-3600>		
Routing	config router ospf virtif authentication <areaid> <neighbor> <none | simple> [key]		

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Routing	config router ospf virtif interval dead <areaid> <neighbor> <1-65535>		
Routing	config router ospf virtif interval hello <areaid> <neighbor> <1-65535>		
Routing	config router ospf virtif interval retransmit <areaid> <neighbor> <0-3600>		
Routing	config router ospf virtif delete <areaid> <neighbor>	Router OSPF Config	no area <areaid> virtual-link <neighborid>
Routing	config router ospf exoverfolwinterval <0-2147483647>	Router OSPF Config	exit-overflow-interval <0-2147483647>
		Router OSPF Config	no exit-overflow-interval
Routing	config router ospf extlsdblimit <-1-2147483647>	Router OSPF Config	external-lsdb-limit <-1-2147483647>
		Router OSPF Config	no external-lsdb-limit
Routing	config router id <routerid>	Router OSPF Config	router-id <ipaddress>
Routing	config router route create <networkaddr> <subnetmask> <nexthopip> [metric]	Global Config	ip route <networkaddr> <subnetmask> <nexthopip> [0-255]
Routing	config router route delete <networkaddr> <subnetmask> <nexthopip>	Global Config	no ip route <networkaddr> <subnetmask> <nexthopip>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Routing	config router route staticpreference <local/static> <0-255>	Global Config	ip route distance <1-255>
Routing	config config router route default create <nexthopip>	Global Config	ip route default <nexthopip>
Routing	config router route default delete	Global Config	no ip route default <nexthopip>
Routing	config router vrrp adminmode <enable/disable>	Global Config	ip vrrp
		Global Config	no ip vrrp
Routing	config router vrrp interface adminmode <slot/port> <VrID> <enable/disable>	Interface Config	ip vrrp <VrID> mode
		Interface Config	no ip vrrp <VrID> mode
Routing	config router vrrp interface priority <slot/port> <VrID> <1-254>	Interface Config	ip vrrp <VrID> priority <1-254>
		Interface Config	no ip vrrp <VrID> priority
Routing	config router vrrp interface ipaddress <slot/port> <vrID> <ipaddr>	Interface Config	ip vrrp <VrID> ip <ipaddress> <ipaddr>
Routing	config router vrrp interface preemptmode <slot/port> <vrID> <enable/disable>	Interface Config	ip vrrp <VrID> preempt
		Interface Config	no ip vrrp <VrID> preempt
Routing	config router vrrp interface advinterval <slot/port> <vrID> <seconds>	Interface Config	ip vrrp <VrID> timers advertise <1-255>
		Interface Config	no ip vrrp <VrID> timers advertise

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Routing	config router vrrp interface authdetails <slot/port> <vrID> <none | simple> [key]	Interface Config	ip vrrp <VrID> authentication [<key>]
		Interface Config	no ip vrrp <VrID> authentication
Routing	config router vrrp removedetails <slot/port> <vrID>	Interface Config	ip vrrp removedetails <VrID>
Routing	config router rtrdiscovery adminmode <slot/port> <enable | disable>	Interface Config	ip irdp [{holdtime <maxinterval-9000> | maxadvertinterval <4-1800> | minadvertinterval <3-maxinterval> | preference <-2147483648 - 2147483647> | address <address>}]
		Interface Config	no ip irdp
Routing	config router rtrdiscovery maxinterval <slot/port> <4-1800>		
Routing	config router rtrdiscovery mininterval <slot/port> <3-maxinterval>		
Routing	config router rtrdiscovery lifetime <slot/port> <max-interval-9000>		
Routing	config router rtrdisocvery address <slot/port> <ipaddr>		
Routing	config router rtrdisocvery prefrence <slot/port> <-2147483648 - 2147483647>		
Routing	config router bootpdhcprelay cidoptmode <enable | disable>	Global Config	bootpdhcprelay cidoptmode
		Global Config	no bootpdhcprelay cidoptmode
Routing	config router bootpdhcprelay adminmode <enable/disable>	Global Config	bootpdhcprelay disable

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Global Config	no bootpdhcprelay disable
Routing	config router bootpdhcprelay maxhopcount <1-16>	Global Config	bootpdhcprelay maxhopcount <1-16>
		Global Config	no bootpdhcprelay maxhopcount
Routing	config router bootpdhcprelay minwaittime <0-100>	Global Config	bootpdhcprelay minwaittime <0-100>
		Global Config	no bootpdhcprelay minwaittime
Routing	config router bootpdhcprelay serverip <ipaddr>	Global Config	bootpdhcprelay serverip <ipaddr>
Routing	config router ecmpmode <enable/ disable>	Global Config	ip ecmpmode
		Global Config	no ip ecmpmode
Routing	config router ospf 1583compatibility <enable/disable>	Router OSPF Config	1583compatibility
		Router OSPF Config	no 1583compatibility
Routing	config router ospf area authentication <areaid> <none/ simple/encrypt>	Router OSPF Config	area <areaid> authentication {encrypt | none | simple}
Routing	config router rip autosummary <enable/disable>	Router RIP Config	auto-summary
		Router RIP Config	no auto-summary

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Routing	config router rip splithorizon <none/ simple/poison>	Router RIP Config	split-horizon {none | simple | poison}
		Router RIP Config	no split-horizon
Routing	config router rip hostroutesaccept <enable/disable>	Router RIP Config	hostroutesaccept
		Router RIP Config	no hostroutesaccept
Switching	show serviceport	Privileged EXEC	show serviceport
Switching	show snmpcommunity	Privileged EXEC	show snmpcommunity
Switching	show snmptrap	Privileged EXEC	show snmptrap
Switching	show trapflags	Privileged EXEC	show trapflags
Switching	show telnet	Privileged EXEC and User EXEC	show remotecon
Switching	show forwardingdb agetime [fdbid | all]	Privileged EXEC	show forwardingdb agetime {<fdbid> | all}
Switching	config network parms <ipaddr> <netmask> [gateway]	Privileged EXEC	network parms <ipaddr> <netmask> [<gateway>]
Switching	config network protocol <none | bootp | dhcp>	Privileged EXEC	network protocol {none | bootp | dhcp}
Switching	config network webmode <enable | disable>	Privileged EXEC	ip http server

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Privileged EXEC	no ip http server
Switching	config network javamode <enable | disable>	Privileged EXEC	network javamode
		Privileged EXEC	no network javamode
Switching	config prompt <system prompt>	Privileged EXEC	set prompt <promptstring>
Switching	config serial baudrate <speed>	Line Config	serial baudrate {1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200}
Switching	config serial timeout <0 - 160>	Line Config	serial timeout <0-160>
Switching	config serviceport parms <ipaddr> <netmask> [gateway]	Privileged EXEC	set serviceport ip <ipaddr> <netmask> [gateway]
Switching	config serviceport protocol <none | bootp | dhcp>	Privileged EXEC	set serviceport protocol {none | bootp | dhcp}
Switching	config snmpcommunity accessmode <ro | rw> <name>	Global Config	snmp-server community ro <name>
		Global Config	snmp-server community rw <name>
Switching	config snmpcommunity create <name>	Global Config	snmp-server community <name>
Switching	config snmpcommunity delete <name>	Global Config	no snmp-server community <name>
Switching	config snmpcommunity ipaddr <ipaddr> <name>	Global Config	snmp-server community ipaddr <ipaddr> <name>
		Global Config	no snmp-server community ipaddr <name>
Switching	config snmpcommunity ipmask <ipmask> <name>	Global Config	snmp-server community ipmask <ipmask> <name>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Global Config	no snmp-server community ipmask <name>
Switching	config snmpcommunity mode <enable | disable> <name>	Global Config	snmp-server community mode <name>
		Global Config	no snmp-server community mode <name>
Switching	config snmptrap create <name> <ipaddr>	Global Config	snmptrap <name> <ipaddr>
Switching	config snmptrap delete <name> <ipaddr>	Global Config	no snmptrap <name> <ipaddr>
Switching	config snmptrap ipaddr <ipaddrold> <name> <ipaddrnew>	Global Config	snmptrap ipaddr <name> <ipaddrold> <ipaddrnew>
Switching	config snmptrap mode <enable | disable> <name> <ipaddr>	Global Config	snmptrap mode <name> <ipaddr>
		Global Config	no snmptrap mode <name> <ipaddr>
Switching	config trapflags authentication <enable | disable>	Global Config	snmp-server enable traps
		Global Config	no snmp-server enable traps
Switching	config trapflags bcaststorm <enable | disable>	Global Config	snmp-server enable traps bcaststorm
		Global Config	no snmp-server enable traps bcaststorm
Switching	config trapflags linkmode <enable | disable>	Global Config	snmp-server enable traps linkmode
		Global Config	no snmp-server enable traps linkmode
Switching	config trapflags multiusers <enable | disable>	Global Config	snmp-server enable traps multiusers

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Global Config	no snmp-server enable traps multiusers
Switching	config trapflags stpmode <enable | disable>	Global Config	snmp-server enable traps stpmode
		Global Config	no snmp-server enable traps stpmode
Switching	config telnet maxsessions <0-5>	Privileged EXEC	remotecon maxsessions <0-5>
		Privileged EXEC	no remotecon maxsessions
Switching	config telnet mode <enable | disable>	Privileged EXEC	telnet
		Privileged EXEC	no telnet
Switching	config telnet timeout <0-160>	Privileged EXEC	remnotecon timeout <0-160>
		Privileged EXEC	no remotecon timeout
Switching	config forwardingdb agetime <10-1,000,000> [fdbid/all]	Global Config	bridge aging-time <10-1000000> {<1-4094> | all}
		Global Config	no bridge aging-time {<1-4094> | all}
Switching	show spanningtree summary	Privileged EXEC and User EXEC	show spanning-tree summary
Switching	show spanningtree port <slot/port>	Privileged EXEC and User EXEC	show spanning-tree interface <slot/port>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	show spanningtree cst detailed	Privileged EXEC and User EXEC	show spanning-tree
Switching	show spanningtree bridge	Privileged EXEC and User EXEC	show spanning-tree brief
Switching	show spanningtree mst summary	Privileged EXEC and User EXEC	show spanning-tree mst summary
Switching	show spanningtree mst detailed <mstid>	Privileged EXEC and User EXEC	show spanning-tree mst detailed <1-4094>
Switching	show spanningtree cst port summary <mstid> <slot/port/all>	Privileged EXEC and User EXEC	show spanning-tree mst port summary 0 {<slot/port> | all}
Switching	show spanningtree cst port detailed <mstid> <slot/port>	Privileged EXEC and User EXEC	show spanning-tree mst port detailed 0 <slot/port>
Switching	show spanningtree vlan <vlan>	Privileged EXEC and User EXEC	show spanning-tree vlan <1-4094>
Switching	config spanningtree adminmode <enable/disable>	Global Config	spanning-tree
		Global Config	no spanning-tree
Switching	config spanningtree forceversion <802.Id/802.lw/802.ls>	Global Config	spanning-tree forceversion {802.1d | 802.lw | 802.ls}

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Global Config	no spanning-tree forceversion
Switching	config spanningtree configuration name <name>	Global Config	spanning-tree configuration name <name>
		Global Config	no spanning-tree configuration name
Switching	config spanningtree configuration revision <0-65535>	Global Config	spanning-tree configuration revision <0-65535>
		Global Config	no spanning-tree configuration revision
Switching	config spanningtree port mode <slot/port/all> <enable/disbale>	Interface Config	spanning-tree port mode all
		Interface Config	no spanning-tree port mode
Switching	config spanningtree port mode <slot/port/all> <enable/disbale>	Global Config	spanning-tree port mode all
		Global Config	no spanning-tree port mode all
Switching	config spanningtree port migrationcheck <slot/port/all> <enable/disable>	Global Config	spanning-tree bpdumigrationcheck {<slot/port> | all}
		Global Config	no spanning-tree bpdumigrationcheck {<slot/port> | all}
Switching	config spanningtree bridge maxage <6-40>	Global Config	spanning-tree max-age <6-40>
		Global Config	no spanning-tree max-age
Switching	config spanningtree bridge hellotime <1-10>	Global Config	spanning-tree hello-time <1-10>
		Global Config	no spanning-tree hello-time

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	config spanningtree bridge forwarddelay <4-30>	Global Config	spanning-tree forward-time <4-30>
		Global Config	no spanning-tree forward-time
Switching	config spanningtree bridge priority <0-61440>		Removed
Switching	config spanningtree cst port pathcost <slot/port> <1-200000000/auto>	Interface Config	spanning-tree mst 0 cost {<1-200000000> | auto}
		Interface Config	no spanning-tree mst 0 cost
Switching	config spanningtree cst port priority <slot/port> <0-240>	Interface Config	spanning-tree mst 0 port-priority <0-240>
		Interface Config	no spanning-tree mst 0 port-priority
Switching	config spanningtree cst port edgeport <slot/port> <true/false>	Interface Config	spanning-tree edgeport
		Interface Config	no spanning-tree edgeport
Switching	config spanningtree mst create <mstid>	Global Config	spanning-tree mst instance <mstid>
Switching	config spanningtree mst delete <mstid>	Global Config	no spanning-tree mst instance <mstid>
Switching	config spanningtree mst vlan add <mstid> <vlan>	Global Config	spanning-tree mst vlan <mstid> <vlanid>
Switching	config spanningtree mst vlan remove <mstid> <vlan>	Global Config	no spanning-tree mst vlan <mstid> <vlanid>
Switching	config spanningtree mst priority <mstid> <0-61440>	Global Config	spanning-tree mst priority <mstid> <0-61440>
		Global Config	no spanning-tree mst priority <mstid>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	config spanningtree mst port pathcost <mstid> <slot/port> <1-200000000/auto>	Interface Config	spanning-tree mst <mstid> cost {<1-200000000> | auto}
		Interface Config	no spanning-tree mst <mstid> cost
Switching	config spanningtree mst port priority <mstid> <slot/port> <0-240>	Interface Config	spanning-tree mst <mstid> port-priority <0-240>
		Interface Config	no spanning-tree mst <mstid> port-priority
Switching	show inventory	Privileged EXEC	show hardware
Switching	show sysinfo	Privileged EXEC	show sysinfo
Switching	show arp switch	Privileged EXEC	show arp switch
Switching	show forwardingdb table [macaddr/ all]	Privileged EXEC	show mac-addr-table [{<macaddr> | all}]
Switching	show stats port detailed <slot/port>	Privileged EXEC	show interface ethernet {<slot/port> | switchport}
Switching	show stats switch detailed	Privileged EXEC	
Switching	show stats port summary <slot/ port>	Privileged EXEC	show interface {<slot/port> | switchport}
Switching	show stats switch summary	Privileged EXEC	
Switching	show eventlog	Privileged EXEC	show eventlog
Switching	show msglog	Privileged EXEC	show msglog

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	show traplog	Privileged EXEC	show logging
Switching	config sysname <name>	Global Config	snmp-server sysname <name>
Switching	config syslocation <location>	Global Config	snmp-server location <loc>
Switching	config syscontact <contact>	Global Config	snmp-server contact <con>
Switching	ping <ipaddr>	Privileged EXEC and User EXEC	ping <ipaddress>
Switching	reset system	Privileged EXEC	reload
Switching	transfer upload mode <xmodem | tftp>	Privileged EXEC	copy { { nvram:errorlog | nvram:msglog | nvram:startup-config | nvram:traplog } <url> } | {<url> nvram:startup-config | system:image | nvram:sshkey-rsa1 | nvram:sshkey-rsa2 | nvram:sshkey-dsa | nvram:sslpem-root | nvram:sslpem-server | nvram:sslpem-dhweak | nvram:sslpem-strong } | {system:running-config nvram:startup-config}
Switching	transfer upload serverip <ipaddr>		
Switching	transfer upload path <path>		
Switching	transfer upload filename <name>		
Switching	transfer upload datatype <config | errorlog | msglog | traplog>		
Switching	transfer upload start		

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	transfer download mode <xmodem | tftp>		
Switching	transfer download serverip <ipaddr>		
Switching	transfer download path <path>		
Switching	transfer download filename <name>		
Switching	transfer download datatype <code | config>		
Switching	transfer download start		
Switching	clear transfer		
Switching	save config	Privileged EXEC	copy system:running-config nvram:startup-config
Switching	clear config	Privileged EXEC	clear config
Switching	clear pass	Privileged EXEC	clear pass
Switching	clear traplog	Privileged EXEC	clear traplog
Switching	clear vlan	Privileged EXEC	clear vlan
Switching	clear lag	Privileged EXEC	clear port-channel
Switching	clear stats port <slot/port>	Privileged EXEC	clear counters [<slot/port>]
Switching	clear stats switch	Privileged EXEC	
Switching	clear igmpsnooping	Privileged EXEC	clear igmpsnooping

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	logout	Privileged EXEC	logout
Switching	show users info	Privileged EXEC	show users
Switching	show loginsession	Privileged EXEC	show loginsession
Switching	config users add <name>	Global Config	users name <username>
Switching	config users delete <name>	Global Config	no users name <username>
Switching	config users passwd <user>	Global Config	users passwd <username>
Switching	config users snmpv3 authentication <user> <none/md5/ sha>	Global Config	users snmpv3 authentication <username> {none | md5 | sha}
		Global Config	no users snmpv3 authentication <username>
Switching	config users snmpv3 encryption <user> <none/des [key]>	Global Config	users snmpv3 encryption <username> {none | des [key]}
		Global Config	no users snmpv3 encryption <username>
Switching	config users snmpv3 accessmode <user> <readonly/readwrite>	Global Config	users snmpv3 accessmode <username> {readonly | readwrite}
		Global Config	no users snmpv3 accessmode <username>
Switching	config loginsession close <sessionID/all>	Privileged EXEC	disconnect {<sessionID> | all}
Switching	show switchconfig	Privileged EXEC	show storm-control
Switching	show port <slot/port | all>	Privileged EXEC	show port {<slot/port> | all}

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	show lag <logical slot/port | all>	Privileged EXEC	show port-channel {<logical slot/port> | all}
Switching	show lags summary	Privileged EXEC and User EXEC	show port-channel brief
Switching	show vlan summary	Privileged EXEC and User EXEC	show vlan brief
Switching	show vlan detailed <vlan-id>	Privileged EXEC and User EXEC	show vlan <vlanid>
Switching	show vlan port <slot/port>	Privileged EXEC and User EXEC	show vlan port {<slot/port> | all}
Switching	show protocol <groupid/all>	Privileged EXEC	show port protocol {<groupid> | all}
Switching	show garp info	Privileged EXEC and User EXEC	show garp
Switching	show garp interface <slot/port/all>	Privileged EXEC and User EXEC	show gmrp configuration {<slot/port> | all}
		Privileged EXEC and User EXEC	show gvrp configuration {<slot/port> | all}
Switching	show igmpsnooping	Privileged EXEC	show igmpsnooping

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	show mfdb table [macaddr/all]	Privileged EXEC	show mac-address-table multicast [{<macaddr> | all}]
Switching	show mfdb gmrp	Privileged EXEC	show mac-address-table gmrp
Switching	show mfdb igmpsnooping	Privileged EXEC	show mac-address-table igmpsnooping
Switching	show mfdb statisticfiltering	Privileged EXEC	show mac-address-table staticfiltering
Switching	show mfdb stats	Privileged EXEC	show mac-address-table stats
Switching	show mirroring	Privileged EXEC	show monitor
Switching	config switchconfig broadcast <enable/disable>	Global Config	storm-control broadcast
		Global Config	no storm-control broadcast
Switching	config switchconfig flowcontrol <enable/disable>	Global Config	storm-control flowcontrol
		Global Config	no storm-control flowcontrol
Switching	config port adminmode <slot/port | all> <enable | disable>	Interface Config	shutdown
		Interface Config	no shutdown
		Global Config	shutdown all
		Global Config	no shutdown all
Switching	config port linktrap <slot/port | all> <enable | disable>	Interface Config	snmp trap link- status

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Interface Config	no snmp trap link- status
		Global Config	snmp trap link- status all
		Global Config	no snmp trap link- status all
Switching	config port physicalmode <slot/port | all> <100h | 100f | 10h | 10f>	Interface Config	speed {{100 | 10} {half-duplex | full-duplex} | 1000 full-duplex}
		Global Config	speed all {{100 | 10} {half-duplex | full-duplex} | 1000 full-duplex}
Switching	config port lacpmode <slot/port/all> <enable/disable>	Interface Config	port lacpmode
		Interface Config	no port lacpmode
		Global Config	port lacpmode all
		Global Config	no port lacpmode all
Switching	config port autoneg <slot/port/all> <enable/disable>	Interface Config	auto-negotiate
		Interface Config	no auto-negotiate
		Global Config	auto-negotiate all
		Global Config	no auto-negotiate all
Switching	config lag create <name>	Global Config	port-channel <name>
Switching	config lag addport <logical slot/ port> <slot/port>	Interface Config	addport <logical slot/port>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	config lag deleteport <logical slot/port> <slot/port | all>	Interface Config	deleteport <logical slot/port>
		Global Config	deleteport <logical slot/port> all
Switching	config lag adminmode <logical slot/port | all> <enable | disable>	Global Config	port-channel adminmode {<logical slot/port> | all}
		Global Config	no port-channel adminmode {<logical slot/port> | all}
Switching	config lag linktrap <logical slot/port | all> <enable | disable>	Global Config	port-channel linktrap {<logical slot/port> | all}
		Global Config	no port-channel linktrap {<logical slot/port> | all}
Switching	config lag name <logical slot/port | all> <name>	Global Config	port-channel name {<logical slot/port> | all} <name>
Switching	config lag deletelag <logical slot/port | all>	Interface Config	delete interface {<logical slot/port> | all}
Switching	config lag stpmode <logical slot/port | all> <off | 802.1d | fast>	Interface Config	spannig-tree {<logical slot/port> | all} {off | 802.1d | fast}
Switching	config vlan create <2-4094>	VLAN database	vlan <1-4094>
		VLAN database	no vlan <1-4094>
Switching	config vlan name <name> <2-4094>	VLAN database	vlan name <1-4094> <newname>
Switching	config vlan delete <2-4094>	VLAN database	no vlan name <1-4094>
Switching	config vlan makestatic <2-4094>	VLAN database	vlan makestatic <1-4094>
Switching	config vlan participation <exclude | include | auto> <1-4094> <slot/port | all>	Interface Config	vlan participation {exclude | include | auto} <1-4094>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Global Config	vlan participation all {exclude | include | auto} <1-4094>
Switching	config vlan port tagging <enable | disable> <1-4094> <slot/port | all>	Interface Config	vlan tagging <1-4094>
		Interface Config	no vlan tagging <1-4094>
		Global Config	vlan port tagging all <1-4094>
		Global Config	no vlan port tagging all <1-4094>
Switching	config vlan port pvid <1-4094> <slot/port | all>	Interface Config	vlan pvid <1-4094>
		Global Config	vlan port pvid all <1-4094>
Switching	config vlan port acceptframe <all | vlan> <slot/port | all>	Interface Config	vlan acceptframe {vlanonly | all}
		Interface Config	no vlan acceptframe
		Global Config	vlan port acceptframe all {vlanonly | all}
		Global Config	no vlan port acceptframe all
Switching	config vlan port ingressfilter <enable | disbale> <slot/port | all>	Interface Config	vlan ingressfilter
		Interface Config	no vlan ingressfilter
		Global Config	vlan port ingressfilter all
		Global Config	no vlan port ingressfilter all

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	config protocol create <groupname>	Global Config	vlan protocol group <groupname>
Switching	config protocol delete <groupid>	Global Config	vlan protocol group remove <groupid>
Switching	config protocol protocol add <groupid> <protocol>	Global Config	vlan protocol group add protocol <groupid> {ip | arp | ipx}
Switching	config protocol protocol remove <groupid> <protocol>	Global Config	no vlan protocol group add protocol <groupid> {ip | arp | ipx}
Switching	config protocol vlan add <groupid> <vlan>	VLAN database	protocol group <groupid> <1-4094>
Switching	config protocol vlan remove <groupid> <vlan>	VLAN database	no protocol group <groupid> <1-4094>
Switching	config protocol interface add <groupid> <slot/port / all>	Interface Config	protocol vlan group <groupid>
Switching	config protocol interface remove <groupid> <slot/port/all>	Interface Config	no protocol vlan group <groupid>
Switching	config protocol interface remove <groupid> <slot/port/all>	Global Config	protocol vlan group all <groupid>
Switching	config protocol interface remove <groupid> <slot/port/all>	Global Config	no protocol vlan group all <groupid>
Switching	config garp gmrp adminmode <enable/disable>	Privileged EXEC	set gmrp adminmode
		Privileged EXEC	no set gmrp adminmode
Switching	config garp gmrp interfacemode <slot/port/all> <enable/disable>	Interface Config	set gmrp interfacemode
		Interface Config	no set gmrp interfacemode
		Global Config	set gmrp interfacemode all

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Global Config	no set gmrp interfacemode all
Switching	config garp gvrp adminmode <enable | disable>	Privileged EXEC	set gvrp adminmode
		Privileged EXEC	no set gvrp adminmode
Switching	config garp gvrp interfacemode <slot/port | all> <enable | disable>	Interface Config	set gvrp interfacemode
		Interface Config	no set gvrp interfacemode
		Global Config	set gvrp interfacemode all
		Global Config	no set gvrp interfacemode all
Switching	config garp jointimer <slot/port/all> <10-100>	Interface Config	set garp timer join <10-100>
		Interface Config	no set garp timer join
		Global Config	set garp timer join all <10-100>
		Global Config	no set garp timer join all
Switching	config garp leavetimer <slot/port/ all> <20-600>	Interface Config	set garp timer leave <20-600>
		Interface Config	no set garp timer leave
		Global Config	set garp timer leave all <20-600>
		Global Config	no set garp timer leave all

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Switching	config garp leavealltimer <slot/port/all> <200-600>	Interface Config	set garp timer leaveall <200-6000>
		Interface Config	no set garp timer leaveall
		Global Config	set garp timer leaveall all <200-6000>
		Global Config	no set garp timer leaveall all
Switching	config igmpsnooping adminmode <enable/disable>	Global Config	set igmp
		Global Config	no set igmp
Switching	config igmpsnooping groupmembershipinterval <1-3600>	Global Config	set igmp groupmembershipinterval <2-3600>
		Global Config	no set igmp groupmembershipinterval
Switching	config igmpsnooping maxresponse <1-3600>	Global Config	set igmp maxresponse <1-3599>
		Global Config	no set igmp maxresponse
Switching	config igmpsnooping mcrtexpiretime <0-3600>	Global Config	set igmp mcrtexpiretime <0-3600>
		Global Config	no set igmp mcrtexpiretime
Switching	config igmpsnooping interfacemode <slot/port/all> <enable/disable>	Interface Config	set igmp
		Interface Config	no set igmp

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Global Config	set igmp interfacemode all
Switching	config mirroring delete	Global Config	no set igmp interfacemode all
Switching	config mirroring create <slot/port> <slot/port>	Global Config	monitor session source <slot/port> destination <slot/port>
		Global Config	no monitor session
Switching	config mirroring mode <enable | disable>	Global Config	monitor session mode
		Global Config	no monitor session mode
Security	config authentication login create <listname>	Global Config	authentication login <listname> [method1 [method2 [method3]]]
Security	config authentication login set <listname> <local/radius/reject> [local/radius/reject] [local/radius/ reject]	Global Config	
Security	config authentication login delete <listname>	Global Config	no authentication login <listname>
Security	config users defaultlogin <listname>	Global Config	users defaultlogin <listname>
Security	config users login <user> <listname>	Global Config	users login <user> <listname>
Security	show authentication login info	Privileged EXEC	show authentication
Security	show authentication login users <listname>	Privileged EXEC	show authentication users <listname>
Security	show users authentication	Privileged EXEC	show users authentication

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Security	config radius maxretransmit <1 - 15>	Global Config	radius server retransmit <1-15>
		Global Config	no radius server retransmit
Security	config radius timeout <1 - 30>	Global Config	radius server timeout <1-30>
		Global Config	no radius server timeout
Security	config radius accounting mode <enable/disable>	Global Config	radius accounting mode
		Global Config	no radius accounting mode
Security	config radius accounting server add <ipaddr>	Global Config	radius server host {auth | acct} <ipaddr> [<0-65535>]
Security	config radius accounting server port <ipaddr> <0 - 65535>	Global Config	
Security	config radius accounting server remove <ipaddr>	Global Config	
Security	config radius server add <ipaddr>	Global Config	
Security	config radius server port <ipaddr> <0 - 65535>	Global Config	
Security	config radius server remove <ipaddr>	Global Config	no radius server host {auth | acct} <ipaddr>
Security	config radius accounting server secret <ipaddr>	Global Config	radius server key {auth | acct} <ipaddr>
Security	config radius server secret <ipaddr>	Global Config	
Security	config radius server primary <ipaddr>	Global Config	radius server primary <ipaddr>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Security	show radius summary	Privileged EXEC	show radius [servers]
Security	show radius server summary	Privileged EXEC	
Security	show radius server stats <ipaddr>	Privileged EXEC	show radius statistics <ipaddr>
Security	show radius accounting summary	Privileged EXEC	show radius accounting [statistics <ipaddr>]
Security	show radius accounting stats <ipaddr>	Privileged EXEC	
Security	show radius stats	Privileged EXEC	show radius statistics
Security	clear radius stats	Privileged EXEC	clear radius statistics
Security	config dot1x adminmode <enable/ disable>	Global Config	dot1x system-auth-control
		Global Config	no dot1x system-auth-control
Security	config dot1x port initialize <slot/ port>	Privileged EXEC	dot1x initialize <slot/port>
Security	config dot1x port reauthenticate <slot/port>	Privileged EXEC	dot1x re-authenticate <slot/port>
Security	config dot1x port controldir <slot/ port/all> <both/in>		Removed
Security	config dot1x port controlmode <slot/port/all> <forceunauthorized/ forceauthorized/auto>	Global Config	dot1x port-control all {force-unauthorized | force-authorized | auto}
		Global Config	no dot1x port-control all

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	**Syntax**
		Interface Config	dot1x port-control {force-unauthorized | force-authorized | auto}
		Interface Config	no dot1x port-control
Security	config dot1x port quietperiod <slot/port> <0-65535>	Interface Config	dot1x timeout {{reauth-period <seconds>} | {quiet-period <seconds>} | {tx-period <seconds>} | {supp-timeout <seconds>} | {server-timeout <0-65535>}}
Security	config dot1x port transmitperiod <slot/port> <1-65535>	Interface Config	no dot1x timeout {reauth-period | quiet-period | tx-period | supp-timeout | server-timeout}
Security	config dot1x port supptimeout <slot/port> <1-65535>	Interface Config	
Security	config dot1x port servertimeout <slot/port> <1-65535>	Interface Config	
Security	config dot1x port reauthperiod <slot/port> <1-65535>	Interface Config	
Security	config dot1x port maxrequests <slot/port> <1-10>	Interface Config	dot1x max-req <1-10>
		Interface Config	no dot1x max-req
Security	config dot1x port reauthenabled <slot/port> <true/false>	Interface Config	dot1x re-authentication
		Interface Config	no dot1x re-authentication
Security	config dot1x defaultlogin <listname>	Global Config	dot1x defaultlogin <listname>
Security	config dot1x login <user> <listname>	Global Config	dot1x login <user> <listname>

Table 13-2. IS CLI Mapping (continued)

Package	7300 Series L3 Switch Command	CLI Command	
		Mode	Syntax
Security	config dot1x port users add <user> <slot/port/all>	Global Config	dot1x user <user> {<slot/port> | all}
Security	config dot1x port users remove <user> <slot/port/all>	Global Config	no dot1x user <user> {<slot/port> | all}
Security	show dot1x summary	Privileged EXEC	show dot1x [{summary {<slot/port> | all}} | {detail <slot/port>} | {statistics <slot/port>} {users <slot/port>}]
Security	show dot1x port summary <slot/ port/all>	Privileged EXEC	
Security	show dot1x port detailed <slot/ port>	Privileged EXEC	
Security	show dot1x port stats <slot/port>	Privileged EXEC	
Security	show dot1x port users <slot/port>	Privileged EXEC	
Security	clear dot1x port stats <slot/port/all>	Privileged EXEC	clear dot1x statistics {<slot/port> | all}
PoE	config poe port adminmode	Global Config	poe
PoE	config poe port priority <slot/port/ all><high/medium/low>	Global Config	poe priority <high/medium/low>
PoE	config poe port limit <slot/port/ all><3-16>	Global Config	poe limit <3-16>
PoE	config poe usagethreshold <0-100>	Global Config	poe usagethreshold <0-100>
PoE	show poe port info	Privilege	show poe port <slot/port, all>
PoE	show poe info	Privilege	show poe

Appendix B
Cabling Guidelines

This appendix provides specifications for cables used with a NETGEAR NETGEAR 7300 Series Layer 3 Managed Switch.

Fast Ethernet Cable Guidelines

Fast Ethernet uses UTP cable, as specified in the IEEE 802.3u standard for 100BASE-TX.The specification requires Category 5 UTP cable consisting of either two-pair or four-pair twisted insulated copper conductors bound in a single plastic sheath. Category 5 cable is certified up to 100 MHz bandwidth. 100BASE-TX operation uses one pair of wires for transmission and the other pair for receiving and for collision detection.

When installing Category 5 UTP cabling, use the following guidelines to ensure that your cables perform to the following specifications:

Certification
Make sure that your Category 5 UTP cable has completed the Underwriters' Laboratories (UL) or Electronic Testing Laboratories (ETL) certification process.

Termination method
To minimize cross-talk noise, maintain the twist ratio of the cable up to the point of termination; untwist at any RJ-45 plug or patch panel should not exceed 0.5 inch (1.5 cm).

Category 5 Cable

Category 5 distributed cable that meets ANSI/EIA/TIA-568-A building wiring standards can be a maximum of 328 feet (ft.) or 100 meters (m) in length, divided as follows:

20 ft. (6 m) between the hub and the patch panel (if used)

295 ft. (90 m) from the wiring closet to the wall outlet

10 ft. (3 m) from the wall outlet to the desktop device

The patch panel and other connecting hardware must meet the requirements for 100 Mbps operation (Category 5). Only 0.5 inch (1.5 cm) of untwist in the wire pair is allowed at any termination point.

Category 5 Cable Specifications

Ensure that the fiber cable is crossed over to guarantee link.

The Table below lists the electrical requirements of Category 5 UTP cable.

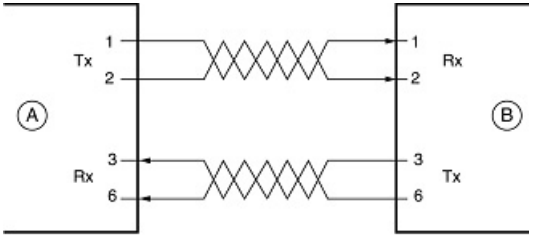
Table 13-3. Electrical Requirements of Category 5 Cable

SPECIFICATIONS	CATEGORY 5 CABLE REQUIREMENTS
Number of pairs	Four
Impedance	100 ± 15%
Mutual capacitance at 1 KHz	5.6 nF per 100 m
Maximum attenuation (dB per 100 m, at 20° C)	at 4 MHz: 8.2 at 31 MHz: 11.7 at 100 MHz: 22.0
NEXT loss (dB minimum)	at 16 MHz: 44 at 31 MHz: 39 at 100 MHz: 32

Twisted Pair Cables

For two devices to communicate, the transmitter of each device must be connected to the receiver of the other device. The crossover function is usually implemented internally as part of the circuitry in the device. Computers and workstation adapter cards are usually media-dependent interface ports, called MDI or uplink ports. Most repeaters and switch ports are configured as media-dependent interfaces with built-in crossover ports, called MDI-X or normal ports. Auto Uplink technology automatically senses which connection, MDI or MDI-X, is needed and makes the right connection.

Figure 13-1 illustrates straight-through twisted pair cable.



Key:
A = UPLINK OR MDI PORT (as on a PC)
B = Normal or MDI-X port (as on a hub or switch)
1, 2, 3, 6 = Pin numbers

Figure 13-1: Straight-Through Twisted-Pair Cable

Figure 13-2 illustrates crossover twisted pair cable.

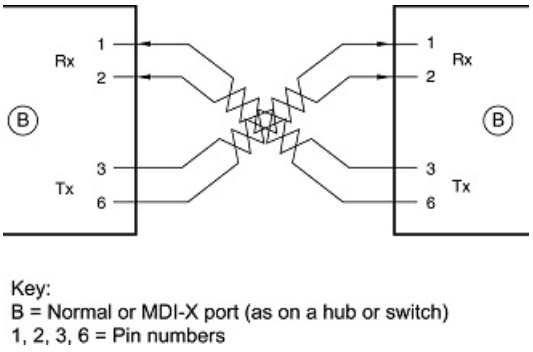


Figure 13-2: Crossover Twisted-Pair Cable

Patch Panels and Cables

If you are using patch panels, make sure that they meet the 100BASE-TX requirements. Use Category 5 UTP cable for all patch cables and work area cables to ensure that your UTP patch cable rating meets or exceeds the distribution cable rating.

To wire patch panels, you need two Category 5 UTP cables with an RJ-45 plug at each end, as shown here.

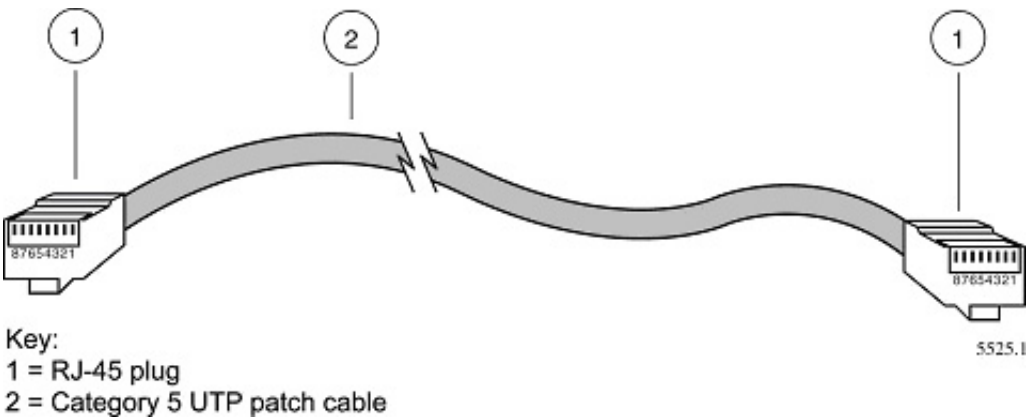


Figure 13-3: Category 5 UTP Cable with Male RJ-45 Plug at Each End

Note: Flat “silver satin” telephone cable may have the same RJ-45 plug. However, using telephone cable results in excessive collisions, causing the attached port to be partitioned or disconnected from the network.

Using 1000BASE-T Gigabit Ethernet over Category 5 Cable

When using the new 1000BASE-T standard, the limitations of cable installations and the steps necessary to ensure optimum performance must be considered. The most important components in your cabling system are patch panel connections, twists of the pairs at connector transition points, the jacket around the twisted-pair cable, bundling of multiple pairs on horizontal runs and punch down blocks. All of these factors affect the performance of 1000BASE-T technology if not correctly implemented. The following sections are designed to act as a guide to correct cabling for 1000BASE-T.

Cabling

The 1000BASE-T product is designed to operate over Category 5 cabling. To further enhance the operation, the cabling standards have been amended. The latest standard is Category 5e, which defines a higher level of link performance than is available with Category 5 cable.

If installing new cable, we recommend using Category 5e cable, since it costs about the same as Category 5 cable. If using the existing cable, be sure to have the cable plant tested by a professional who can verify that it meets or exceeds either ANSI/EIA/TIA-568-A:1995 or ISO/IEC 11801:1995 Category 5 specifications.

Length

The maximum distance limitation between two pieces of equipment is 100 m, as per the original Ethernet specification. The end-to-end link is called the “channel.”

TSB-67 defines the “Basic Link” which is the portion of the link that is part of the building infrastructure. This excludes patch and equipment cords. The maximum basic link length is 295 feet (90 m).

Return Loss

Return loss measures the amount of reflected signal energy resulting from impedance changes in the cabling link. The nature of 1000BASE-T renders this measurement very important; if too much energy is reflected back on to the receiver, the device does not perform optimally.

Unlike 10BASE-T and 100BASE-TX, which use only two of the four pairs of wires within the Category 5, 1000BASE-T uses all four pairs of the twisted pair. Make sure all wires are tested — this is important.

Factors that affect the return loss are:

The number of transition points, as there is a connection via an RJ-45 to another connector, a patch panel, or device at each transition point.

Removing the jacket that surrounds the four pairs of twisted cable. It is highly recommended that, when RJ-45 connections are made, this is minimized to 1-1/4 inch (32 mm).

Untwisting any pair of the twisted-pair cabling. It is important that any untwisting be minimized to 3/8 inch (10 mm) for RJ-45 connections.

Cabling or bundling of multiple Category 5 cables. This is regulated by ANSI/EIA/TIA-568A-3. If not correctly implemented, this can adversely affect all cabling parameters.

Near End Cross Talk (NEXT)

This is a measure of the signal coupling from one wire to another, within a cable assembly, or among cables within a bundle. NEXT measures the amount of cross-talk disturbance energy that is detected at the near end of the link — the end where the transmitter is located. NEXT measures the amount of energy that is “returned” to the sender end. The factors that affect NEXT and cross talk are exactly the same as outlined in the Return Loss section. The cross-talk performance is directly related to the quality of the cable installation.

Patch Cables

When installing your equipment, replace old patch panel cables that do not meet Category 5e specifications. As pointed out in the NEXT section, this near end piece of cable is critical for successful operation.

RJ-45 Plug and RJ-45 Connectors

In a Fast Ethernet network, it is important that all 100BASE-T certified Category 5 cabling use RJ-45 plugs. The RJ-45 plug accepts 4-pair UTP or shielded twisted-pair (STP) 100-ohm cable and connects into the RJ-45 connector. The RJ-45 connector is used to connect stations, hubs, and switches through UTP cable; it supports 10 Mbps, 100 Mbps, or 1000 Mbps data transmission.

Figure 13-4 shows the RJ-45 plug and RJ-45 connector.

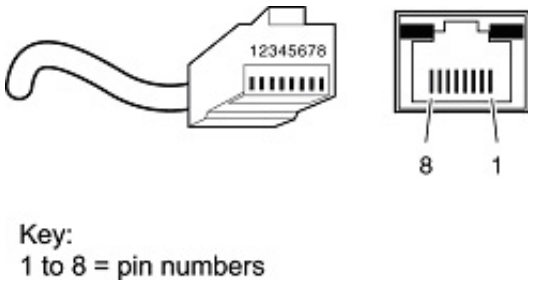


Figure 13-4: RJ-45 Plug and RJ-45 Connector with Built-in LEDs

Table 13-1 lists the pin assignments for the 10/100 Mbps RJ-45 plug and the RJ-45 connector.

Table 13-1. 10/100 Mbps RJ-45 Plug and RJ-45 Connector Pin Assignments

PIN	NORMAL ASSIGNMENT ON PORTS 1 TO 8	UPLINK ASSIGNMENT ON PORT 8
1	Input Receive Data +	Output Transmit Data +
2	Input Receive Data –	Output Transmit Data –
3	Output Transmit Data +	Input Receive Data +
6	Output Transmit Data –	Input Receive Data –
4, 5, 7, 8	Internal termination, not used for data transmission	

Table E-2 lists the pin assignments for the 100/1000 Mbps RJ-45 plug and the RJ-45 connector.

Table 13-2. 100/1000 Mbps RJ-45 Plug and RJ-45 Connector Pin Assignments

PIN	CHANNEL	DESCRIPTION
1 2	A	Rx/Tx Data + Rx/Tx Data
3 6	B	Rx/Tx Data + Rx/Tx Data
4 5	C	Rx/Tx Data + Rx/Tx Data
7 8	D	Rx/Tx Data + Rx/Tx Data

Conclusion

For optimum performance of your 1000BASE-T product, it is important to fully qualify your cable installation and ensure it meets or exceeds ANSI/EIA/TIA-568-A:1995 or ISO/IEC 11801:1995 Category 5 specifications. Install Category 5e cable where possible, including patch panel cables. Minimize transition points, jacket removal, and untwist lengths. Bundling of cables must be properly installed to meet the requirements in ANSI/EIA/TIA-568A-3.

Appendix C
Glossary

Use the list below to find definitions for technical terms used in this manual.

Numeric

802.1D
The IEEE designator for Spanning Tree Protocol (STP). STP, a link management protocol, is part of the 802.1D standard for media access control bridges. Using the spanning tree algorithm, STP provides path redundancy while preventing endless loops in a network. An endless loop is created by multiple active paths between stations where there are alternate routes between hosts. To establish path redundancy, STP creates a logical tree that spans all of the switches in an extended network, forcing redundant paths into a standby, or blocked, state. STP allows only one active path at a time between any two network devices (this prevents the loops) but establishes the redundant links as a backup if the initial link should fail. If STP costs change, or if one network segment in the STP becomes unreachable, the spanning tree algorithm reconfigures the spanning tree topology and reestablishes the link by activating the standby path. Without spanning tree in place, it is possible that both connections may be simultaneously live, which could result in an endless loop of traffic on the LAN.

802.1P
The IEEE protocol designator for Local Area Network (LAN). This Layer 2 network standard improves support of time critical traffic, and limits the extent of high bandwidth multicast traffic within a bridged LAN. To do this, 802.1P defines a methodology for introducing traffic class priorities. The 802.1P standard allows priority to be defined in all 802 MAC protocols (Ethernet, Token Bus, Token Ring), as well as in FDDI. For protocols (such as Ethernet) that do not contain a priority field, 802.1P specifies a method for indicating frame priority based on the new fields defined in the 802.1Q (VLAN) standard.

802.1Q VLAN
The IEEE protocol designator for Virtual Local Area Network (VLAN). This standard provides VLAN identification and quality of service (QoS) levels. Four bytes are added to an Ethernet frame to allow eight priority levels (QoS) and to identify up to 4096 VLANs. See “VLAN” on page 21 for more information.

10BASE-T
The IEEE specification for 10 Mbps Ethernet over Category 3, 4, or 5 twisted-pair cable.

100BASE-FX
The IEEE specification for 100 Mbps Fast Ethernet over fiber-optic cable.

100BASE-TX
The IEEE specification for 100 Mbps Fast Ethernet over Category 5 twisted-pair cable.

1000BASE-SX
The IEEE specification for 1000 Mbps Gigabit Ethernet over fiber-optic cable.

1000BASE-T
The IEEE specification for 1000 Mbps Gigabit Ethernet over Category 5 twisted-pair cable.
gain access.

A

ABR
See “Area Border Router” on page 2.

Access Control List
An ACL is a database that an Operating System uses to track each user’s access rights to system objects (such as file directories and/or files).

ACL
See “Access Control List” on page 2.

Address Resolution Protocol
An Internet Protocol that dynamically maps Internet addresses to physical (hardware) addresses on a LAN.

Advanced Network Device Layer/Software
Term for the Device Driver level.

Aging
When an entry for a node is added to the lookup table of a switch, it is given a timestamp. Each time a packet is received from a node, the timestamp is updated. The switch has a user-configurable timer that erases the entry after a certain length of time with no activity from that node.

Area Border Router
A router located on the border of one or more OSPF areas that connects those areas to the backbone network. ABRs are considered members of both the OSPF backbone and the attached areas. They therefore maintain routing tables describing both the backbone topology and the topology of the other areas. (Cisco Systems Inc.)

ARP
See “Address Resolution Protocol” on page 2.

ASBR
See “Autonomous System Boundary Router” on page 3.

Autonomous System Boundary Router
ABR located between an OSPF autonomous system and a non-OSPF network. ASBRs run both OSPF and another routing protocol, such as RIP. ASBRs must reside in a non-stub OSPF area. See also ABR, non-stub area, and OSPF. (Cisco Systems Inc.)

Auto-negotiation
A feature that allows twisted-pair ports to advertise their capabilities for speed, duplex and flow control. When connected to a port that also supports auto-negotiation, the link can automatically configure itself to the optimum setup.

Auto Uplink
Auto Uplink™ technology (also called MDI/MDIX) eliminates the need to worry about crossover vs. straight-through Ethernet cables. Auto Uplink™ will accommodate either type of cable to make the right connection.

AVL tree
Binary tree having the property that for any node in the tree, the difference in height between the left and right subtrees of that node is no more than 1.

B

BPDU
See “Bridge Protocol Data Unit” on page 4.

Backbone
The part of a network used as a primary path for transporting traffic between network segments.

Bandwidth
The information capacity, measured in bits per second, that a channel could transmit. Bandwidth examples include 10 Mbps for Ethernet, 100 Mbps for Fast Ethernet, and 1000 Mbps (I Gbps) for Gigabit Ethernet.

Baud
The signaling rate of a line, that is, the number of transitions (voltage or frequency changes) made per second. Also known as line speed.

BootP
See “Bootstrap Protocol” on page 4.

Bootstrap Protocol
An Internet protocol that enables a diskless workstation to discover its own IP address, the IP address of a BootP server on the network, and a file to be loaded into memory to boot the machine. This enables the workstation to boot without requiring a hard or floppy disk drive.

Bridge Protocol Data Unit
BPDU is the IEEE 802.1D MAC Bridge Management protocol that is the standard implementation of STP (Spanning Tree Protocol). It uses the STP algorithm to insure that physical loops in the network topology do not result in logical looping of network traffic. Using one bridge configured as root for reference, the BPDU switches one of two bridges forming a network loop into standby mode, so that only one side of a potential loop passes traffic. By examining frequent 802.1d configuration updates, a bridge in the standby mode can switch automatically into the forward mode if the other bridge forming the loop fails.

Broadcast
A packet sent to all devices on a network.

Broadcast storm
Multiple simultaneous broadcasts that typically absorb all the available network bandwidth and can cause a network to fail. Broadcast storms can be due to faulty network devices or network loops.

C

Cat 5
Category 5 unshielded twisted pair (UTP) cabling. An Ethernet network operating at 10 Mbits/second (10BASE-T) will often tolerate low quality cables, but at 100 Mbits/second (10BASE-Tx) the cable must be rated as Category 5, or Cat 5 or Cat V, by the Electronic Industry Association (EIA).
This rating will be printed on the cable jacket. Cat 5 cable contains eight conductors, arranged in four twisted pairs, and terminated with an RJ45 type connector. In addition, there are restrictions on maximum cable length for both 10 and 100 Mbits/second networks.

Capacity planning
Determining whether current solutions can satisfy future demands. Capacity planning includes evaluating potential workload and infrastructure changes.

Checksum
A simple error-detection scheme in which each transmitted message is identified with a numerical value based on the number of set bits in the message. The receiving station then applies a formula to the message and checks to make sure the accompanying numerical value is the same. If not, the receiver can assume that the message has been corrupted.

Class of Service
A term to describe treating different types of traffic with different levels of service priority. Higher priority traffic gets faster treatment during times of switch congestion

CLI
See “Command Line Interface” on page 5.

Collision
A term used to describe two colliding packets in an Ethernet network. Collisions are a part of normal Ethernet operation, but a sudden prolonged increase in the number of collisions can indicate a problem with a device, particularly if it is not accompanied by a general increase in traffic.

Command Line Interface
CLI is a line-item interface for configuring systems.

Common Open Policy Service Protocol
A proposed standard protocol for exchanging network policy information between a Policy Decision Point (PDP) in a network and Policy Enforcement Points (PEPs) as part of overall Quality of Service (QoS) - the allocation of network traffic resources according to desired priorities of service. The policy decision point might be a network server controlled directly by the network administrator who enters policy statements about which kinds of traffic (voice, bulk data, video, teleconferencing, and so forth) should get the highest priority. The policy enforcement points might be router or layer 3 switches that implement the policy choices as traffic moves through the network. Currently, COPS is designed for use with the Resource Reservation Protocol (RSVP), which lets you allocate traffic priorities in advance for temporary high-bandwidth requirements (for example, video broadcasts or multicasts). It is possible that COPS will be extended to be a general policy communications protocol.

COPS
See “Common Open Policy Service Protocol” on page 5.

D

DHCP
See “Dynamic Host Configuration Protocol” on page 6.

Differentiated Services
Diffserv is a protocol for specifying and controlling network traffic by class so that certain types of traffic get precedence - for example, voice traffic, which requires a relatively uninterrupted flow of data, might get precedence over other kinds of traffic. Differentiated Services is the most advanced method for managing traffic in terms of what is called Class of Service (CoS). Unlike the earlier mechanisms of 802.1P tagging and Type of Service (ToS), Differentiated Services avoids simple priority tagging and depends on more complex policy or rule statements to determine how to forward a given network packet. An analogy is made

to travel services, in which a person can choose among different modes of travel - train, bus, airplane - degree of comfort, the number of stops on the route, standby status, the time of day or period of year for the trip, and so forth. For a given set of packet travel rules, a packet is given one of 64 possible forwarding behaviors - known as per hop behaviors (PHBs). A six-bit field, known as the Differentiated Services Code Point (DSCP), in the Internet Protocol (Internet Protocol) header specifies the per hop behavior for a given flow of packets. Differentiated Services and the Class of Service approach provide a way to control traffic that is both more flexible and more scalability than the Quality of Service approach.

Diffserv

See “Differentiated Services” on page 5.

DNS

Short for Domain Name System (or Service), an Internet service that translates domain names into IP addresses.

Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses. Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address. For example, the domain name www.example.com might translate to 198.105.232.4. The DNS system is, in fact, its own network. If one DNS server doesn't know how to translate a particular domain name, it asks another one, and so on, until the correct IP address is returned.

Domain Name

A descriptive name for an address or group of addresses on the Internet. Domain names are of the form of a registered entity name plus one of a number of predefined top level suffixes such as .com, .edu, .uk, etc. For example, in the address mail.NETGEAR.com, mail is a server name and NETGEAR.com is the domain.

Dynamic Host Configuration Protocol

DHCP is a protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network. In some systems, the device's IP address can even change while it is still connected. DHCP also supports a mix of static and dynamic IP addresses. Dynamic addressing simplifies network administration because the software tracks IP addresses rather than requiring an administrator to manage the task. A new computer can be added to a network without the hassle of manually assigning it a unique IP address.

E

EAP

Extensible Authentication Protocol is a general protocol for authentication that supports multiple authentication methods.

EAP, an extension to PPP, supports such authentication methods as token cards, Kerberos, one-time passwords, certificates, public key authentication and smart cards. In wireless communications using EAP, a user requests connection to a WLAN through an AP, which then requests the identity of the user and transmits that identity to an authentication server such as RADIUS. The server asks the AP for proof of

identity, which the AP gets from the user and then sends back to the server to complete the authentication. EAP is defined by RFC 2284.

Endstation
A computer, printer, or server that is connected to a network.

Ethernet
A LAN specification developed jointly by Xerox, Intel and Digital Equipment Corporation. Ethernet networks transmit packets at a rate of 10 Mbps.

F

Fast Ethernet
An Ethernet system that is designed to operate at 100 Mbps.

Fault isolation
A technique for identifying and alerting administrators about connections (such as those associated with switch ports) that are experiencing congestion or failure, or exceeding an administrator-defined threshold.

Fast STP
A high-performance Spanning Tree Protocol. See “STP” on page 19 for more information.

Filtering
The process of screening a packet for certain characteristics, such as source address, destination address, or protocol. Filtering is used to determine whether traffic is to be forwarded, and can also prevent unauthorized access to a network or network devices.

Flow Control
The process of adjusting the flow of data from one network device to another to ensure that the receiving device can handle all of the incoming data. This is particularly important where the sending device is capable of sending data much faster than the receiving device can receive it. There are many flow control mechanisms. One of the most common flow control protocols for asynchronous communication is called xon-xoff. In this case, the receiving device sends a an “xoff” message to the sending device when its buffer is full. The sending device then stops sending data. When the receiving device is ready to receive more data, it sends an “xon” signal.

Forwarding
When a frame is received on an input port on a switch, the address is checked against the lookup table. If the lookup table has recorded the destination address, the frame is automatically forwarded on an output port.

Full-duplex
A system that allows packets to be transmitted and received at the same time and, in effect, doubles the potential throughput of a link.

G

GARP
See “Generic Attribute Registration Protocol” on page 8.

GARP Information Propagation
GIP is the propagation of information between GARP participants for the same application in a bridge is carried out by a GIP component.

GARP Multicast Registration Protocol
GMRP provides a mechanism that allows Bridges and end stations to dynamically register (and subsequently, de-register) Group membership information with the MAC Bridges attached to the same LAN segment, and for that information to be disseminated across all Bridges in the Bridged LAN that support Extended Filtering Services. The operation of GMRP relies upon the services provided by the GARP.

GARP VLAN Registration Protocol
GVRP allows workstations to request admission to a particular VLAN for multicast purposes.

Gateway
A local device, usually a router, that connects hosts on a local network to other networks.

GE
See “Gigabit Ethernet” on page 8.

Generic Attribute Registration Protocol
GARP provides a generic attribute dissemination capability that is used by participants in GARP Applications (called GARP Participants) to register and de-register attribute values with other GARP Participants within a Bridged LAN. The definition of the attribute types, the values that they can carry, and the semantics that are associated with those values when registered are specific to the operation of the GARP Application concerned.

Gigabit Ethernet
An Ethernet system that is designed to operate at 1000 Mbps (1 Gbps).

GIP
See “GARP Information Propagation” on page 8.

GMRP
See “GARP Multicast Registration Protocol” on page 8.

GVD
GARP VLAN Database.

GVRP
See “GARP VLAN Registration Protocol” on page 8.

H

Half-duplex
A system that allows packets to transmitted and received, but not at the same time. Contrast with full-duplex.

hop count
The number of routers that a data packet passes through on its way to its destination.

I

ICMP
See “Internet Control Message Protocol” on page 10.

IEEE
Institute of Electrical and Electronics Engineers. This American organization was founded in 1963 and sets standards for computers and communications.

IETF
Internet Engineering Task Force. An organization responsible for providing engineering solutions for TCP/IP networks. In the network management area, this group is responsible for the development of the SNMP protocol.

IGMP
See “Internet Group Management Protocol” on page 10.

IGMP Snooping
A series of operations performed by intermediate systems to add logic to the network to optimize the flow of multicast traffic; these intermediate systems (such as Layer 2 switches) listen for IGMP messages and build mapping tables and associated forwarding filters, in addition to reducing the IGMP protocol traffic. See “Internet Group Management Protocol” on page 10 for more information.

Internet Control Message Protocol
ICMP is an extension to the Internet Protocol (IP) that supports packets containing error, control, and informational messages. The PING command, for example, uses ICMP to test an Internet connection.

Internet Group Management Protocol
IGMP is the standard for IP Multicasting on the Internet. IGMP is used to establish host memberships in particular multicast groups on a single network. The mechanisms of the protocol allow a host to inform its local router, using Host Membership Reports, that it wants to receive messages addressed to a specific multicast group. All hosts conforming to Level 2 of the IP Multicasting specification require IGMP.

IP
See “Internet Protocol” on page 10.

IP Multicasting
Sending out data to distributed servers on the MBone (Multicast Backbone). For large amounts of data, IP Multicast is more efficient than normal Internet transmissions because the server can broadcast a message to many recipients simultaneously. Unlike traditional Internet traffic that requires separate connections for each source-destination pair, IP Multicasting allows many recipients to share the same source. This means that just one set of packets is transmitted for all the destinations.

Internet Protocol
The method or protocol by which data is sent from one computer to another on the Internet. Each computer (known as a host) on the Internet has at least one IP address that uniquely identifies it among all other computers on the Internet. When you send or receive data (for example, an e-mail note or a Web page), the message gets divided into little chunks called packets. Each of these packets contains both the sender's Internet address and the receiver's address. Any packet is sent first to a gateway computer that understands a small part of the Internet. The gateway computer reads the destination address and forwards the packet to an adjacent gateway that in turn reads the destination address and so forth across the Internet until one gateway recognizes the packet as belonging to a computer within its immediate neighborhood or domain. That gateway then forwards the packet directly to the computer whose address is specified.
Because a message is divided into a number of packets, each packet can, if necessary, be sent by a different route across the Internet. Packets can arrive in a different order than they were sent. The Internet Protocol just delivers them. It's up to another protocol, the Transmission Control Protocol (TCP) to put them back in the right order. IP is a connectionless protocol, which means that there is no continuing connection between the end points that are communicating. Each packet that travels through the Internet is treated as an independent unit of data without any relation to any other unit of data. (The reason the packets do get put in the right order is because of TCP, the connection-oriented protocol that keeps track of the packet sequence in a message.) In the Open Systems Interconnection (OSI) communication model, IP is in Layer 3, the Networking Layer. The most widely used version of IP today is IP version 4 (IPv4). However, IP version 6 (IPv6) is also beginning to be supported. IPv6 provides for much longer addresses and therefore for the possibility of many more Internet users. IPv6 includes the capabilities of IPv4 and any server that can support IPv6 packets can also support IPv4 packets.

L

LAN
See “Local Area Network” on page 11.

LDAP
See “Lightweight Directory Access Protocol” on page 11.

Lightweight Directory Access Protocol

A set of protocols for accessing information directories. LDAP is based on the standards contained within the X.500 standard, but is significantly simpler. Unlike X.500, LDAP supports TCP/IP, which is necessary for any type of Internet access. Although not yet widely implemented, LDAP should eventually make it possible for almost any application running on virtually any computer platform to obtain directory information, such as e-mail addresses and public keys. Because LDAP is an open protocol, applications need not worry about the type of server hosting the directory.

Learning
The bridge examines the Layer 2 source addresses of every frame on the attached networks (called listening) and then maintains a table, or cache, of which MAC addresses are attached to each of its ports.

Link-State
In routing protocols, the declared information about the available interfaces and available neighbors of a router or network. The protocol's topological database is formed from the collected link-state declarations.

Load balancing
The ability to distribute traffic across various ports of a device, such as a switch, to provide efficient, optimized traffic throughout the network.

Local Area Network
A communications network serving users within a limited area, such as one floor of a building. A LAN typically connects multiple personal computers and shared network devices such as storage and printers. Although many technologies exist to implement a LAN, Ethernet is the most common for connecting personal computers and is limited to a distance of 1,500 feet. LANs can be connected together, but if modems and telephones connect two or more LANs, the larger network constitutes what is called a WAN or Wide Area Network.

Loop
An event that occurs when two network devices are connected by more than one path, thereby causing packets to repeatedly cycle around the network and not reach their destination.

M

MAC
(1) Medium Access Control. In LANs, the sublayer of the data link control layer that supports medium-dependent functions and uses the services of the physical layer to provide services to the logical link control (LLC) sublayer. The MAC sublayer includes the method of determining when a device has access to the transmission medium. (2) Message Authentication Code. In computer security, a value that is a part of a message or accompanies a message and is used to determine that the contents, origin, author, or other attributes of all or part of the message are as they appear to be. (*IBM Glossary of Computing Terms*)

MAC address
The Media Access Control address is a unique 48-bit hardware address assigned to every network interface card. Usually written in the form 01:23:45:67:89:ab.

Management Information Base
When SNMP devices send SNMP messages to the management console (the device managing SNMP messages), it stores information in the MIB.

Mbps
Megabits per second.

MBONE
See “Multicast Backbone” on page 13.

MD5
MD5 creates digital signatures using a one-way hash function, meaning that it takes a message and converts it into a fixed string of digits, also called a message digest.
When using a one-way hash function, one can compare a calculated message digest against the message digest that is decrypted with a public key to verify that the message hasn't been tampered with. This comparison is called a "hashcheck."

MDI/MDIX
In cable wiring, the concept of transmit and receive are from the perspective of the PC, which is wired as a Media Dependant Interface (MDI). In MDI wiring, a PC transmits on pins 1 and 2. At the hub, switch, router, or access point, the perspective is reversed, and the hub receives on pins 1 and 2. This wiring is referred to as Media Dependant Interface - Crossover (MDI-X). See “Auto-negotiation” on page 3.

MIB
See “Management Information Base” on page 12.

MOSPF
See “Multicast OSPF” on page 13.

MPLS
See “Multi-Protocol Label Switching” on page 13.

Multicast Backbone
The MBONE is a virtual network. It is layered on top of portions of the physical Internet to support routing of IP multicast packets since that function has not yet been integrated into many production routers. The network is composed of islands that can directly support IP multicast, such as multicast LANs like Ethernet, linked by virtual point-to-point links called "tunnels". The tunnel endpoints are typically workstation-class machines having operating system support for IP multicast and running the "mrouted" multicast routing daemon.

Multicasting
To transmit a message to specific recipients across a network. A simple example of multicasting is sending an e-mail message to a mailing list. Teleconferencing and videoconferencing also use multicasting, but require more robust protocols and networks. Standards are being developed to support multicasting over a TCP/IP network such as the Internet. These standards, IP Multicast and Mbone, will allow users to easily join multicast groups. Note that multicasting refers to sending a message to a select group whereas broadcasting refers to sending a message to everyone connected to a network. The terms multicast and narrowcast are often used interchangeably, although narrowcast usually refers to the business model whereas multicast refers to the actual technology used to transmit the data.

Multicast OSPF
With a MOSPF specification, an IP Multicast packet is routed based both on the packet's source and its multicast destination (commonly referred to as source/destination routing). As it is routed, the multicast packet follows a shortest path to each multicast destination. During packet forwarding, any commonality of paths is exploited; when multiple hosts belong to a single multicast group, a multicast packet will be replicated only when the paths to the separate hosts diverge. See “OSPF” on page 15 for more information.

Multiplexing
A function within a layer that interleaves the information from multiple connections into one connection.

Multi-Protocol Label Switching
An initiative that integrates Layer 2 information about network links (bandwidth, latency, utilization) into Layer 3 (IP) within a particular autonomous system—or ISP—in order to simplify and improve IP-packet exchange. MPLS gives network operators a great deal of flexibility to divert and route traffic around link failures, congestion, and bottlenecks. From a QoS standpoint, ISPs will better be able to manage different kinds of data streams based on priority and service plan. For instance, those who subscribe to a premium service plan, or those who receive a lot of streaming media or high-bandwidth content can see minimal latency and packet loss. When packets enter into a MPLS-based network, Label Edge Routers (LERs) give them a label (identifier). These labels not only contain information based on the routing table entry (i.e., destination, bandwidth, delay, and other metrics), but also refer to the IP header field (source IP address), Layer 4 socket number information, and differentiated service. Once this classification is complete and mapped, different packets are assigned to corresponding Labeled Switch Paths (LSPs), where Label Switch

Routers (LSRs) place outgoing labels on the packets. With these LSPs, network operators can divert and route traffic based on data-stream type and Internet-access customer.

MUX
See “Multiplexing” on page 13.

N

NAT
See “Network Address Translation” on page 14.

netmask
Combined with the IP address, the IP Subnet Mask allows a device to know which other addresses are local to it, and which must be reached through a gateway or router.
A number that explains which part of an IP address comprises the network address and which part is the host address on that network. It can be expressed in dotted-decimal notation or as a number appended to the IP address. For example, a 28-bit mask starting from the MSB can be shown as 255.255.255.192 or as /28 appended to the IP address.

Network Address Translation
Sometimes referred to as Transparent Proxying, IP Address Overloading, or IP Masquerading. Involves use of a device called a Network Address Translator, which assigns a contrived, or logical, IP address and port number to each node on an organization's internal network and passes packets using these assigned addresses.

nm
Nanometer (1 x $10e^{9}$) meters.

non-stub area
Resource-intensive OSPF area that carries a default route, static routes, intra-area routes, interarea routes, and external routes. Non-stub areas are the only OSPF areas that can have virtual links configured across them, and are the only areas that can contain an ASBR. Compare with stub area. See also ASAM and OSPF. (Cisco Systems Inc.)

O

Open Shortest Path First
A link- state (algorithm used by the router to determine the current topology of a network), Interior Gateway (distributes routing information between routers belonging to a single Autonomous System) routing

protocol. This protocol's algorithm determines the shortest path from its router to all the other routers in the network. This protocol is rapidly replacing RIP on the Internet.

Open Systems Interconnection
OSI is a seven (7) layer architecture model for communications systems developed by the ISO for the interconnection of data communications systems. Each layer uses and builds on the services provided by those below it.

OSI
See “Open Systems Interconnection” on page 15.

OSPF
See “Open Shortest Path First” on page 14.

P

packet
A block of information sent over a network. A packet typically contains a source and destination network address, some protocol and length information, a block of data, and a checksum.

PDU
See “Protocol Data Unit” on page 16.

PHY
The OSI Physical Layer: The physical layer provides for transmission of cells over a physical medium connecting two ATM devices. This physical layer is comprised of two sublayers: the Physical Medium Dependent (PMD) sublayer, and the Transmission Convergence (TC) sublayer.

PIM-DM
See “Protocol Independent Multicast – Dense Mode” on page 16.

PMC
Packet Mode Channel.

Point-to-Point Protocol
PPP. A protocol allowing a computer using TCP/IP to connect directly to the Internet.

Port Mirroring
Also known as a roving analysis port. This is a method of monitoring network traffic that forwards a copy of each incoming and outgoing packet from one port of a network switch to another port where the packet can be studied. A network administrator uses port mirroring as a diagnostic tool or debugging feature, especially when fending off an attack. It enables the administrator to keep close track of switch performance and alter it

if necessary. Port mirroring can be managed locally or remotely. An administrator configures port mirroring by assigning a port from which to copy all packets and another port where those packets will be sent. A packet bound for or heading away from the first port will be forwarded onto the second port as well. The administrator places a protocol analyzer on the port receiving the mirrored data to monitor each segment separately. The analyzer captures and evaluates the data without affecting the client on the original port. The monitor port may be a port on the same SwitchModule with an attached RMON probe, a port on a different SwitchModule in the same hub, or the SwitchModule processor. Port mirroring can consume significant CPU resources while active. Better choices for long-term monitoring may include a passive tap like an optical probe or an Ethernet repeater.

Port monitoring
The ability to monitor the traffic passing through a port on a device to analyze network characteristics and perform troubleshooting.

Port speed
The speed that a port on a device uses to communicate with another device or the network.

Port trunking
The ability to combine multiple ports on a device to create a single, high-bandwidth connection.

Protocol
A set of rules for communication between devices on a network.

Protocol Data Unit
PDU is a packet of data passed across a network. The term implies a specific layer of the OSI model and a specific protocol.

Protocol Independent Multicast – Dense Mode
Like DVMRP, PIM-DM uses a flood and prune protocol for building multicast trees. However, unlike DVMRP, PIM-DM uses existing unicast protocols for determining the route to the source.

Q

QoS
See “Quality of Service” on page 16.

Quality of Service
QoS is a networking term that specifies a guaranteed level of throughput. Throughput is the amount of data transferred from one device to another or processed in a specified amount of time - typically, throughputs are measured in bytes per second (Bps).

R

RADIUS
Short for Remote Authentication Dial-In User Service, RADIUS is an authentication system. Using RADIUS, you must enter your user name and password before gaining access to a network. This information is passed to a RADIUS server, which checks that the information is correct, and then authorizes access. Though not an official standard, the RADIUS specification is maintained by a working group of the IETF.

Real-Time Operating System
RTOS is a component of the OSAPI module that abstracts operating systems with which other systems can interface.

Resource Reservation Setup Protocol
RSVP is a new Internet protocol being developed to enable the Internet to support specified Qualities-of-Service (QoS). Using RSVP, an application will be able to reserve resources along a route from source to destination. RSVP-enabled routers will then schedule and prioritize packets to meet the prioritization assigned by QoS. RSVP is a chief component of a new type of Internet being developed, known broadly as an integrated services Internet. The general idea is to enhance the Internet to support transmission of real-time data.

RIP
See “Routing Information Protocol” on page 17.

router
A device that forwards data between networks. An IP router forwards data based on IP source and destination addresses.

Routing Information Protocol
RIP is the routing protocol used by the routed process on Berkeley-derived UNIX systems. Many networks use RIP; it works well for small, isolated, and topologically simple networks.

RIPng
Routing Information Protocol, new generation.

RMON
Short for remote monitoring, a network management protocol that allows network information to be gathered at a single workstation. Whereas SNMP gathers network data from a single type of Management Information Base (MIB), RMON 1 defines nine additional MIBs that provide a much richer set of data about network usage. For RMON to work, network devices, such as hubs and switches, must be designed to support it. The newest version of RMON, RMON 2, provides data about traffic at the network layer in addition to the physical layer. This allows administrators to analyze traffic by protocol.

RSVP
See “Resource Reservation Setup Protocol” on page 17.

RTOS
See “Real-Time Operating System” on page 17.

S

Simple Network Management Protocol
SNMP is the protocol governing network management and the monitoring of network devices and their functions. It is not necessarily limited to TCP/IP networks. The versions have the following differences:

SNMPv1 (full): Security is based on community strings.

SNMPsec (historic): Security is based on parties. Few, if any, vendors implemented this version of the protocol, which is now largely forgotten.

SNMPv2p (historic): For this version, much work was done to update the SNMPv1 protocol and the SMIv1, and not just security. The result was updated protocol operations, new protocol operations and data types, and party-based security from SNMPsec.

SNMPv2c (experimental): This version of the protocol is called community string-based SNMPv2. It is an update of the protocol operations and data types of SNMPv2p, and uses community-based security from SNMPv1.

SNMPv2u (experimental): This version of the protocol uses the protocol operations and data types of SNMPv2c and security based on users.

*SNMPv2** (experimental): This version combined the best features of SNMPv2p and SNMPv2u. (It is also called SNMPv2star.) The documents defining this version were never published as RFCs.

SNMPv3 (proposed): This version of the protocol is a combination of user-based security and the protocol operations and data types from SNMPv2p and support for proxies. The security is based on that found in SNMPv2u and SNMPv2*, and updated after much review. The documents defining this protocol will soon be published as RFCs.

SimpleX signaling
SX is one of IEEE 802.3's designations for media. For example, 1000SX indicates 1000 gigabit Ethernet over "short haul" or "short wavelength" optical fiber.

SMII
Serial Media Independent Interface.

SNMP
See “Simple Network Management Protocol” on page 18.

Spanning Tree
A technique that detects loops in a network and logically blocks the redundant paths, ensuring that only one route exists between any two LANs.

Spanning Tree Protocol (STP)
A protocol that finds the most efficient path between segments of a multi-looped, bridged network. STP allows redundant switches and bridges to be used for network resilience, without the broadcast storms associated with looping. If a switch or bridge falls, a new path to a redundant switch or bridge is opened.

SRAM
Static Random Access Memory.

STP
Spanning Tree Protocol. See “802.1D” on page 1 for more information.

stub area
OSPF area that carries a default route, intra-area routes, and interarea routes, but does not carry external routes. Virtual links cannot be configured across a stub area, and they cannot contain an ASBR. Compare with non-stub area. See also OSPF. (Cisco Systems Inc.)

Subnet Mask
Combined with the IP address, the IP Subnet Mask allows a device to know which other addresses are local to it, and which must be reached through a gateway or router.

Switch
A device that interconnects several LANs to form a single logical LAN that comprises of several LAN segments. Switches are similar to bridges, in that they connect LANs of a different type; however they connect more LANs than a bridge and are generally more sophisticated.

SX
See “SimpleX signaling” on page 18.

T

Telnet
A character-based UNIX application that enables users with a Telnet server account to log on to a UNIX computer and utilize its resources.

TFTP
See “TLS” on page 20.

TLS
Short for Transport Layer Security, TLS is a protocol that guarantees privacy and data integrity between client/server applications communicating over the Internet.
The TLS protocol is made up of two layers. The TLS Record Protocol ensures that a connection is private by using symmetric data encryption and ensures that the connection is reliable. The second TLS layer is the TLS Handshake Protocol, which allows authentication between the server and client and the negotiation of an encryption algorithm and cryptographic keys before data is transmitted or received. Based on Netscape’s SSL 3.0, TLS supercedes and is an extension of SSL. TLS and SSL are not interoperable.

Telnet
A TCP/IP application protocol that provides a virtual terminal service, allowing a user to log into another computer system and access a device as if the user were connected directly to the device.

Traffic prioritization
Giving time-critical data traffic a higher quality of service over other, non-critical data traffic.

Trivial File Transfer Protocol
TFTP is a simple form of the File Transfer Protocol (FTP). TFTP uses the User Datagram Protocol (UDP, a direct protocol used to communicate datagrams over a network with little error recovery) and provides no security features. It is often used by servers to boot diskless workstations, X-terminals, and routers.

Trunking
The process of combing a set of trunks that are traffic-engineered as a unit for the establishment of connections between switching systems in which all of the communications paths are interchangeable.

U

UTP
Unshielded twisted pair is the cable used by 10BASE-T and 100BASE-Tx Ethernet networks.

V

Virtual Local Area Network
Operating at the Data Link Layer (Layer 2 of the OSI model), the VLAN is a means of parsing a single network into logical user groups or organizations, as if they physically resided on a dedicated LAN segment of their own. In reality, this virtually defined community may have individual members peppered across a large, extended LAN. The VLAN identifier is part of the 802.1Q tag, which is added to an Ethernet frame by

an 802.1Q-compliant switch or router. Devices recognizing 802.1Q-tagged frames maintain appropriate tables to track VLANs. The first three bits of the 802.1Q tag are used by 802.1P to establish priority for the packet.

Virtual Router Redundancy Protocol

VRRP specifies an election protocol that dynamically assigns responsibility for a virtual router to one of the VRRP routers on a LAN. The VRRP router controlling the IP address(es) associated with a virtual router is called the Master, and forwards packets sent to these IP addresses. The election process provides dynamic fail-over in the forwarding responsibility should the Master become unavailable. This allows any of the virtual router IP addresses on the LAN to be used as the default first hop router by end-hosts. The advantage gained from using VRRP is a higher availability default path without requiring configuration of dynamic routing or router discovery protocols on every end-host.

VLAN

See “Virtual Local Area Network” on page 20.

VRRP

See “Virtual Router Redundancy Protocol” on page 21.

W

WAN

See “Wide Area Network” on page 21.

Web

Also known as World-Wide Web (WWW) or W3. An Internet client-server system to distribute information, based upon the hypertext transfer protocol (HTTP).

Wide Area Network

A WAN is a computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more local-area networks (LANs).

Windows Internet Naming Service

WINS. Windows Internet Naming Service is a server process for resolving Windows-based computer names to IP addresses.

If a remote network contains a WINS server, your Windows PCs can gather information from that WINS server about its local hosts. This allows your PCs to browse that remote network using the Windows Network Neighborhood feature.

WINS

WINS. Windows Internet Naming Service is a server process for resolving Windows-based computer names to IP addresses.

X

XModem

One of the most popular file transfer protocols (FTPs). Xmodem is fairly effective at detecting errors. It sends blocks of data together with a checksum and then waits for acknowledgment of the block's receipt. The waiting slows down the rate of data transmission considerably, but it ensures accurate transmission. Xmodem can be implemented either in software or in hardware. Many modems, and almost all communications software packages, support Xmodem. However, it is useful only at relatively slow data transmission speeds (less than 4,800 bps). Enhanced versions of Xmodem that work at higher transmission speeds are known as Ymodem and Zmodem.