Dell PowerConnect 3500 Series
CLI Reference Guide

Regulatory Model: 3524, 3524P, 3548, 3548P

Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Regulatory Models: 3524, 3524P, 3548, 3548P

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Using the CLI

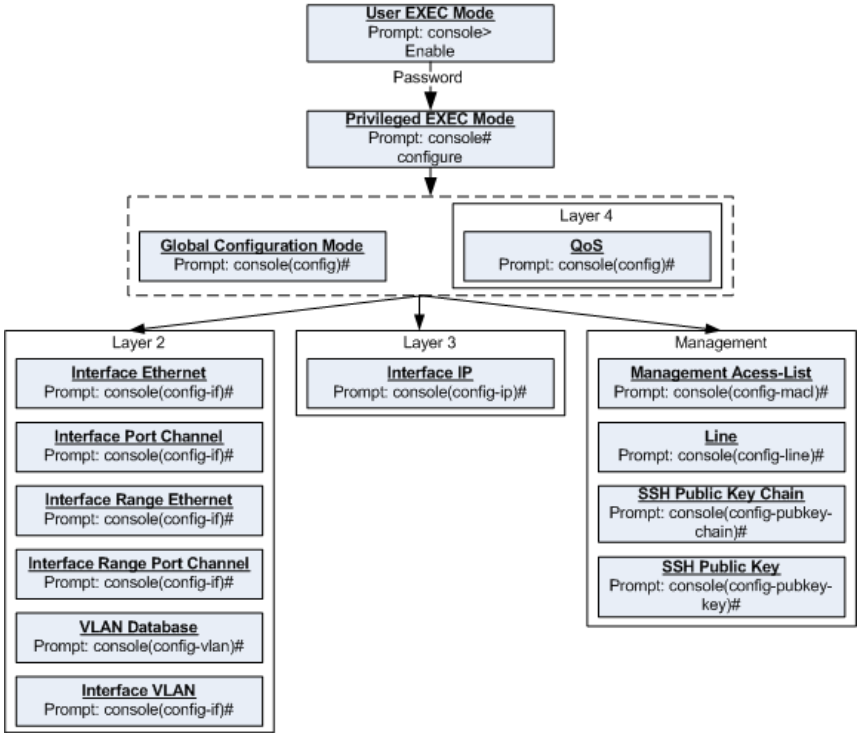
This chapter describes how to start using the CLI and describes the command editing features to assist in using the CLI.

CLI Command Modes

Introduction

To assist in configuring the device, the Command Line Interface (CLI) is divided into different command modes. Each command mode has its own set of specific commands. Entering a question mark "?" at the system prompt (console prompt) displays a list of commands available for that particular command mode.

From each mode a specific command is used to navigate from one command mode to another. The standard order to access the modes is as follows: *User EXEC* mode, *Privileged EXEC* mode, *Global Configuration* mode, and *Interface Configuration* mode. The following figure illustrates the command mode access path.



When starting a session, the initial mode is the User EXEC mode. Only a limited subset of commands are available in the User EXEC mode. This level is reserved for tasks that do not change the configuration. To enter the next level, the Privileged EXEC mode, a password is required.

The Privileged EXEC mode gives access to commands that are restricted on User EXEC mode and provides access to the device Configuration mode.

The Global Configuration mode manages the device configuration on a global level.

The Interface Configuration mode configures specific interfaces in the device.

User EXEC Mode

After logging into the device, the user is automatically in the User EXEC command mode unless the user is defined as a privileged user. In general, the User EXEC commands allow the user to perform basic tests, and list system information.

The user-level prompt consists of the device host name followed by the angle bracket (>).

```
Console>
```

The default host name is Console unless it was changed using the **hostname** command in the Global Configuration mode.

Privileged EXEC Mode

Privileged access is password protected to prevent unauthorized use because, many of the privileged commands set operating system parameters. The password is not displayed on the screen and is case sensitive.

Privileged users enter directly into the Privileged EXEC mode. To enter the Privileged EXEC mode from the User EXEC mode, perform the following steps:

1. At the prompt enter the **`enable`** command and press <Enter>. A password prompt appears.
2. Enter the password and press <Enter>. The password is displayed as *. The Privileged EXEC mode prompt is displayed. The Privileged EXEC mode prompt consists of the device host name followed by **#**.

```
Console#
```

To return from the Privileged EXEC mode to the User EXEC mode, use the **disable** command. The following example illustrates how to access the Privileged EXEC mode and return to the User EXEC mode:

```
Console> enable
Enter Password: ******
Console#
Console# disable
Console>
```

The **exit** command is used to return from any mode to the previous mode except when returning to the User EXEC mode from the Privileged EXEC mode. For example, the **exit** command is used to return from the Interface Configuration mode to the Global Configuration mode.

Global Configuration Mode

Global Configuration mode commands apply to features that affect the system as a whole, rather than just a specific interface. The **configure** Privileged EXEC mode command is used to enter the Global Configuration mode.

To enter the Global Configuration mode, at the Privileged EXEC mode prompt enter the command **configure** and press <Enter>. The Global Configuration mode prompt is displayed. The Global Configuration mode prompt consists of the device host name followed by (config) and #.

```
Console(config)#
```

To return from the Global Configuration mode to the Privileged EXEC mode, the user can use one of the following commands:

- **exit**
- **end**
- **Ctrl+Z**

The following example illustrates how to access the Global Configuration mode and return to the Privileged EXEC mode:

```
Console#
Console# configure
Console(config)# exit
Console#
```

Interface Configuration Mode and Specific Configuration Modes

Interface Configuration mode commands modify specific interface operations. The following are the Interface Configuration modes:

- **Line Interface** — Contains commands to configure the management connections. These include commands such as line timeout settings, etc. The **line** Global Configuration mode command is used to enter the Line Configuration command mode.
- **VLAN Database** — Contains commands to create a VLAN as a whole. The **vlan database** Global Configuration mode command is used to enter the VLAN Database Interface Configuration mode.
- **Management Access List** — Contains commands to define management access-lists. The **management access-list** Global Configuration mode command is used to enter the Management Access List Configuration mode.
- **Ethernet** — Contains commands to manage port configuration. The **interface ethernet** Global Configuration mode command is used to enter the Interface Configuration mode to configure an Ethernet type interface.

- **Port Channel** — Contains commands to configure port-channels, for example, assigning ports to a port-channel. Most of these commands are the same as the commands in the Ethernet interface mode, and are used to manage the member ports as a single entity. The **interface port-channel** Global Configuration mode command is used to enter the Port Channel Interface Configuration mode.
- **SSH Public Key-chain** — Contains commands to manually specify other device SSH public keys. The **crypto key pubkey-chain ssh** Global Configuration mode command is used to enter the SSH Public Key-chain Configuration mode.
- **QoS —** Contains commands related to service definitions. The **qos** Global Configuration mode command is used to enter the QoS services configuration mode.
- **MAC Access-List—** Configures conditions required to allow traffic based on MAC addresses. The **ip access-list** Global Configuration mode command is used to enter the MAC access-list configuration mode.

Starting the CLI

The device can be managed over a direct connection to the device console port or via a Telnet connection. The device is managed by entering command keywords and parameters at the prompt. Using the device command-line interface (CLI) is very similar to entering commands on a UNIX system.

If access is via a Telnet connection, ensure that the device has a defined IP address, corresponding management access is granted, and the workstation used to access the device is connected to the device prior to using CLI commands.

NOTE: The following steps are for use on the console line only.

To start using the CLI, perform the following steps:

1 Connect the DB9 null-modem or cross over cable to the RS-232 serial port of the device to the RS-232 serial port of the terminal or computer running the terminal emulation application.

NOTE: The default data rate, for Ryan, is 115,200 (Console port on unit shows a default data rate of 9600).

a Set the data format to 8 data bits, 1 stop bit, and no parity.

b Set Flow Control to **none**.

c Under **Properties**, select **VT100 for Emulation** mode.

d Select **Terminal keys** for **Function, Arrow, and Ctrl keys**. Ensure that the setting is for **Terminal keys** (not **Windows keys**).

NOTICE: When using HyperTerminal with Microsoft® Windows 2000, ensure that Windows® 2000 Service Pack 2 or later is installed. With Windows 2000 Service Pack 2, the arrow keys function properly in HyperTerminal's VT100 emulation. Go to www.microsoft.com for information on Windows 2000 service packs.

For more information, see **Dell™ PowerConnect™ 3500 Series User's Guide**.

2 Enter the following commands to begin the configuration procedure:

```
Console> enable

Console# configure

Console(config)#
```

3 Configure the device and enter the necessary commands to complete the required tasks.

4 When finished, exit the session with the **exit** command.

When a different user is required to log onto the system, use the **login** Privileged EXEC mode command. This effectively logs off the current user and logs on the new user.

Editing Features

Entering Commands

A CLI command is a series of keywords and arguments. Keywords identify a command, and arguments specify configuration parameters. For example, in the command **show interfaces status ethernet 1/e11**, **show**, **interfaces** and **status** are keywords, **ethernet** is an argument that specifies the interface type, and **1/e11** specifies the port.

To enter commands that require parameters, enter the required parameters after the command keyword. For example, to set a password for the administrator, enter:

```
Console(config)# username admin password alansmith
```

When working with the CLI, the command options are not displayed. The command is not selected from a menu, but is manually entered. To see what commands are available in each mode or within an interface configuration, the CLI provides a method of displaying the available commands, the command syntax requirements and in some instances, parameters required to complete the command. The standard command to request help is the character **?**.

There are two instances where help information can be displayed:

- **Keyword lookup** — The character **?** is entered in place of a command. A list of all valid commands and corresponding help messages are is displayed.
- **Partial keyword lookup** — If a command is incomplete and or the character **?** is entered in place of a parameter. The matched keyword or parameters for this command are displayed.

To assist in using the CLI, there is an assortment of editing features. The following features are described:

- Terminal Command Buffer
- Command Completion
- Keyboard Shortcuts

Copying and Pasting Text

Up to 100 lines of text (i.e., commands) can be copied and pasted into the device.

NOTE: This editing features are for Telnet only.

NOTE: It is the user's responsibility to ensure that the text copied into the device consists of legal commands only.

When copying and pasting commands from a configuration file, make sure that the following conditions exist:

- A device Configuration mode has been accessed.
- The commands contain no encrypted data, like encrypted passwords or keys. Encrypted data cannot be copied and pasted into the device.

Setup Wizard

The CLI supports a Setup Wizard. This is an easy-to-use user interface which quickly guides the user in setting up basic device information, so that the device can be easily managed from a Web Based Interface. Refer to the **Getting Started Guide** and **User Guide** for more information on the Setup Wizard.

Terminal Command Buffer

Every time a command is entered in the CLI, it is recorded on an internally managed Command History buffer. Commands stored in the buffer are maintained on a *First In First Out (FIFO)* basis. These commands can be recalled, reviewed, modified, and reissued. This buffer is not preserved across device resets.

Keyword	Description
Up-arrow key Ctrl+P	Recalls commands in the history buffer, beginning with the most recent command. Repeats the key sequence to recall successively older commands.
Down-arrow key	Returns to more recent commands in the history buffer after recalling commands with the up-arrow key. Repeating the key sequence will recall successively more recent commands.

By default, the history buffer system is enabled, but it can be disabled at any time. For information about the command syntax to enable or disable the history buffer, see **history**.

There is a standard default number of commands that are stored in the buffer. The standard number of 10 commands can be increased to 216. By configuring 0, the effect is the same as disabling the history buffer system. For information about the command syntax for configuring the command history buffer, see **history size**.

To display the history buffer, see **show history**.

Negating the Effect of Commands

For many configuration commands, the prefix keyword ***no*** can be entered to cancel the effect of a command or reset the configuration to the default value. This guide describes the negation effect for all applicable commands.

Command Completion

An appropriate error message displays if the entered command is incomplete or invalid; or has missing or invalid parameters. This assists in entering the correct command.

Keyboard Shortcuts

The CLI has a range of keyboard shortcuts to assist in editing the CLI commands. The following table describes the CLI shortcuts.

Keyboard Key	Description
Up-arrow key	Recalls commands from the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands.
Down-arrow key	Returns the most recent commands from the history buffer after recalling commands with the up arrow key. Repeating the key sequence will recall successively more recent commands.
Ctrl+A	Moves the cursor to the beginning of the command line.
Ctrl+E	Moves the cursor to the end of the command line.
Ctrl+Z / End	Returns back to the Privileged EXEC mode from any configuration mode.
Backspace key	Deletes one character left to the cursor position.

CLI Command Conventions

When entering commands there are certain command entry standards that apply to all commands. The following table describes the command conventions.

Convention	Description
[ ]	In a command line, square brackets indicate an optional entry.
{ }	In a command line, curly brackets indicate a selection of compulsory parameters separated by the | character. One option must be selected. For example, **flowcontrol {auto|on|off}** means that for the **flowcontrol** command either **auto**, **on** or **off** must be selected.
Italic font	Indicates a parameter.
<Enter>	Indicates an individual key on the keyboard. For example, <Enter> indicates the **Enter** key.
Ctrl+F4	Any combination of keys pressed simultaneously on the keyboard.
`Screen Display`	Indicates system messages and prompts appearing on the console.
all	When a parameter is required to define a range of ports or parameters and **all** is an option, the default for the command is **all** when no parameters are defined. For example, the command **interface range port-channel** has the option of either entering a range of channels, or selecting **all**. When the command is entered without a parameter, it automatically defaults to **all**.

2

Command Groups

Introduction

The Command Language Interface (CLI) is a network management application operated through an ASCII terminal without the use of a Graphical User Interface (GUI) driven software application. By directly entering commands, you achieve greater configuration flexibility. The CLI is a basic command-line interpreter similar to the UNIX C shell.

You can configure and maintain a device by entering commands from the CLI, which is based solely on textual input and output; you enter commands using a terminal keyboard and the textual output displays via a terminal monitor. You can access the CLI from a VT100 terminal connected to the console port of the device or through a Telnet connection from a remote host.

The first time you use the CLI from the console a Setup Wizard is invoked. The Setup Wizard guides you in setting up a minimum configuration, so that the device can be managed from the Web Based Interface. Refer to the *Getting Started Guide* and *User Guide* for more information on the Setup Wizard.

This guide describes how the Command Line Interface (CLI) is structured, describes the command syntax, and describes the command functionality.

This guide also provides information for configuring the PowerConnect device, details the procedures, and provides configuration examples. Basic installation configuration is described in the *User's Guide* and must be completed before using this document.

Command Groups

The system commands can be broken down into functional groups as shown below.

Command Group	Description
AAA Commands	Configures connection security including authorization and passwords.
ACL Commands	Configures ACL on the device.
Address Table Commands	Configures bridging Address Tables.
Clock Commands	Configures clock commands on the device.
Configuration and Image Files Commands	Manages the device configuration files.
DHCP Snooping Commands	Configuring DHCP snooping on the device.
Ethernet Configuration	Configures all port configuration options for, example ports, storm control, and auto-negotiation.
GVRP Commands	Configures and displays GVRP configuration and information.
IGMP Snooping Commands	Configures IGMP snooping and displays IGMP configuration and IGMP information.
IP Addressing Commands	Configures and manages IP addresses on the device.
IPv6 Addressing Commands	Configures and manages IPv6 addresses on the device.
LACP Commands	Configures and displays LACP information.
Line Commands	Configures the console and remote Telnet connection.
LLDP Commands	Configures and displays LLDP information.
Login Banner Commands	Configures customizable login banners on the device.
Management ACL Commands	Configures and displays management access-list information.
PHY Diagnostics Commands	Diagnoses and displays the interface status.
Power-over-Ethernet Commands	Configure Power over Ethernet settings on the device.
Port Channel Commands	Configures and displays Port Channel information.
Port Monitor Commands	Monitors activity on specific target ports.
QoS Commands	Configures and displays QoS information.
RADIUS Commands	Configures and displays RADIUS information.
RMON Commands	Displays RMON statistics.
SNMP Commands	Configures SNMP communities, traps and displays SNMP information.
Spanning Tree Commands	Configures and reports on Spanning Tree protocol.

SSH Commands	Configures SSH authentication.
Syslog Commands	Manages and displays syslog messages.
System Management Commands	Configures the device clock, name and authorized users.
TACACS Commands	Configures TACACS+ commands.
TIC Commands	Configures and displays TIC information.
Tunnel Commands	Configures tunnel routing configurations.
User Interface Commands	Describes user commands used for entering CLI commands.
VLAN Commands	Configures VLANs and displays VLAN information.
Voice VLAN Commands	Configures Voice VLANs and displays VLAN information.
Web Server Commands	Configures Web based access to the device.
802.1x Commands	Configures commands related to 802.1x security protocol.

AAA Commands

Command Group	Description	Access Mode
aaa authentication login	Defines login authentication.	Global Configuration
aaa authentication enable	Defines authentication method lists for accessing higher privilege levels.	Global Configuration
login authentication	Specifies the login authentication method list for a remote telnet or console.	Line Configuration
enable authentication	Specifies the authentication method list when accessing a higher privilege level from a remote telnet or console.	Line Configuration
ip http authentication	Specifies authentication methods for HTTP server users.	Global Configuration
ip https authentication	Specifies authentication methods for HTTPS server users.	Global Configuration
show authentication methods	Displays information about the authentication methods.	Privileged EXEC
password	Specifies a password on a line.	Line Configuration
enable password	Sets a local password to control access to normal and privilege levels.	Global Configuration
username	Establishes a username-based authentication system.	Global Configuration

ACL Commands

Command Group	Description	Access Mode
ip access-list	Creates Layer 2 ACLs.	Global Configuration
permit (IP)	Permits traffic if the conditions defined in the permit statement match.	IP Access-List Configuration
deny (IP)	Denies traffic if the conditions defined in the deny statement match.	IP Access-List Configuration
mac access-list	Creates Layer 2 ACLs.	Global Configuration
permit (MAC)	Set permit conditions for a MAC access list	MAC Access-List Configuration
deny (MAC)	Denies traffic if the conditions defined in the deny statement match	MAC Access-List Configuration
service-acl	Sets the default ace action to permit or deny.	Interface Configuration
show access-lists	Applies an ACL to the input interface.	Privileged EXEC
show interfaces access-lists	Displays ACLs defined on the device.	Privileged EXEC

Address Table Commands

Command Group	Description	Access Mode
bridge address	Adds a static MAC-layer station source address to the bridge table.	Interface (VLAN) Configuration
bridge multicast filtering	Enables filtering of Multicast addresses.	Global Configuration
bridge multicast address	Registers MAC-layer Multicast addresses to the bridge table, and adds static ports to the group.	Interface (VLAN) Configuration
bridge multicast forbidden address	Forbids adding a specific Multicast address to specific ports.	Interface (VLAN) Configuration
bridge multicast unregistered	Configures the forwarding state of unregistered multicast addresses.	Interface Configuration
bridge multicast forward-all	Enables forwarding all Multicast frames on a port.	Interface (VLAN) Configuration

bridge multicast forbidden forward-all	Forbids a port from becoming a forward-all Multicast port.	Interface (VLAN) Configuration
bridge aging-time	Sets the Address Table aging time.	Global Configuration
clear bridge	Removes any learned entries from the forwarding database.	Privileged EXEC
port security	Disables new address learning/forwarding on an interface.	Interface Configuration
port security mode	Configures the port security learning mode.	Interface Configuration
port security max	Configures the maximum number of addresses that may be learned on the port while the port is in port security mode.	Interface Configuration
port security routed secure-address	Adds MAC-layer secure addresses to a routed port.	Interface Configuration
show bridge address-table	Displays all entries in the bridge-forwarding database.	Privileged EXEC
show bridge address-table static	Displays statically created entries in the bridge-forwarding database.	Privileged EXEC
show bridge address-table count	Displays the number of addresses present in the bridge-forwarding database.	Privileged EXEC
show bridge multicast address-table	Displays all entries in the bridge-forwarding database.	Privileged EXEC
show bridge multicast address-table static	Displays the statically configured multicast addresses.	Privileged EXEC
show bridge multicast filtering	Displays the Multicast filtering configuration.	Privileged EXEC
show ports security	Displays the port-lock status.	Privileged EXEC
show ports security addresses	Displays current dynamic addresses in locked ports.	Privileged EXEC

Clock Commands

Command Group	Description	Access Mode
clock set	Manually sets the system clock.	Privileged EXEC
clock source	Configures an external time source for the system clock.	Global Configuration
clock timezone	Sets the time zone for display purposes.	Global Configuration
clock summer-time	Configures the system to automatically switch to summer time (daylight saving time).	Global Configuration
sntp authentication-key	Defines an authentication key for Simple Network Time Protocol (SNTP).	Global Configuration
sntp authenticate	Grants authentication for received Network Time Protocol (NTP) traffic from servers.	Global Configuration
sntp trusted-key	Authenticates the identity of a system to which Simple Network Time Protocol (SNTP) will synchronize.	Global Configuration
sntp client poll timer	Sets the polling time for the Simple Network Time Protocol (SNTP) client.	Global Configuration
sntp broadcast client enable	Enables the Simple Network Time Protocol (SNTP) Broadcast clients.	Global Configuration
sntp anycast client enable	Enables Anycast clients.	Global Configuration
sntp client enable	Enables the Simple Network Time Protocol (SNTP) Broadcast and Anycast client on an interface.	Global Configuration
sntp client enable (Interface)	Enables the Simple Network Time Protocol (SNTP) client on an interface.	Interface Configuration
sntp unicast client enable	Enables the device to use the Simple Network Time Protocol (SNTP) to request and accept Simple Network Time Protocol (SNTP) traffic from servers.	Global Configuration
sntp unicast client poll	Enables polling for the Simple Network Time Protocol (SNTP) predefined Unicast clients.	Global Configuration
sntp server	Configures the device to use the Simple Network Time Protocol (SNTP) to request and accept Simple Network Time Protocol (SNTP) traffic from a server.	Global Configuration
show clock	Displays the time and date from the system clock.	User EXEC

show sntp configuration	Shows the configuration of the Simple Network Time Protocol (SNTP).	Privileged EXEC
show sntp status	Shows the status of the Simple Network Time Protocol (SNTP).	Privileged EXEC

Configuration and Image Files Commands

Command Group	Description	Access Mode
copy	Copies files from a source to a destination.	Privileged EXEC
delete	Deletes a file from a Flash memory device.	Privileged EXEC
delete startup-config	Deletes the startup-config file.	Privileged EXEC
dir	Displays a list of files on a flash file system.	Privileged EXEC
more	Displays a file.	Privileged EXEC
rename	Renames a file.	Privileged EXEC
boot system	Specifies the system image that the device loads at startup.	Privileged EXEC
show running-config	Displays the contents of the currently running configuration file.	Privileged EXEC
show startup-config	Displays the startup configuration file contents.	Privileged EXEC
show bootvar	Displays the active system image file that the device loads at startup.	Privileged EXEC

DHCP Snooping Commands

Command Group	Description	Access Mode
ip dhcp snooping	Globally enables DHCP snooping	Global Configuration
ip dhcp snooping vlan	Enables DHCP snooping on a VLAN.	Global Configuration
ip dhcp snooping trust	Configures a port as trusted for DHCP snooping purposes.	Interface Configuration
ip dhcp snooping information option allowed-untrusted	Configures a switch to accept DHCP packets with option-82 information from an untrusted port.	Global Configuration
ip dhcp snooping verify	Configures a switch to accept DHCP packets with option-82 information from an untrusted port.	Global Configuration
ip dhcp snooping database	Configures the DHCP snooping binding file.	Global Configuration
ip dhcp snooping database update-freq	Configures the update frequency of the DHCP snooping binding file.	Global Configuration

ip dhcp snooping binding	Configures the update frequency of the DHCP snooping binding file.	Privileged EXEC
clear ip dhcp snooping database	Clears the DHCP snooping binding database.	Privileged EXEC
show ip dhcp snooping	Displays the DHCP snooping configuration.	EXEC
show ip dhcp snooping binding	Displays the DHCP snooping binding database and configuration information for all interfaces on a switch.	User EXEC

Ethernet Configuration Commands

Command Group	Description	Access Mode
interface ethernet	Enters the interface configuration mode to configure an Ethernet type interface.	Global Configuration
interface range ethernet	Enters the interface configuration mode to configure multiple Ethernet type interfaces.	Global Configuration
shutdown	Disables interfaces.	Interface Configuration
description	Adds a description to an interface.	Interface Configuration
speed	Configures the speed of a given Ethernet interface when not using auto-negotiation.	Interface Configuration
duplex	Configures the full/half duplex operation of a given Ethernet interface when not using auto-negotiation.	Interface Configuration
negotiation	Enables auto-negotiation operation for the speed and duplex parameters of a given interface.	Interface Configuration
flowcontrol	Configures the Flow Control on a given interface.	Interface Configuration
mdix	Enables automatic crossover on a given interface.	Interface Configuration
back-pressure	Enables Back Pressure on a given interface.	Interface Configuration
clear counters	Clears statistics on an interface.	Privileged EXEC
set interface active	Reactivates an interface that was suspended by the system.	Privileged EXEC
show interfaces advertise	Displays auto negotiation advertisement data.	Privileged EXEC
show interfaces configuration	Displays the configuration for all interfaces.	Privileged EXEC

show interfaces status	Displays the status for all interfaces.	Privileged EXEC
show interfaces description	Displays the description for all interfaces.	Privileged EXEC
show interfaces counters	Displays traffic seen by the physical interface.	Privileged EXEC
port storm-control include-multicast	Enables the device to count Multicast packets with Broadcast packets.	Interface Configuration
port storm-control broadcast enable	Enables Broadcast storm control.	Interface Configuration
port storm-control broadcast rate	Configures the maximum Broadcast rate.	Interface Configuration
show ports storm-control	Displays the storm control configuration.	Privileged User EXEC

GVRP Commands

Command Group	Description	Mode
gvrp enable (Global)	Enables GVRP globally.	Global Configuration
gvrp enable (Interface)	Enables GVRP on an interface.	Interface Configuration
garp timer	Adjusts the GARP application join, leave, and leaveall GARP timer values.	Interface Configuration
gvrp vlan-creation-forbid	Enables or disables dynamic VLAN creation.	Interface Configuration
gvrp registration-forbid	De-registers all VLANs, and prevents dynamic VLAN registration on the port.	Interface Configuration
clear gvrp statistics	Clears all the GVRP statistics information.	Privileged EXEC
show gvrp configuration	Displays GVRP configuration information.	User EXEC
show gvrp statistics	Displays GVRP statistics.	User EXEC
show gvrp error-statistics	Displays GVRP error statistics.	User EXEC

IGMP Snooping Commands

Command Group	Description	Access Mode
ip igmp snooping (Global)	Enables Internet Group Management Protocol (IGMP) snooping.	Global Configuration
ip igmp snooping (Interface)	Enables Internet Group Management Protocol (IGMP) snooping on a specific VLAN.	Interface (VLAN)
ip igmp snooping mrouter	Enables automatic learning of Multicast router ports.	Interface (VLAN)
ip igmp snooping host-time-out	Configures the host-time-out.	Interface (VLAN)
ip igmp snooping mrouter-time-out	Configures the mrouter-time-out.	Interface (VLAN)
ip igmp snooping leave-time-out	Configures the leave-time-out.	Interface (VLAN)
ip igmp snooping querier enable	Enables Internet Group Management Protocol (IGMP) querier on a specific VLAN	Interface (VLAN)
ip igmp snooping querier address	Defines the source IP address that the IGMP Snooping querier uses.	Interface (VLAN)
show ip igmp snooping mrouter	Displays information on dynamically learned Multicast router interfaces.	User EXEC
show ip igmp snooping interface	Displays IGMP snooping configuration.	User EXEC
show ip igmp snooping groups	Displays Multicast groups learned by IGMP snooping.	User EXEC

IP Addressing Commands

Command Group	Description	Access Mode
ip address	Sets an IP address.	Interface Configuration
ip address dhcp	Acquires an IP address on an interface from the DHCP server.	Interface Configuration
ip default-gateway	Defines a default gateway (router).	Global Configuration
show ip interface	Displays the usability status of interfaces configured for IP.	Privileged EXEC

arp	Adds a permanent entry in the ARP cache.	Global Configuration
arp timeout	Configures how long an entry remains in the ARP cache.	Global Configuration
clear arp-cache	Deletes all dynamic entries from the ARP cache.	Privileged EXEC
show arp	Displays entries in the ARP table.	Privileged EXEC
ip domain-lookup	Enables the IP Domain Naming System (DNS)-based host name-to-address translation.	Global Configuration
ip domain-name	Defines a default domain name that the software uses to complete unqualified host names.	Global Configuration
ip name-server	Sets the available name servers.	Global Configuration
ip host	Defines static host name-to-address mapping in the host cache.	Global Configuration
clear host	Deletes entries from the host name-to-address cache.	Privileged EXEC
clear host dhcp	Deletes entries from the host name-to-address mapping received from Dynamic Host Configuration Protocol (DHCP).	Privileged EXEC
show hosts	Displays the default domain name, a list of name server hosts, the static and cached list of host names and addresses.	Privileged EXEC

IPv6 Addressing Commands

Command Group	Description	Access Mode
ipv6 enable	Enables IPv6 processing on an interface.	Interface Configuration
ipv6 address autoconfig	Enables automatic configuration of IPv6 addresses using stateless autoconfiguration on an interface.	Interface Configuration
ipv6 icmp error-interval	Configures the rate limit interval and bucket size parameters for IPv6 ICMP error messages.	Global Configuration
show ipv6 icmp error-interval	Displays the IPv6 ICMP error interval setting	Privileged EXEC
ipv6 address	Configures an IPv6 address for an interface.	Interface Configuration
ipv6 address link-local	Configures an IPv6 link-local address for an interface.	Interface Configuration
ipv6 unreachables	Enables the generation of Internet Control Message Protocol for IPv6 (ICMPv6) unreachable messages for any packets arriving on a specified interface.	Interface Configuration
ipv6 default-gateway	Defines an IPv6 default gateway.	Global Configuration
ipv6 mld join-group	Configures Multicast Listener Discovery (MLD) reporting for a specified group.	Interface Configuration
ipv6 mld version	Changes the Multicast Listener Discovery Protocol (MLD) version.	Interface Configuration
show ipv6 interface	Displays the usability status of interfaces configured for IPv6.	Privileged EXEC
show IPv6 route	Displays the current state of the IPv6 routing table.	Privileged EXEC
ipv6 nd dad attempts	Configures the number of consecutive neighbor solicitation messages that are sent on an interface while duplicate address detection is performed on the unicast IPv6 addresses of the interface.	Interface Configuration
ipv6 host	Defines a static host name-to-address mapping in the host name cache.	Global Configuration
ipv6 neighbor	Configures a static entry in the IPv6 neighbor discovery cache.	Global Configuration
ipv6 set mtu	Sets the MTU size of IPv6 packets sent on an interface.	Privileged EXEC
show ipv6 neighbors	Displays IPv6 neighbor discovery cache information.	Privileged EXEC

clear ipv6 neighbors	Deletes all entries in the IPv6 neighbor discovery cache, except static entries.	Privileged EXEC

LACP Commands

Command Group	Description	Access Mode
lacp system-priority	Configures the system LACP priority.	Global Configuration
lacp port-priority	Configures the priority value for physical ports.	Interface Configuration
lacp timeout	Assigns an administrative LACP timeout.	Interface Configuration
show lacp ethernet	Displays LACP information for Ethernet ports.	Privileged EXEC
show lacp port-channel	Displays LACP information for a port-channel.	Privileged EXEC

Line Commands

Command Group	Description	Access Mode
line	Identifies a specific line for configuration and enters the line configuration command mode.	Global Configuration
speed	Configures the baud rate of the line.	Line Configuration
autobaud	Configures the line for automatic baud rate detection (autobaud).	Line Configuration
exec-timeout	Configures the interval that the system waits until user input is detected.	Line Configuration
history	Enables the command history function.	Line Configuration
history size	Configures the command history buffer size for a particular line.	Line Configuration
terminal history	Enables the command history function for the current terminal session.	User EXEC
terminal history size	Configures the command history buffer size for the current terminal session.	User EXEC
show line	Displays line parameters.	User EXEC

Line Commands

Command Group	Description	Access Mode

line	Identifies a specific line for configuration and enters the Line Configuration command mode.	Global Configuration
speed	Sets the line baud rate.	Line Configuration
autobaud	Sets the line for automatic baud rate detection	Line Configuration
exec-timeout	Configures the interval that the system waits until user input is detected.	Line Configuration
show line	Displays line parameters.	User EXEC
terminal history	Enables the command history function for the current terminal session.	User EXEC
terminal history size	Terminal history buffer size for the current terminal session.	User EXEC

LLDP Commands

Command Group	Description	Access Mode
lldp enable (global)	Enables Link Layer Discovery Protocol (LLDP).	Global configuration
lldp enable (interface)	Enables LLDP on an interface.	Interface configuration (Ethernet)
lldp timer	Specifies how often the software sends LLDP updates.	Global configuration
lldp hold-multiplier	Specifies the amount of time the receiving device should hold a LLDP packet before discarding it.	Global configuration
lldp reinit-delay	Specifies the minimum time an LLDP port will wait before reinitializing LLDP transmission.	Global configuration
lldp tx-delay	Specifies the delay between successive LLDP frame transmissions initiated by value/status changes in the LLDP local systems MIB.	Global configuration
lldp optional-tlv	Specifies which optional TLVs from the basic set should be transmitted.	Interface configuration (Ethernet)
lldp management-address	Specifies the management address that would be advertised from an interface.	Interface configuration (Ethernet)
lldp med enable	Enables LLDP Media Endpoint Discovery (MED) on an interface.	Interface configuration (Ethernet)
lldp med network-policy (global)	Defines LLDP MED network policy.	Global configuration
lldp med network-policy (interface)	Attaches a LLDP MED network policy to a port.	Interface configuration (Ethernet)
lldp med location		Interface configuration (Ethernet)
clear lldp rx	Restarts the LLDP RX state machine and clears the neighbors table.	Privileged EXEC
show lldp configuration	Displays the LLDP configuration.	Privileged EXEC

show lldp med configuration	Displays the Link Layer Discovery Protocol (LLDP) Media Endpoint Discovery (MED) configuration.	Privileged EXEC
show lldp local	Displays the Link Layer Discovery Protocol (LLDP) information that is advertised from a specific port.	Privileged EXEC
show lldp neighbors	Displays information about discovered neighboring devices using Link Layer Discovery Protocol (LLDP)	Privileged EXEC

Login Banner Commands

Command Group	Description	Access Mode
banner exec	Specifies and enables a message to be displayed when an EXEC process is created.	Global Configuration
banner login	Enables a message to be displayed before the username and password login prompts.	Global Configuration
banner motd	Specifies and enables a message-of-the-day banner.	Global Configuration
exec-banner	Enables the display of exec banners.	Line Configuration
login-banner	Enables the display of login banners.	Line Configuration
motd-banner	Enables the display of message-of-the-day banners.	Line Configuration
show banner	Displays the banners configuration.	Privileged EXEC

Management ACL Commands

Command Group	Description	Access Mode
management access-list	Defines a management access-list, and enters the access-list for configuration.	Global Configuration
permit (Management)	Defines a permit rule.	Management Access-level
deny (Management)	Defines a deny rule.	Management Access-level
management access-class	Defines which management access-list is used.	Global Configuration
show management access-list	Displays management access-lists.	Privileged EXEC
show management access-class	Displays the active management access-list.	Privileged EXEC

PHY Diagnostics Commands

Command Group	Description	Access Mode
test copper-port tdr	Diagnoses with TDR (Time Domain Reflectometry) technology the quality and characteristics of a copper cable attached to a port.	Privileged EXEC
show copper-ports tdr	Displays the last TDR (Time Domain Reflectometry) tests on specified ports.	User EXEC
show copper-ports cable-length	Displays the estimated copper cable length attached to a port.	User EXEC

Power-over-Ethernet Commands

Command Group	Description	Access Mode
power inline	Configures the administrative mode of the inline power on an interface.	Interface Configuration
power inline powered-device	Adds a description of the powered device type attached to the interface.	Interface Configuration
power inline priority	Displays port monitoring status.	Interface Configuration

power inline usage-threshold	Configures the administrative mode of the inline power on an interface.	Global Configuration
power inline traps enable	Adds a description of the powered device type attached to the interface.	Global Configuration
show power inline	Displays port monitoring status.	User EXEC

Port Channel Commands

Command Group	Description	Access Mode
interface port-channel	Enters the interface configuration mode of a specific port-channel.	Global Configuration
interface range port-channel	Enters the interface configuration mode to configure multiple port-channels.	Global Configuration
channel-group	Associates a port with a port-channel.	Interface Configuration
show interfaces port-channel	Displays port-channel information.	Privileged EXEC

Port Monitor Commands

Command Group	Description	Access Mode
port monitor	Starts a port monitoring session.	Interface Configuration
show ports monitor	Displays port monitoring status.	User EXEC

QoS Commands

Command Group	Description	Access Mode
qos	Enables quality of service (QoS) on the device and enters QoS basic mode.	Global Configuration
show qos	Displays the QoS status.	User EXEC
priority-queue out num-of-queues	Configures the number of expedite queues.	Global Configuration
traffic-shape	Sets the shaper on an egress port.	Interface Configuration

rate-limit (Ethernet)	Limits the rate of the incoming traffic.	Interface Configuration
wrr-queue cos-map	Maps assigned CoS values to select one of the egress queues.	Global Configuration
show qos interface	Displays interface QoS information.	User EXEC
qos map dscp-queue	Modifies the DSCP to CoS map.	Global Configuration
qos trust (Global)	Configures the system to basic mode and the "trust" state.	Global Configuration
qos cos	Configures the default port CoS value.	Interface Configuration
show qos map	Displays all the maps for QoS.	User EXEC

RADIUS Commands

Command Group	Description	Access Mode
radius-server host	Specifies a RADIUS server host.	Global Configuration
radius-server key	Sets the authentication and encryption key for all RADIUS communications between the device and the RADIUS daemon.	Global Configuration
radius-server retransmit	Specifies the number of times the software searches the list of RADIUS server hosts.	Global Configuration
radius-server source-ip	Specifies the source IP address used for communication with RADIUS servers.	Global Configuration
radius-server source-ipv6	Specifies the source IPv6 address used for the IPv6 communication with RADIUS servers.	Global Configuration
radius-server timeout	Sets the interval for which a device waits for a server host to reply.	Global Configuration
radius-server deadtime	Improves RADIUS response times when servers are unavailable.	Global Configuration
show radius-servers	Displays the RADIUS server settings.	Privileged EXEC

RMON Commands

Command Group	Description	Mode
show rmon statistics	Displays RMON Ethernet Statistics.	User EXEC
rmon collection history	Enables a Remote Monitoring (RMON) MIB history statistics group on an interface.	Interface Configuration
show rmon collection history	Displays the requested history group configuration.	User EXEC
show rmon history	Displays RMON Ethernet statistics history.	User EXEC
rmon alarm	Configures alarm conditions.	Global Configuration
show rmon alarm-table	Displays the alarms table.	User EXEC
show rmon alarm	Displays alarm configurations.	User EXEC
rmon event	Configures a RMON event.	Global Configuration
show rmon events	Displays the RMON event table.	User EXEC
show rmon log	Displays the RMON logging table.	User EXEC
rmon table-size	Configures the maximum RMON tables sizes.	Global Configuration

SNMP Commands

Command Group	Description	Access Mode
snmp-server community	Sets up the community access string to permit access to SNMP protocol.	Global Configuration
snmp-server view	Creates and modifies view entries.	Global Configuration
snmp-server group	Configures a new SNMP group or a table that maps SNMP users to SNMP views.	Global Configuration
snmp-server user	Configures a new SNMP v3 user.	Global Configuration
snmp-server engineID local	Specifies an SNMP EngineID on the local device.	Global Configuration
snmp-server enable traps	Enables the device to send SNMP traps or SNMP notifications.	Global Configuration
snmp-server filter	Creates and modifies filter entries.	Global Configuration
snmp-server host	Specifies an SNMP notification recipient.	Global Configuration
snmp-server v3-host	Specifies an SNMP v3 notification recipient.	Global Configuration
snmp-server trap authentication	Enables the device to send Simple Network Management Protocol traps when authentication failed.	Global Configuration
snmp-server contact	Sets up a system contact.	Global Configuration
snmp-server location	Sets up the information on where the device is located.	Global Configuration
snmp-server set	Sets SNMP MIB value by the CLI.	Global Configuration
show snmp	Displays the SNMP status.	Privileged EXEC
show snmp engineid	Displays the local SNMP EngineID.	Privileged EXEC
show snmp views	Displays the configuration of SNMP views.	Privileged EXEC
show snmp groups	Displays the configuration of SNMP groups.	Privileged EXEC
show snmp filters	Displays the configuration of SNMP filters.	Privileged EXEC
show snmp users	Displays the configuration of SNMP users.	Privileged EXEC

Spanning Tree Commands

Command Group	Description	Access Mode
spanning-tree	Enables Spanning Tree functionality.	Global Configuration
spanning-tree mode	Configures the Spanning Tree protocol.	Global Configuration
spanning-tree forward-time	Configures the Spanning Tree bridge forward time.	Global Configuration
spanning-tree hello-time	Configures the Spanning Tree bridge Hello Time.	Global Configuration
spanning-tree max-age	Configures the Spanning Tree bridge maximum age.	Global Configuration
spanning-tree priority	Configures the Spanning Tree priority.	Global Configuration
spanning-tree disable	Disables Spanning Tree on a specific port.	Interface Configuration
spanning-tree cost	Configures the Spanning Tree path cost for a port.	Interface Configuration
spanning-tree port-priority	Configures port priority.	Interface Configuration
spanning-tree portfast	Enables PortFast mode.	Interface Configuration
spanning-tree link-type	Overrides the default link-type setting.	Interface Configuration
spanning-tree pathcost method	Sets the default path cost method.	Global Configuration
spanning-tree bpdu	Defines bridge protocol data unit (BPDU) handling when Spanning Tree is disabled on an interface.	Global Configuration
clear spanning-tree detected-protocols	Shutdowns an interface when it receives a BPDU.	Interface Configuration
clear spanning-tree detected-protocols	Restarts the protocol migration process on all interfaces or on the specified interface.	Privileged EXEC
spanning-tree mst priority	Configures the device priority for the specified spanning-tree instance.	Global Configuration
spanning-tree mst max-hops	Configures the number of hops in an MST region before the BDPU is discarded and the port information is aged out.	Global Configuration

spanning-tree mst port-priority	Configures the priority of a port.	Interface Configuration
spanning-tree mst cost	Configures the path cost for multiple Spanning Tree (MST) calculations.	Interface Configuration
spanning-tree mst configuration	Enables configuring an MST region by entering the Multiple Spanning Tree (MST) mode.	Global Configuration
instance (mst)	Maps VLANs to the MST instance.	MST Configuration
name (mst)	Defines the configuration name.	MST Configuration
revision (mst)	Defines the configuration revision number.	MST Configuration
show (mst)	Displays the current or pending MST region configuration.	MST Configuration
exit (mst)	Exits the MST region configuration mode and applies all configuration changes.	MST Configuration
abort (mst)	Exits the MST region configuration mode without applying configuration changes.	MST Configuration
show spanning-tree	Displays Spanning Tree configuration.	Privileged EXEC
spanning-tree guard root	Enables root guard on all the Spanning Tree instances in the interface.	Interface Configuration

SSH Commands

Command Group	Description	Access Mode
ip ssh port	Specifies the port to be used by the SSH server.	Global Configuration
ip ssh server	Enables the device to be configured from a SSH server.	Global Configuration
crypto key generate dsa	Generates DSA key pairs.	Global Configuration
crypto key generate rsa	Generates RSA key pairs.	Global Configuration
ip ssh pubkey-auth	Enables public key authentication for incoming SSH sessions.	Global Configuration
crypto key pubkey-chain ssh	Enters SSH Public Key-chain configuration mode.	Global Configuration
user-key	Specifies which SSH public key is manually configured and enters the SSH public key-string configuration command.	SSH Public Key
key-string	Manually specifies a SSH public key.	SSH Public Key
show ip ssh	Displays the SSH server configuration.	Privileged EXEC

show crypto key mypubkey	Displays the SSH public keys stored on the device.	Privileged EXEC
show crypto key pubkey-chain ssh	Displays SSH public keys stored on the device.	Privileged EXEC

Syslog Commands

Command Group	Description	Access Mode
logging on	Controls error messages logging.	Global Configuration
logging	Logs messages to a syslog server.	Global Configuration
logging console	Limits messages logged to the console based on severity.	Global Configuration
logging buffered	Limits syslog messages displayed from an internal buffer based on severity.	Global Configuration
logging buffered size	Changes the number of syslog messages stored in the internal buffer.	Global Configuration
clear logging	Clears messages from the internal logging buffer.	Privileged EXEC
logging file	Limits syslog messages sent to the logging file based on severity.	Global Configuration
clear logging file	Clears messages from the logging file.	Privileged EXEC
aaa logging	Enables logging AAA login events.	Global Configuration
file-system logging	Enables logging file system events.	Global Configuration
management logging	Enables logging management access list events.	Global Configuration
show logging	Displays the state of logging and the syslog messages stored in the internal buffer.	Privileged EXEC
show logging file	Displays the state of logging and the syslog messages stored in the logging file.	Privileged EXEC
show syslog-servers	Displays the syslog servers settings.	Privileged EXEC

System Management Commands

Command Group	Description	Access Mode
ping	Sends ICMP echo request packets to another node on the network.	User EXEC
traceroute	Discovers the routes that packets will actually take when traveling to their destination.	User EXEC
telnet	Logs in to a host that supports Telnet.	User EXEC
resume	Switches to another open Telnet session.	User EXEC
reload	Reloads the operating system.	Privileged EXEC
hostname	Specifies or modifies the device host name.	Global Configuration
stack master	Forces selection of a stack master.	Global Configuration
stack reload	Reloads stack members.	Privileged EXEC
show stack	Displays information about stack status.	User EXEC
show users	Displays information about the active users.	User EXEC
show sessions	Lists the open Telnet sessions.	User EXEC
show system	Displays system information.	User EXEC
show version	Displays the system version information.	User EXEC
asset-tag	Specifies the device asset-tag.	Global Configuration
show system id	Displays the service ID information.	User EXEC
show cpu utilization	Displays information about the CPU utilization of active processes.	Privileged EXEC

TACACS Commands

Command Group	Description	Mode
tacacs-server host	Specifies a TACACS+ host.	Global Configuration
tacacs-server key	Sets the authentication encryption key used for all TACACS+ communications between the device and the TACACS+ daemon.	Global Configuration
tacacs-server source-ip	Specifies the source IP address that will be used for the communication with TACACS+ servers.	Global Configuration
tacacs-server timeout	Sets the timeout value.	Global Configuration
show tacacs	Displays configuration and statistics for a TACACS+ servers.	Privileged EXEC

TIC Commands

Command Group	Description	Access Mode
passwords min-length	Sets the minimum length required for passwords in the local database.	Global Configuration
password-aging	Sets the expiration time of username and enables passwords.	Global Configuration
passwords aging	Configures the expiration time of line passwords in the local database.	Line Configuration
passwords history	Sets the number of required password changes before a password in the local database can be reused.	Global Configuration
passwords history hold-time	Configures the number of days a password is relevant for tracking its password history.	Global Configuration
passwords lockout	Sets the number of failed login attempts before a user account is locked.	Global Configuration
aaa login-history file	Enables writing to the login history file.	Global Configuration
set username active	Reactivates a locked user account.	Privileged EXEC
set line active	Reactivates a locked line.	Privileged EXEC
set enable-password active	Reactivates a locked enable password.	Privileged EXEC
show passwords configuration	Displays information about password management.	Privileged EXEC
show users login-history	Displays information about the login history of users.	Privileged EXEC
show users accounts	Displays information about the local user database.	Privileged EXEC

Tunnel Commands

Command Group	Description	Access Mode
interface tunnel	enters tunnel interface configuration mode.	Global Configuration
tunnel mode ipv6ip	configures an IPv6 transition mechanism global support mode.	Interface Tunnel Configuration
tunnel isatap router	configures a global string that represents a specific automatic tunnel router domain name.	Interface Tunnel Configuration
tunnel source	sets the local (source) tunnel interface IPv4 address.	Interface Tunnel Configuration
tunnel isatap query-interval	configures the interval between DNS Queries (before the IP address of the ISATAP router is known) for the automatic tunnel router domain name.	Global Configuration
tunnel isatap solicitation-interval	configures the interval between ISATAP router solicitations messages (when there is no active ISATAP router).	Global Configuration
tunnel isatap robustness	configures the number of DNS Query/Router Solicitation refresh messages that the device sends.	Global Configuration
show ipv6 tunnel	displays information on the ISATAP tunnel.	Privileged EXEC

User Interface Commands

Command Group	Description	Access Mode
enable	Enters the privileged EXEC mode.	User EXEC
disable	Returns to User EXEC mode.	Privileged EXEC
login	Changes a login username.	Priv/User EXEC
configure	Enables the global configuration mode.	Privileged EXEC
exit (Configuration)	Exits any configuration mode to the next highest mode in the CLI mode hierarchy.	All
exit	Closes an active terminal session by logging off the device.	Priv/User EXEC
end	Ends the current configuration session and returns to the Privileged EXEC mode.	After Privileged EXEC
help	Displays a brief description of the help system.	All
terminal datadump	Enables dumping all output of a show command without prompting.	User EXEC

show history	Lists the commands entered in the current session.	Privileged EXEC
show privilege	Displays the current privilege level.	User EXEC

VLAN Commands

Command Group	Description	Access Mode
vlan database	Enters the VLAN database configuration mode.	Global Configuration
vlan	Creates a VLAN.	VLAN Database
interface vlan	Enters the interface configuration (VLAN) mode.	Global Configuration
interface range vlan	Enters the interface configuration mode to configure multiple VLANs.	Global Configuration
name	Configures a name to a VLAN.	Interface (VLAN) Configuration
switchport access vlan	Configures the VLAN ID when the interface is in access mode.	Interface Configuration
switchport trunk allowed vlan	Adds or removes VLANs from a port in general mode.	Interface Configuration
switchport trunk native vlan	Defines the port as a member of the specified VLAN, and the VLAN ID is the "port default VLAN ID (PVID)".	Interface Configuration
switchport general allowed vlan	Adds or removes VLANs from a general port.	Interface Configuration
switchport general pvid	Configures the PVID when the interface is in general mode.	Interface Configuration
switchport general ingress-filtering disable	Disables port ingress filtering.	Interface Configuration
switchport general acceptable-frame-type tagged-only	Discards untagged frames at ingress.	Interface Configuration
switchport forbidden vlan	Forbids adding specific VLANs to a port.	Interface Configuration
switchport mode	Configures the VLAN membership mode of a port	Interface Configuration
switchport customer vlan	Set the port’s VLAN when the interface is in customer mode.	Interface Configuration

switchport protected	Overrides the FDB (Forwarding Database) decision, and sends all the Unicast, Multicast and Broadcast traffic to an uplink port.	Interface Configuration
map protocol protocols-group	Maps a protocol to a protocol group. Protocol groups are used for protocol-based VLAN assignment.	VLAN Configuration
switchport general map protocols-group vlan	Sets a protocol-based classification rule.	Interface Configuration
ip internal-usage-vlan	Reserves a VLAN as the internal usage VLAN of an interface.	Interface Configuration
mac-to-vlan	Adds MAC addresses to the MAC-to-VLAN database.	VLAN configuration
show vlan	Displays the MAC-to-VLAN database.	Privileged EXEC
show vlan	Displays VLAN information.	Privileged EXEC
show vlan protocols-groups	Displays protocols-groups information.	Privileged EXEC
show vlan internal usage	Displays a list of VLANs used internally by the device.	Privileged EXEC
show interfaces switchport	Displays switchport configuration.	Privileged EXEC

Voice VLAN Commands

Command Group	Description	Access Mode
voice vlan id	Enables voice VLAN and configures voice VLAN ID.	Global Configuration
voice vlan oui-table	Configures the voice OUI table.	Global Configuration
voice vlan cos		Global Configuration
voice vlan aging-timeout	Sets the voice VLAN aging timeout.	Global Configuration
voice vlan enable	Enables automatic voice VLAN configuration for a port.	Interface configuration (Ethernet, port-channel)

voice vlan secure	Configures the secure mode for the voice VLAN.	Interface configuration (Ethernet, port-channel
show voice vlan	Displays the voice VLAN status.	EXEC mode

Web Server Commands

Command Group	Description	Access Mode
ip http server	Enables the device to be configured from a browser.	Global Configuration
ip http port	Specifies the TCP port for use by a web browser to configure the device.	Global Configuration
ip http exec-timeout	Sets the interval the system waits for user input before automatically logging off.	Global Configuration
ip https server	Enables configuring the device from a secured browser.	Global Configuration
ip https port	Specifies the TCP port used by the server to configure the device through the Web browser.	Global Configuration
ip https exec-timeout	Sets the interval the system waits for user input before automatically logging off.	Global Configuration
crypto certificate generate	Generates a self-signed HTTPS certificate.	Global Configuration
crypto certificate request	Generates and displays certificate requests for HTTPS.	Privileged EXEC
crypto certificate import	Imports a certificate signed by Certification Authority for HTTPS.	Global Configuration
ip https certificate	Configures the active certificate for HTTPS.	Global Configuration
show crypto certificate mycertificate	Displays the SSH certificates of the device.	Privileged EXEC
show ip http	Displays the HTTP server configuration.	Privileged EXEC
show ip https	Displays the HTTPS server configuration.	Privileged EXEC

802.1x Commands

Command	Description	Access Mode
aaa authentication dot1x	Specifies one or more authentication, authorization, and accounting (AAA) methods for use on interfaces running IEEE 802.1x.	Global Configuration
dot1x system-auth-control	Enables 802.1x globally.	Global Configuration
dot1x port-control	Enables manual control of the authorization state of the port	Interface Configuration
dot1x re-authentication	Enables periodic re-authentication of the client.	Interface Configuration
dot1x timeout re-authperiod	Sets the number of seconds between re-authentication attempts.	Interface Configuration
dot1x re-authentication	Manually initiates a re-authentication of all 802.1x-enabled ports or the specified 802.1x-enabled port.	Interface Configuration
dot1x timeout quiet-period	Sets the number of seconds that the device remains in the quiet state following a failed authentication exchange.	Interface Configuration
dot1x timeout tx-period	Sets the number of seconds that the device waits for a response to an Extensible Authentication Protocol (EAP) - request/identity frame from the client, before resending the request.	Interface Configuration
dot1x max-req	Sets the maximum number of times that the device sends an EAP - request/identity frame to the client, before restarting the authentication process.	Interface Configuration
dot1x timeout supp-timeout	Sets the time for the retransmission of an Extensible Authentication Protocol (EAP)-request frame to the client.	Interface Configuration
dot1x timeout server-timeout	Sets the time for the retransmission of packets to the authentication server.	Interface Configuration
show dot1x	Allows multiple hosts on an 802.1x-authorized port that has the **dot1x port-control** interface configuration command set to **auto**.	Privileged EXEC
show dot1x users	Displays active 802.1x authenticated users.	Privileged EXEC
show dot1x statistics	Displays 802.1x statistics for the specified interface.	Privileged EXEC
dot1x auth-not-req	Enables unauthorized users access to that VLAN.	Interface (VLAN) Configuration

dot1x multiple-hosts	Allows multiple hosts (clients) on an 802.1x-authorized port that has the **dot1x port-control** Interface Configuration mode command set to **auto**.	Interface Configuration
dot1x single-host-violation	Configures the action to be taken, when a station whose MAC address is not the supplicant MAC address, attempts to access the interface.	Interface Configuration
dot1x guest-vlan	Defines a guest VLAN.	Interface Configuration
dot1x guest-vlan enable	Enables unauthorized users on the interface to access the guest VLAN.	Interface Configuration
dot1x mac-authentication	Enables authentication based on the station's MAC address.	Interface Configuration
dot1x traps mac-authentication failure	Enables sending traps when a MAC address was failed in authentication of the 802.1X MAC authentication access control.	Global Configuration
dot1x radius-attributes vlan	Enables user-based VLAN assignment.	Interface Configuration
show dot1x advanced	Displays 802.1x advanced features for the device or for the specified interface.	Privileged EXEC

Command Modes

GC (Global Configuration) Mode

Command Group	Description
aaa authentication dot1x	Specifies one or more authentication, authorization, and accounting (AAA) methods for use on interfaces running IEEE 802.1x.
aaa authentication enable	Defines authentication method lists for accessing higher privilege levels.
aaa authentication login	Defines login authentication.
aaa logging	Enables logging AAA login events.
aaa login-history file	Enables writing to the login history file.
arp	Adds a permanent entry in the ARP cache.
arp timeout	Configures how long an entry remains in the ARP cache.
asset-tag	Specifies the device asset-tag.
bridge aging-time	Sets the Address Table aging time.
bridge multicast filtering	Enables filtering of Multicast addresses.
clock source	Configures an external time source for the system clock.
clock summer-time	Configures the system to automatically switch to summer time (daylight saving time).
clock timezone	Sets the time zone for display purposes
crypto certificate generate	Generates a self-signed HTTPS certificate.
crypto certificate import	Imports a certificate signed by Certification Authority for HTTPS.
crypto certificate request	Generates and displays certificate requests for HTTPS.
crypto key generate dsa	Generates DSA key pairs.
crypto key generate rsa	Generates RSA key pairs.
crypto key pubkey-chain ssh	Enters SSH Public Key-chain configuration mode.
dot1x system-auth-control	Enables 802.1x globally.
dot1x traps mac-authentication failure	Enables sending traps when a MAC address was failed in authentication of the 802.1X MAC authentication access control.

enable password	Sets a local password to control access to normal and privilege levels.
end	Ends the current configuration session and returns to the previous command mode.
file-system logging	Enables logging file system events.
gvrp enable (Global)	Enables GVRP globally.
hostname	Specifies or modifies the device host name.
interface ethernet	Enters the interface configuration mode to configure an Ethernet type interface.
interface port-channel	Enters the interface configuration mode of a specific port-channel.
interface range ethernet	Enters the interface configuration mode to configure multiple ethernet type interfaces.
interface range port-channel	Enters the interface configuration mode to configure multiple port-channels.
interface range vlan	Enters the interface configuration mode to configure multiple VLANs.
interface vlan	Enters the interface configuration (VLAN) mode.
ip access-list	Creates Layer 2 ACLs.
ip access-list	Creates Layer 2 ACLs.
ip address	Sets an IP address.
ip default-gateway	Defines a default gateway.
ip dhcp snooping	Globally enables DHCP snooping.
ip dhcp snooping database	Configures the DHCP snooping binding file.
ip dhcp snooping database update-freq	Configures the update frequency of the DHCP snooping binding file.
ip dhcp snooping information option allowed-untrusted	Configures a switch to accept DHCP packets with option-82 information from an untrusted port.
ip dhcp snooping trust	Configures a port as trusted for DHCP snooping purposes.
ip dhcp snooping verify	Configures a switch to accept DHCP packets with option-82 information from an untrusted port.
ip dhcp snooping vlan	Enables DHCP snooping on a VLAN.
ip domain-lookup	Enables the IP Domain Naming System (DNS)-based host name-to-address translation.
ip domain-name	Defines a default domain name, that the software uses to complete unqualified host names.
ip host	Defines static host name-to-address mapping in the host cache.
ip http authentication	Specifies authentication methods for HTTP server users.

ip http exec-timeout	Enables the device to be configured from a secured browser.
ip http port	Specifies the TCP port for use by a web browser to configure the device.
ip http server	Enables the device to be configured from a browser.
ip https authentication	Specifies authentication methods for HTTPS server users.
ip https certificate	Configures the active certificate for HTTPS.
ip https exec-timeout	Sets the interval the system waits for user input before automatically logging off.
ip https port	Configures a TCP port for use by a secure web browser to configure the device.
ip https server	Enables configuring the device from a secured browser.
ip igmp snooping (Global)	Enables Internet Group Management Protocol (IGMP) snooping.
ip name-server	Sets the available name servers.
ip ssh port	Specifies the port to be used by the SSH server.
ip ssh pubkey-auth	Enables public key authentication for incoming SSH sessions.
ip ssh server	Enables the device to be configured from a SSH server.
lacp system-priority	Configures the system LACP priority.
line	Identifies a specific line for configuration and enters the line configuration command mode.
logging	Logs messages to a syslog server.
logging buffered	Limits syslog messages displayed from an internal buffer based on severity.
logging buffered size	Changes the number of syslog messages stored in the internal buffer.
logging console	Limits messages logged to the console based on severity.
logging file	Limits syslog messages sent to the logging file based on severity.
logging on	Controls error messages logging.
mac access-list	Creates Layer 2 ACLs.
management access-class	Defines which management access-list is used.
management access-list	Defines a management access-list, and enters the access-list for configuration.
management logging	Enables logging management access list events.
password min-length	Sets the minimum required length for passwords in the local database.
password-aging	Sets the expiration time for passwords in the local database.

passwords history	Sets the number of required password changes before a password in the local database can be reused.
passwords history hold-time	Sets the number of days a password is relevant for tracking its password history.
passwords lockout	Sets the number of failed login attempts before a user account is locked.
power inline traps enable	Adds a description of the powered device type attached to the interface.
power inline usage-threshold	Configures the administrative mode of the inline power on an interface.
priority-queue out num-of-queues	Enables the egress queues to be SP queues.
qos	Enables Quality of Service (QoS) on the device and enters QoS basic or advance mode.
qos map dscp-queue	Modifies the DSCP to CoS map.
qos trust (Global)	Configure the system to "trust" state.
radius-server deadtime	Improves RADIUS response times when servers are unavailable.
radius-server host	Specifies a RADIUS server host.
radius-server key	Sets the authentication and encryption key for all RADIUS communications between the device and the RADIUS daemon.
radius-server retransmit	Specifies the number of times the software searches the list of RADIUS server hosts.
radius-server source-ip	Specifies the source IP address used for communication with RADIUS servers.
radius-server source-ipv6	Specifies the source IPv6 address used for the IPv6 communication with RADIUS servers.
radius-server timeout	Sets the interval for which a device waits for a server host to reply.
rmon alarm	Configures alarm conditions.
rmon event	Configures a RMON event.
rmon table-size	Configures the maximum RMON tables sizes.
rmon table-size	Configures the maximum RMON tables sizes.
show cpu utilization	Enables measuring CPU utilization.
show users	Changes the unit ID of a specific unit.
snmp-server community	Sets up the community access string to permit access to SNMP protocol.
snmp-server contact	Sets up a system contact.
snmp-server enable traps	Enables the device to send SNMP traps or SNMP notifications.
snmp-server engineID local	Specifies an SNMP EngineID on the local device.

snmp-server filter	Creates and modifies filter entries.
snmp-server group	Configures a new SNMP group or a table that maps SNMP users to SNMP views.
snmp-server host	Specifies the recipient of Simple Network Management Protocol notification operation.
snmp-server location	Sets up the information on where the device is located.
snmp-server set	Sets SNMP MIB value by the CLI.
snmp-server trap authentication	Enables the device to send Simple Network Management Protocol traps when authentication failed.
snmp-server user	Configures a new SNMP v3 user.
snmp-server v3-host	Specifies an SNMP v3 notification recipient.
snmp-server view	Creates and modifies view entries.
sntp anycast client enable	Enables Anycast clients.
sntp authenticate	Grants authentication for received Simple Network Time Protocol (SNTP) traffic from servers.
sntp authentication-key	Defines an authentication key for Simple Network Time Protocol (SNTP).
sntp broadcast client enable	Enables the Simple Network Time Protocol (SNTP) Broadcast clients.
sntp client enable	Enables the Simple Network Time Protocol (SNTP) Broadcast and Anycast client on an interface.
sntp client poll timer	Sets the polling time for the Simple Network Time Protocol (SNTP) client.
sntp server	Configures the device to use the Simple Network Time Protocol (SNTP) to request and accept Simple Network Time Protocol (SNTP) traffic from a server.
sntp trusted-key	Authenticates the identity of a system to which Simple Network Time Protocol (SNTP) will synchronize.
sntp unicast client enable	Enables the device to use the Simple Network Time Protocol (SNTP) to request and accept Simple Network Time Protocol (SNTP) traffic from servers.
sntp unicast client poll	Enables polling for the Simple Network Time Protocol (SNTP) predefined Unicast clients.
spanning-tree	Enables Spanning Tree functionality.
spanning-tree bpdu	Defines BPDU handling when Spanning Tree is disabled on an interface.
spanning-tree forward-time	Configures the Spanning Tree bridge forward time.
spanning-tree hello-time	Configures the Spanning Tree bridge Hello Time.

spanning-tree max-age	Configures the Spanning Tree bridge maximum age.
spanning-tree mode	Configures the Spanning Tree protocol.
spanning-tree mst configuration	Enables configuring an MST region by entering the Multiple Spanning Tree (MST) mode.
spanning-tree mst max-hops	Configures the number of hops in an MST region before the BDPU is discarded and the port information is aged out.
spanning-tree mst priority	Configures the device priority for the specified spanning-tree instance.
spanning-tree pathcost method	Sets the default pathcost method.
spanning-tree priority	Configures the Spanning Tree priority.
stack master	Forces selection of a stack master.
tacacs-server host	Specifies a TACACS+ host.
tacacs-server key	Sets the authentication encryption key used for all TACACS+ communications between the device and the TACACS+ daemon.
tacacs-server source-ip	Specifies the source IP address that will be used for the communication with TACACS+ servers.
tacacs-server timeout	Sets the timeout value.
username	Establishes a username-based authentication system.
vlan database	Enters the VLAN database configuration mode.
wrr-queue cos-map	Maps CoS values to a specific egress queue.

IC (Interface Configuration) Mode

Command Group	Description
back-pressure	Enables Back Pressure on a given interface.
bridge multicast forbidden forward-all	Forbids a port from becoming a forward-all Multicast port.
bridge multicast forward-all	Enables forwarding all Multicast frames on a port.
bridge multicast unregistered	Configures the forwarding state of unregistered multicast addresses.
channel-group	Associates a port with a Port-channel.
description	Adds a description to an interface.
dot1x guest-vlan	Defines a guest VLAN.
dot1x guest-vlan enable	Enables unauthorized users on the interface to access the guest VLAN.
dot1x mac-authentication	Enables authentication based on the station's MAC address.
dot1x max-req	Sets the maximum number of times that the device sends an EAP - request/identity frame to the client, before restarting the authentication process.
dot1x multiple-hosts	Allows multiple hosts (clients) on an 802.1x-authorized port, that has the **dot1x port-control** Interface Configuration mode command set to **auto**.
dot1x port-control	Enables manual control of the authorization state of the port
dot1x radius-attributes vlan	Enables user-based VLAN assignment.
dot1x re-authentication	Enables periodic re-authentication of the client.
dot1x single-host-violation	Configures the action to be taken, when a station whose MAC address is not the supplicant MAC address, attempts to access the interface.
dot1x timeout quiet-period	Sets the number of seconds that the device remains in the quiet state following a failed authentication exchange.
dot1x timeout re-authperiod	Sets the number of seconds between re-authentication attempts.
dot1x timeout server-timeout	Sets the time for the retransmission of packets to the authentication server.
dot1x timeout supp-timeout	Sets the time for the retransmission of an EAP-request frame to the client.
dot1x timeout tx-period	Sets the number of seconds that the device waits for a response to an Extensible Authentication Protocol (EAP) - request/identity frame, from the client, before resending the request.
duplex	Configures the full/half duplex operation of a given ethernet interface when not using auto-negotiation.
flowcontrol	Configures the Flow Control on a given interface.

garp timer	Adjusts the GARP application join, leave, and leaveall GARP timer values.
gvrp enable (Interface)	Enables GVRP on an interface.
gvrp registration-forbid	De-registers all VLANs, and prevents dynamic VLAN registration on the port.
gvrp vlan-creation-forbid	Enables or disables dynamic VLAN creation.
ip address	Sets an IP address.
ip address dhcp	Acquires an IP address on an interface from the DHCP server.
ip internal-usage-vlan	Reserves a VLAN as the internal usage VLAN of an interface.
ipv6 default-gateway	Defines an IPv6 default gateway.
ipv6 mld join-group	Configures Multicast Listener Discovery (MLD) reporting for a specified group.
ipv6 mld version	Changes the Multicast Listener Discovery Protocol (MLD) version.
lacp port-priority	Configures the priority value for physical ports.
lacp timeout	Assigns an administrative LACP timeout.
mdix	Enables automatic crossover on a given interface.
name	Configures a name to a VLAN.
negotiation	Enables auto-negotiation operation for the speed and duplex parameters of a given interface.
port monitor	Starts a port monitoring session.
port security	Disables new address learning/forwarding on an interface.
port security max	Configures the maximum number of addresses that may be learned on the port while the port is in port security mode.
port security mode	Configures the port security learning mode.
port security routed secure-address	Adds MAC-layer secure addresses to a routed port.
port storm-control broadcast enable	Enables Broadcast storm control.
port storm-control broadcast rate	Configures the maximum Broadcast rate.
port storm-control include-multicast	Enables the device to count Multicast packets.
power inline	Configures the administrative mode of the inline power on an interface.
power inline powered-device	Adds a description of the powered device type attached to the interface.
power inline priority	Displays port monitoring status

qos cos	Configures the default port CoS value.
qos cos	Configures the default port CoS value.
qos cos	Enables each port trust state.
qos cos	Enables each port trust state while the system is in basic mode.
rate-limit (Ethernet)	Limits the rate of the incoming traffic.
rmon collection history	Enables a Remote Monitoring (RMON) MIB history statistics group on an interface.
rmon collection history	Enables a Remote Monitoring (RMON) MIB history statistics group on an interface.
service-acl	Sets the default ace action to permit or deny.
show ports monitor	Transmits tagged ingress mirrored packets.
shutdown	Disables interfaces.
sntp client enable (Interface)	Enables the Simple Network Time Protocol (SNTP) client on an interface.
clear spanning-tree detected-protocols	Shutsdown an interface when it receives a bridge protocol data unit (BPDU).
spanning-tree cost	Configures the Spanning Tree path cost for a port.
spanning-tree disable	Disables Spanning Tree on a specific port.
spanning-tree guard root	Enables root guard on all the Spanning Tree instances in the interface.
spanning-tree link-type	Overrides the default link-type setting.
spanning-tree mst cost	Configures the path cost for multiple Spanning Tree (MST) calculations.
spanning-tree mst port-priority	Configures the priority of a port.
spanning-tree portfast	Enables PortFast mode.
spanning-tree port-priority	Configures port priority.
speed	Configures the speed of a given Ethernet interface when not using auto-negotiation.
switchport access vlan	Configures the VLAN ID when the interface is in access mode.
switchport access vlan	Defines the primary PVLAN.
switchport customer vlan	Set the port’s VLAN when the interface is in customer mode.
switchport forbidden vlan	Forbids adding specific VLANs to a port.
switchport general acceptable-frame-type tagged-only	Discards untagged frames at ingress.
switchport general allowed vlan	Adds or removes VLANs from a general port.

switchport general ingress-filtering disable	Disables port ingress filtering.
switchport general map protocols-group vlan	Sets a protocol-based classification rule.
switchport general pvid	Configures the PVID when the interface is in general mode.
switchport mode	Configures the VLAN membership mode of a port
switchport protected	Overrides the FDB (Forwarding Database) decision, and sends all the Unicast, Multicast and Broadcast traffic to an uplink port.
switchport trunk allowed vlan	Adds or removes VLANs from a port in general mode.
switchport trunk native vlan	Defines the port as a member of the specified VLAN, and the VLAN ID is the "port default VLAN ID (PVID)".
traffic-shape	Sets the shaper on an egress port.

LC (Line Configuration) Mode

Command Group	Description
autobaud	Configures the line for automatic baud rate detection (autobaud)
enable authentication	Specifies the authentication method list when accessing a higher privilege level from a remote telnet or console.
exec-timeout	Configures the interval that the system waits until user input is detected.
history	Enables the command history function.
history size	Configures the command history buffer size for a particular line.
login authentication	Specifies the login authentication method list for a remote telnet or console.
password	Specifies a password on a line.
password-aging	Sets the expiration time of line passwords in the local database.
speed	Configures the baud rate of the line.

MA (Management Access-level) Mode

Command Group	Description
deny (Management)	Defines a deny rule.
permit (Management)	Defines a permit rule.

MC (MST Configuration) Mode

Command Group	Description
abort (mst)	Exits the MST region configuration mode without applying configuration changes.
exit (mst)	Exits the MST region configuration mode and applies all configuration changes.
instance (mst)	Maps VLANs to the MST instance.
name (mst)	Defines the configuration name.
revision (mst)	Defines the configuration revision number.
show (mst)	Displays the current or pending MST region configuration.

ML (MAC Access-List) Mode

Command Group	Description
permit (MAC)	Denies traffic if the conditions defined in the permit statement match.

PE (Privileged EXEC) Mode

Command Group	Description
boot system	Specifies the system image that the device loads at startup.
clear arp-cache	Deletes all dynamic entries from the ARP cache.
clear bridge	Removes any learned entries from the forwarding database.
clear counters	Clears statistics on an interface.
clear gvrp statistics	Clears all the GVRP statistics information.
clear host	Deletes entries from the host name-to-address cache.
clear host dhcp	Deletes entries from the host name-to-address mapping received from Dynamic Host Configuration Protocol (DHCP).
clear ip dhcp snooping database	Clears the DHCP snooping binding database.
clear logging	Clears messages from the internal logging buffer.
clear logging file	Clears messages from the logging file.
clear spanning-tree detected-protocols	Restarts the protocol migration process on all interfaces or on the specified interface.
clock set	Manually sets the system clock.
configure	Enters the Global Configuration mode.

copy	Copies files from a source to a destination.
crypto certificate request	Generates and displays certificate requests for HTTPS.
delete	Deletes a file from a Flash memory device.
delete startup-config	Deletes the startup-config file.
dir	Displays a list of files on a flash file system.
disable	Returns to User EXEC mode.
dot1x re-authentication	Manually initiates a re-authentication of all 802.1x-enabled ports or the specified 802.1x-enabled port.
exit	Closes an active terminal session by logging off the device.
ip dhcp snooping binding	Configures the update frequency of the DHCP snooping binding file.
login	Changes a login username.
more	Displays a file.
reload	Reloads the operating system.
rename	Renames a file.
set enable-password active	Reactivates a locked local password.
set interface active	Reactivates an interface that was suspended by the system.
set line active	Reactivates a locked line.
set username active	Reactivates a locked user account.
show access-lists	Displays ACLs defined on the device.
show arp	Displays entries in the ARP table.
show authentication methods	Displays information about the authentication methods.
show bootvar	Displays the active system image file that the device loads at startup
show bridge address-table	Displays all entries in the bridge-forwarding database.
show bridge address-table count	Displays the number of addresses present in all VLANs or at specific VLAN.
show bridge address-table static	Displays statically created entries in the bridge-forwarding database.
show bridge multicast address-table	Displays Multicast MAC or IP Address Table information.
show bridge multicast address-table static	Displays the statically configured multicast addresses.
show bridge multicast filtering	Displays the Multicast filtering configuration.
show cpu utilization	Enables measuring CPU utilization.
show cpu utilization	Displays information about the CPU utilization of active processes.

show crypto certificate mycertificate	Displays the SSH certificates of the device.
show crypto key mypubkey	Displays the SSH public keys stored on the device.
show crypto key pubkey-chain ssh	Displays SSH public keys stored on the device.
show dot1x	Displays 802.1x status for the device or for the specified interface.
show dot1x advanced	Displays 802.1x enhanced features for the device or for the specified interface.
show dot1x statistics	Displays 802.1x statistics for the specified interface.
show dot1x users	Displays 802.1x users for the device.
show history	Lists the commands entered in the current session.
show hosts	Displays the default domain name, a list of name server hosts, the static and the cached list of host names and addresses.
show interfaces access-lists	Displays access lists applied on interfaces.
show interfaces advertise	Displays auto negotiation advertisement data.
show interfaces configuration	Displays the configuration for all interfaces.
show interfaces counters	Displays traffic seen by the physical interface.
show interfaces description	Displays the description for all interfaces.
show interfaces port-channel	Displays Port-channel information.
show interfaces status	Displays the status for all interfaces.
show interfaces switchport	Displays switchport configuration.
show ip http	Displays the HTTP server configuration.
show ip https	Displays the HTTPS server configuration.
show ip interface	Displays the usability status of interfaces configured for IP.
show ip ssh	Displays the SSH server configuration.
show logging	Displays the state of logging and the syslog messages stored in the internal buffer.
show logging file	Displays the state of logging and the syslog messages stored in the logging file.
show management access-class	Displays the active management access-list.
show management access-list	Displays management access-lists.
show passwords configuration	Displays information about password management.
show ports security	Displays the port-lock status.

show ports security addresses	Displays current dynamic addresses in locked ports.
show ports storm-control	Displays the storm control configuration.
show radius-servers	Displays the RADIUS server settings.
show running-config	Displays the contents of the currently running configuration file.
show snmp	Displays the SNMP status.
show snmp engineid	Displays the local SNMP EngineID.
show snmp filters	Displays the configuration of SNMP filters.
show snmp groups	Displays the configuration of SNMP groups.
show snmp users	Displays the configuration of SNMP users.
show snmp views	Displays the configuration of SNMP views.
show sntp configuration	Shows the configuration of the Simple Network Time Protocol (SNTP).
show sntp status	Shows the status of the Simple Network Time Protocol (SNTP).
show spanning-tree	Displays Spanning Tree configuration.
show startup-config	Displays the startup configuration file contents.
show syslog-servers	Displays the syslog servers settings.
show tacacs	Displays configuration and statistics for a TACACS+ servers.
show users accounts	Displays information about the local user database.
show users login-history	Displays information about the login history of users.
show vlan	Displays VLAN information.
show vlan internal usage	Displays a list of VLANs used internally by the device.
show vlan	Displays the MAC-to-VLAN database.
show vlan protocols-groups	Displays protocols-groups information.
stack reload	Reloads stack members.
test copper-port tdr	Diagnoses with TDR (Time Domain Reflectometry) technology the quality and characteristics of a copper cable attached to a port.

SP (SSH Public Key) Mode

Command Group	Description
key-string	Manually specifies a SSH public key.
user-key	Specifies which SSH public key is manually configured and enters the SSH public key-string configuration command.

UE (User EXEC) Mode

Command Group	Description
enable	Enters the Privileged EXEC mode.
exit	Closes an active terminal session by logging off the device.
login	Changes a login username.
ping	Sends ICMP echo request packets to another node on the network.
resume	Switches to another open Telnet session.
show clock	Displays the time and date from the system clock.
show copper-ports cable-length	Displays the estimated copper cable length attached to a port.
show copper-ports tdr	Displays the last TDR (Time Domain Reflectometry) tests on specified ports.
show gvrp configuration	Displays GVRP configuration information.
show gvrp error-statistics	Displays GVRP error statistics.
show gvrp statistics	Displays GVRP statistics.
show history	Lists the commands entered in the current session.
show ip dhcp snooping	Displays the DHCP snooping configuration.
show ip dhcp snooping binding	Displays the DHCP snooping binding database and configuration information for all interfaces on a switch.
show ip igmp snooping groups	Displays Multicast groups learned by IGMP snooping.
show ip igmp snooping interface	Displays IGMP snooping configuration.
show ip igmp snooping mrouter	Enables automatic learning of Multicast switch ports in the context of a specific VLAN.
show ip igmp snooping mrouter	Displays information on dynamically learned Multicast router interfaces.
show lacp ethernet	Displays LACP information for Ethernet ports.
show lacp port-channel	Displays LACP information for a port-channel.
show line	Displays line parameters.
show ports monitor	Displays port monitoring status
show power inline	Displays information about inline power.
show privilege	Displays the current privilege level.
show qos	Displays the QoS status.

show qos interface	Displays interface QoS information.
show qos map	Displays all the maps for QoS.
show rmon alarm	Displays alarm configurations.
show rmon alarm-table	Displays the alarms table.
show rmon collection history	Displays the requested history group configuration.
show rmon events	Displays the RMON event table.
show rmon history	Displays RMON Ethernet Statistics history.
show rmon log	Displays the RMON logging table.
show rmon statistics	Displays RMON Ethernet Statistics.
show sessions	Lists the open Telnet sessions.
show stack	Displays information about stack status.
show system	Displays system information.
show system id	Displays the service id information.
show users	Displays information about the active users.
show version	Displays the system version information.
telnet	Sends ICMP echo request packets to another node on the network.
terminal datadump	Enables dumping all output of a show command without prompting.
terminal history	Enables the command history function for the current terminal session.
terminal history size	Configures the command history buffer size for the current terminal session.
traceroute	Discovers the routes that packets will actually take when traveling to their destination.
traffic-shape	Assigns CoS values to select one of the egress queues.

VC (VLAN Configuration) Mode

Command Group	Description
bridge address	Adds a static MAC-layer station source address to the bridge table.
bridge multicast address	Registers MAC-layer Multicast addresses to the bridge table, and adds static ports to the group.
bridge multicast forbidden address	Forbids adding a specific Multicast address to specific ports.
bridge multicast forbidden forward-all	Forbids a port from becoming a forward-all Multicast port.
bridge multicast forward-all	Enables forwarding of all Multicast frames on a port.
dot1x auth-not-req	Enables unauthorized users access to that VLAN.
ip igmp snooping (Interface)	Enables Internet Group Management Protocol (IGMP) snooping on a specific VLAN.
ip igmp snooping host-time-out	Configures the host-time-out.
ip igmp snooping leave-time-out	Configures the leave-time-out.
ip igmp snooping mrouter	Enables automatic learning of Multicast router ports.
ip igmp snooping mrouter-time-out	Configures the mrouter-time-out.
ip igmp snooping querier address	Defines the source IP address that the IGMP Snooping querier uses.
ip igmp snooping querier enable	Enables Internet Group Management Protocol (IGMP) querier on a specific VLAN.
ip internal-usage-vlan	Reserves a VLAN as the internal usage VLAN of an interface.
mac-to-vlan	Adds MAC addresses to the MAC-to-VLAN database.
name	Configures a name to a VLAN.
vlan	Creates a VLAN.

IPAL (IP-Access List Configuration) Mode

Command Group	Description
deny (IP)	Denies traffic if the conditions defined in the deny statement match.
permit (IP)	Permits traffic if the conditions defined in the permit statement match.

MAL (MAC-Access List Configuration) Mode

Command Group	Description
deny (MAC)	Denies traffic if the conditions defined in the deny statement match.
permit (MAC)	Set permit conditions for a MAC access list.

4

AAA Commands

aaa authentication login

The **aaa authentication login** Global Configuration mode command defines login authentication. Use the **no** form of this command to return to the default configuration.

Syntax

- **aaa authentication login** {**default** | *list-name*} *method1* [*method2*...]
- **no aaa authentication login** {**default** | *list-name*}
  - **default** — Uses the listed authentication methods that follow this argument as the default list of methods when a user logs in.
  - *list-name* — Character string used to name the list of authentication methods activated when a user logs in. (Range: 1 - 12 characters)
  - *method1* [*method2*...] — Specify at least one from the following table:

Keyword	Description
enable	Uses the enable password for authentication.
line	Uses the line password for authentication.
local	Uses the local username database for authentication.
none	Uses no authentication.
radius	Uses the list of all RADIUS servers for authentication.
tacacs	Uses the list of all TACACS+ servers for authentication.

Default Configuration

The local user database is checked. This has the same effect as the command **aaa authentication login default local**.

NOTE: On the console, login succeeds without any authentication check if the authentication method is not defined.

Command Mode

Global Configuration mode.

User Guidelines

- The default and optional list names created with the **aaa authentication login** command are used with the **login authentication** command.
- Create a list by entering the **aaa authentication login** *list-name method* command for a particular protocol, where *list-name* is any character string used to name this list. The *method* argument identifies the list of methods that the authentication algorithm tries, in the given sequence.
- The additional methods of authentication are used only if the previous method returns an error, not if it fails. To ensure that the authentication succeeds even if all methods return an error, specify **none** as the final method in the command line.

Example

The following example configures the authentication login, so that user authentication is performed as follows: Authentication is attempted at the RADIUS server. If the RADIUS server is not available, authentication is attempted at the local user database. If there is no database, then no authentication is performed.

```
Console(config)# aaa authentication login radius local none
```

aaa authentication enable

The **aaa authentication enable** Global Configuration mode command defines authentication method lists for accessing higher privilege levels. Use the **no** form of this command to return to the default configuration.

Syntax

- **aaa authentication enable** {**default** | *list-name*} *method1* [*method2...*]
- **no aaa authentication enable** {**default** | *list-name*}
  - **default** — Uses the listed authentication methods that follow this argument as the default list of methods, when using higher privilege levels.
  - *list-name* — Character string used to name the list of authentication methods activated, when using access higher privilege levels. (Range: 1 - 12 characters)
  - *method1* [*method2...*] — Specify at least one from the following table:

Keyword	Description
enable	Uses the enable password for authentication.
line	Uses the line password for authentication.
none	Uses no authentication.

radius	Uses the list of all RADIUS servers for authentication. Uses username $enabx$., where x is the privilege level.
tacacs	Uses the list of all TACACS+ servers for authentication. Uses username "$enabx$." where x is the privilege level.

Default Configuration

If the **default** list is not set, only the enable password is checked. This has the same effect as the command **aaa authentication enable default enable**.

On the console, the enable password is used if it exists. If no password is set, the process still succeeds. This has the same effect as using the command **aaa authentication enable default enable none**.

Command Mode

Global Configuration mode.

User Guidelines

- The default and optional list names created with the **aaa authentication enable** command are used with the **enable authentication** command.
- The additional methods of authentication are used only if the previous method returns an error, not if it fails. To ensure that the authentication succeeds even if all methods return an error, specify **none** as the final method in the command line.
- All **aaa authentication enable default** requests sent by the device to a RADIUS or TACACS+ server include the username $enabx$., where x is the requested privilege level.

Example

The following example sets the enable password for authentication when accessing higher privilege levels.

```
Console(config)# aaa authentication enable default enable
```

login authentication

The **login authentication** Line Configuration mode command specifies the login authentication method list for a remote telnet or console. Use the **no** form of this command to return to the default configuration specified by the **aaa authentication login** command.

Syntax

- **login authentication** {**default** | *list-name*}
- **no login authentication**
  - **default** — Uses the default list created with the **aaa authentication login** command.
  - *list-name* — Uses the indicated list created with the **aaa authentication login** command.

Default Configuration

Uses the default set with the command **aaa authentication login**.

Command Mode

Line Configuration mode.

User Guidelines

- Changing login authentication from default to another value may disconnect the telnet session.

Example

The following example specifies the default authentication method for a console.

```
Console(config)# line console
Console(config-line)# login authentication default
```

enable authentication

The **enable authentication** Line Configuration mode command specifies the authentication method list when accessing a higher privilege level from a remote telnet or console. Use the **no** form of this command to return to the default configuration specified by the **aaa authentication enable** command.

Syntax

- **enable authentication** {**default** | *list-name*}
- **no enable authentication**
  - **default** — Uses the default list created with the **aaa authentication enable** command.
  - *list-name* — Uses the indicated list created with the **aaa authentication enable** command.

Default Configuration

Uses the default set with the **aaa authentication enable** command.

Command Mode

Line Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example specifies the default authentication method when accessing a higher privilege level from a console.

```
Console(config)# line console
Console(config-line)# enable authentication default
```

ip http authentication

The **ip http authentication** Global Configuration mode command specifies authentication methods for HTTP server users. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip http authentication** *method1* [*method2*...]
- **no ip http authentication**
  - *method1* [*method2*...] — Specify at least one from the following table:

Keyword	Description
local	Uses the local username database for authentication.
none	Uses no authentication.
radius	Uses the list of all RADIUS servers for authentication.
tacacs	Uses the list of all TACACS+ servers for authentication.

Default Configuration

The local user database is checked. This has the same effect as the command **ip http authentication local**.

Command Mode

Global Configuration mode.

User Guidelines

- The additional methods of authentication are used only if the previous method returns an error, not if it fails. To ensure that the authentication succeeds even if all methods return an error, specify **none** as the final method in the command line.

Example

The following example configures the HTTP authentication.

```
Console(config)# ip http authentication radius local
```

ip https authentication

The **ip https authentication** Global Configuration mode command specifies authentication methods for HTTPS server users. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip https authentication** *method1* [*method2*...]
- **no ip https authentication**
  - *method1* [*method2*...] — Specify at least one from the following table:

Keyword	Source or destination
local	Uses the local username database for authentication.
none	Uses no authentication.
radius	Uses the list of all RADIUS servers for authentication.
tacacs	Uses the list of all TACACS+ servers for authentication.

Default Configuration

The local user database is checked. This has the same effect as the command **ip https authentication local**.

Command Mode

Global Configuration mode.

User Guidelines

- The additional methods of authentication are used only if the previous method returns an error, not if it fails. To ensure that the authentication succeeds even if all methods return an error, specify **none** as the final method in the command line.

Example

The following example configures HTTPS authentication.

```
Console(config)# ip https authentication radius local
```

show authentication methods

The **show authentication methods** Privileged EXEC mode command displays information about the authentication methods.

Syntax

- **show authentication methods**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the authentication configuration.

```
Console# sh authentication methods
Login Authentication Method Lists
---------------------------------
Console_Default: None
Network_Default: Local

Enable Authentication Method Lists
----------------------------------
Console_Default: Enable, None
Network_Default: Enable
```

```
Line                    Login Method List       Enable Method List
--------------          -----------------       ------------------
Console                 Default                 Default
Telnet                  Default                 Default
SSH                     Default                 Default

http                    : Local
https                   : Local
dot1x                   :
console#
```

password

The **password** Line Configuration mode command specifies a password on a line. Use the **no** form of this command to remove the password.

Syntax

- **password** *password* [**encrypted**]
- **no password**
  - *password* — Password for this level. (Range: 1 - 159 characters)
  - **encrypted** — Encrypted password to be entered, copied from another device configuration.

Default Configuration

No password is defined.

Command Mode

Line Configuration mode.

User Guidelines

If a password is defined as encrypted, the required password length is 32 characters.

Example

The following example specifies password **secret** on a console.

```
Console(config)# line console
Console(config-line)# password secret
```

enable password

The **enable password** Global Configuration mode command sets a local password to control access to user and privilege levels. Use the **no** form of this command to remove the password requirement.

Syntax

- **enable password** [**level** *level*] *password* [**encrypted**]
- **no enable password** [**level** *level*]
  - *password* — Password for this level. (Range: 8 - 64 characters)
  - *level* — Level for which the password applies. If not specified the level is 15. (Range: 1 or 15)
  - **encrypted** — Encrypted password entered, copied from another device configuration.

Default Configuration

No enable password is defined.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example sets local level 15 password **secret** to control access to privilege levels.

```
Console(config)# enable password level 15 secret
```

username

The **username** Global Configuration mode command creates a user account in the local database. Use the **no** form of this command to remove a user name.

Syntax

- **username** *name* [**password** *password*] [**level** *level*] [**encrypted**]
- **no username** *name*
  - *name* — The name of the user. (Range: 1 - 20 characters)
  - *password* — The authentication password for the user. (Range: 8 - 64 characters)
  - *level* — The user level. (Range: 1 or 15)
  - **encrypted** — Encrypted password entered, copied from another device configuration.

Default Configuration

No user is defined.

Command Mode

- Global Configuration mode

User Guidelines

- User account can be created without a password.

Example

The following example configures user **bob** with password **lee** and user level 15 to the system.

```
Console(config)# username bob password lee level 15
```

service password-recovery

Use the **service password-recovery** Global Configuration mode command to enable the password-recovery mechanism. This mechanism enables an end user, with physical access to the console port of the device, to enter the boot menu and trigger the password recovery process. Use the **no service password-recovery** command to disable the password-recovery mechanism. When the password-recovery mechanism is disabled, accessing the boot menu is still allowed and the user can trigger the password recovery process. The difference is, that in this case, all the configuration files and all the user files are removed.

Syntax

- **service password-recovery**
- **no service password-recovery**

Parameters

- N/A

Default Configuration

- The service password recovery is enabled by default.

Command Mode

- Global Configuration mode

User Guidelines

- If password recovery is enabled, the user can access the boot menu and trigger the password recovery in the boot menu. All configuration files and user files are kept.
- If password recovery is disabled, the user can access the boot menu and trigger the password recovery in the boot menu. The configuration files and user files are removed.

Example

The following command disables password recovery:

```
Console(config)# no service password recovery

Note that choosing to use Password recovery option in the Boot
Menu during the boot process will remove the configuration files
and the user files. Would you like to continue ? Y/N.
```

5

ACL Commands

ip access-list

The **ip access-list** global configuration mode command defines an IPv4 access list and places the device in IPv4 access list configuration mode. Use the no form of this command to remove the access list.

Syntax

- **ip access-list** *access-list-name*
- **no ip access-list** *access-list-name*
  - *access-list-name* — Specifies the name of the IPv4 access list.

Default Configuration

No IPv4 access list is defined.

Command Mode

Global Configuration mode.

User Guidelines

- IPv4 ACLs are defined by a unique name. An IPv4 ACL and MAC ACL cannot share the same name.

Example

The following example shows how to define an IPv4 access list called dell-access-1 and to place the device in IPv4 access list configuration mode.

```
Console(config)# ip access-list dell-access-1
Console(config-ip-al)#
```

permit (IP)

The **permit** IP-Access List Configuration mode command permits traffic if the conditions defined in the permit statement match.

Syntax

- **permit** {**any**| *protocol*} {**any**|{*source source-wildcard*}} {**any**|{*destination destination-wildcard*}} [**dscp** *number* | **ip-precedence** *number*]
- **permit-icmp** {**any**|{*source source-wildcard*}} {**any**|{*destination destination-wildcard*}} {**any**|*icmp-type*} {**any**|*icmp-code*} [**dscp** *number* | **ip-precedence** *number*]
- **permit-igmp** {**any**|{*source source-wildcard*}} {**any**|{*destination destination-wildcard*}} {**any**|*igmp-type*} [**dscp** *number* | **ip-precedence** *number*]
- **permit-tcp** {**any**|{ *source source-wildcard*}} {**any**|*source-port*} {**any**|{ **destination** *destination-wildcard*}} {**any**|*destination-port*} [**dscp** *number* | **ip-precedence** *number*] [**flags** *list-of-flags*] [**src-port-wildcard** *source-port-wildcard*] [**dst-port-wildcard** *source-port-wildcard*]
- **permit-udp** {**any**|{ *source source-wildcard*}} {**any**| *source-port*} {**any**|{*destination destination-wildcard*}} {**any**|*destination-port*} [**dscp** *number* | **ip-precedence** *number*] [**src-port-wildcard** *source-port-wildcard*] [**dst-port-wildcard** *source-port-wildcard*]
  - *source* — Specifies the source IP address of the packet.
  - *source-wildcard* — Specifies wildcard bits to be applied to the sources IP address by placing 1s in bit positions to be ignored.
  - *destination* — Specifies the destination IP address of the packet.
  - *destination- wildcard* — Specifies wildcard bits to be applied to the destination IP address by placing 1s in bit positions to be ignored.
  - *protocol* — Specifies the name or the number of an IP protocol. Available protocol names: **icmp, igmp, ip, tcp, egp, igp, udp, hmp, rdp, idpr, idrp, rsvp, gre, esp, ah, eigrp, ospf, ipip, pim, l2tp, isis**. (Range: 0 - 255)
  - **dscp** *number* — Specifies the DSCP value.
  - **ip-precedence** *number* — Specifies the IP precedence value.
  - *icmp-type* — Specifies an ICMP message type for filtering ICMP packets. Enter a number or one of the following values: **echo-reply, destination-unreachable, source-quench, redirect, alternate-host-address, echo-request, router-advertisement, router-solicitation, time-exceeded, parameter-problem, timestamp, timestamp-reply, information-request, information-reply, address-mask-request, address-mask-reply, traceroute, datagram-conversion-error, mobile-host-redirect, mobile-registration-request, mobile-registration-reply, domain-name-request, domain-name-reply, skip, photuris**. (Range: 0 - 255)
  - *icmp-code* — Specifies an ICMP message code for filtering ICMP packets. (Range: 0 - 255)

- *igmp-type* — Specifies IGMP packets filtered by IGMP message type. Enter a number or one of the following values: **host-query, host-report, dvmrp, pim, cisco-trace, host-report-v2, host-leave-v2, host-report-v3**. (Range: 0 - 255)
- *destination-port* — Specifies the UDP/TCP destination port. (Range: 1 - 65535)
- *destination-port-wildcard* — Specifies wildcard bits to be applied to the destination port by placing 1s in bit positions to be ignored.
- *source-port* — Specifies the UDP/TCP source port. (Range: 1 - 65535)
- *source-port-wildcard* —Specifies wildcard bits to be applied to the source port by placing 1s in bit positions to be ignored.
- **flags** *list-of-flags* — Specifies the list of TCP flags. If a flag is set, it is prefixed by "+". If a flag is not set, it is prefixed by "-". Available options are **+urg, +ack, +psh, +rst, +syn, +fin, -urg, -ack, -psh, -rst, -syn** and **-fin**. The flags are concatenated to a one string. For example: **+fin-ack**.

Default Configuration

No IPv4 ACL is defined.

Command Mode

IP-Access List Configuration mode.

User Guidelines

- Use the **ip access-list** Global Configuration mode command to enable the IP-Access List Configuration mode.
- Before an Access Control Element (ACE) is added to an ACL, all packets are permitted. After an ACE is added, an implied **deny-any-any** condition exists at the end of the list and those packets that do not match the conditions defined in the permit statement are denied.

Example

The following example shows how to define a permit statement for an IP ACL.

```
Console(config)# ip access-list ip-acl1
Console(config-ip-al)# permit rsvp 192.1.1.1 0.0.0.0 any dscp 56
```

deny (IP)

The **deny** IP-Access List Configuration mode command denies traffic if the conditions defined in the deny statement match.

Syntax

- **deny** [**disable-port**] {**any**| *protocol*} {**any**|{*source source-wildcard*}} {**any**|{*destination destination-wildcard*}} [**dscp** *number* | **ip-precedence** *number*]
- **deny-icmp** [**disable-port**] {**any**|{*source source-wildcard*}} {**any**|{*destination destination-wildcard*}} {**any**|*icmp-type*} {**any**|*icmp-code*} [**dscp** *number* | **ip-precedence** *number*]
- **deny-igmp** [**disable-port**] {**any**|{*source source-wildcard*}} {**any**|{*destination destination-wildcard*}} {**any**|*igmp-type*} [**dscp** *number* | **ip-precedence** *number*]
- **deny-tcp** [**disable-port**] {**any**|{ *source source-wildcard*}} {**any**|*source-port*} {**any**|{*destination destination-wildcard*}} {**any**|*destination-port*} [**dscp** *number* | *ip-precedence number*] [**flags** *list-of-flags*] [**src-port-wildcard** *source-port-wildcard*] [**dst-port-wildcard** *source-port-wildcard*]
- **deny-udp** [**disable-port**] {**any**|{ *source source-wildcard*}} {**any**| *source-port*} {**any**|{*destination destination-wildcard*}} {**any**|*destination-port*} [**dscp** *number* | **ip-precedence** *number*] [**src-port-wildcard** *source-port-wildcard*] [**dst-port-wildcard** *source-port-wildcard*]
  - **disable-port** — Specifies that the Ethernet interface is disabled if the condition is matched.
  - *source* — Specifies the Source IP address of the packet.
  - *source-wildcard* — Specifies wildcard bits to be applied to the source IP address by placing 1s in bit positions to be ignored.
  - *destination* — Specifies the destination IP address of the packet.
  - *destination- wildcard* — Specifies wildcard bits to be applied to the destination IP address by placing 1s in bit positions to be ignored.
  - *protocol* — Specifies the name or the number of an IP protocol. Available protocol names: **icmp, igmp, ip, tcp, egp, igp, udp, hmp, rdp, idpr, idrp, rsvp, gre, esp, ah, eigrp, ospf, ipip, pim, l2tp, isis**. (Range: 0 - 255)
  - **dscp** *number* — Specifies the DSCP value.
  - **ip-precedence** *number* — Specifies the IP precedence value.
  - *icmp-type* — Specifies an ICMP message type for filtering ICMP packets. Enter a number or one of the following values: **echo-reply, destination-unreachable, source-quench, redirect, alternate-host-address, echo-request, router-advertisement, router-solicitation, time-exceeded, parameter-problem, timestamp, timestamp-reply, information-request, information-reply, address-mask-request, address-mask-reply, traceroute, datagram-conversion-error, mobile-host-redirect, mobile-registration-request, mobile-registration-reply, domain-name-request, domain-name-reply, skip, photuris**.

- *icmp-code* — Specifies an ICMP message code for filtering ICMP packets. (Range: 0 - 255)
- *igmp-type* — Specifies IGMP packets filtered by IGMP message type. Enter a number or one of the following values: **host-query, host-report, dvmrp, pim, cisco-trace, host-report-v2, host-leave-v2, host-report-v3**. (Range: 0 - 255)
- *destination-port* — Specifies the UDP/TCP destination port. (Range: 1 - 65535)
- *destination-port-wildcard* — Specifies wildcard bits to be applied to the destination port by placing 1s in bit positions to be ignored.
- *source-port* — Specifies the UDP/TCP source port. (Range: 1 - 65535)
- *source-port-wildcard* — Specifies wildcard bits to be applied to the source port by placing 1s in bit positions to be ignored.
- **flags** *list-of-flags* — Specifies the list of TCP flags. If a flag should be set it is prefixed by "+". If a flag is not set, it is prefixed by "-". Available options are **+urg, +ack, +psh, +rst, +syn, +fin, -urg, -ack, -psh, -rst, -syn** and **-fin**. The flags are concatenated to a one string. For example: **+fin-ack**.

Default Configuration

No IPv4 access list is defined.

Command Mode

IP-Access List Configuration mode.

User Guidelines

- Use the **ip access-list** Global Configuration mode command to enable the IP-Access List Configuration mode.
- Before an Access Control Element (ACE) is added to an ACL, all packets are permitted. After an ACE is added, an implied **deny-any-any** condition exists at the end of the list and those packets that do not match the defined conditions are denied.

Example

The following example shows how to define a permit statement for an IP ACL.

```
Console(config)# ip access-list ip-acl1
Console(config-ip-al)# deny rsvp 192.1.1.1 0.0.0.255 any
```

mac access-list

The **mac access-list** Global Configuration mode command creates Layer 2 ACLs. Use the no form of this command to delete an ACL.

Syntax

- **mac access-list** *name*
- **no mac access-list** *name*
  - *name* — Specifies the name of the ACL.

Default Configuration

No MAC access list is defined.

Command Mode

Global Configuration mode.

User Guidelines

MAC ACLs are defined by a unique name. IP-based ACLs and MAC-based ACLs cannot share the same name.

Example

The following example shows how to create a MAC ACL.

```
Console(config)# mac access-list macl-1
Console(config-mac-al)#
```

permit (MAC)

The **permit** MAC-Access List Configuration mode command sets permit conditions for a MAC access list.

Syntax

- **permit** {**any** | { *source source-wildcard*} **any** | {*destination destination-wildcard*}} [**vlan** *vlan-id*] [**cos** *cos cos-wildcard*] [**ethtype** *eth-type*]
  - *source* — Specifies the source MAC address of the packet.
  - *source-wildcard* — Specifies wildcard bits to be applied to the source MAC address by placing 1s in bit positions to be ignored.
  - **any** — Specify a MAC address and mask. For example, to set 00:00:00:00:10:XX use the Mac address 00:00:00:00:10:00 and mask 00:00:00:00:00:FF.
  - *destination* — Specifies the MAC address of the host to which the packet is being sent.
  - *destination-wildcard* — Specifies wildcard bits to be applied to the destination MAC address by placing 1s in bit positions to be ignored.
  - *vlan-id* — Specifies the ID of the packet vlan. (Range: 1 - 4093)
  - *cos* — Specifies the Class of Service (CoS) for the packet. (Range: 0 - 7)

- *cos-wildcard* — Specifies wildcard bits to be applied to the CoS.
- *eth-type* — Specifies the etherType of the packet in hexadecimal format. (Range: 0 - 05dd-ffff {hex})

Default Configuration

No MAC ACL is defined.

Command Mode

MAC-Access List Configuration mode.

User Guidelines

- Before an Access Control Element (ACE) is added to an ACL, all packets are permitted. After an ACE is added, an implied **deny-any-any** condition exists at the end of the list and those packets that do not match the conditions defined in the permit statement are denied.

Example

The following example shows how to create a MAC ACL with permit rules.

```
Console(config)# mac access-list macl-acl1
Console(config-mac-al)# permit 06:a6 00:00:00:00:00:00 any vlan 6
```

deny (MAC)

The **deny** MAC-Access List Configuration mode command denies traffic if the conditions defined in the deny statement match.

Syntax

- **deny [disable-port] {any|{***source source- wildcard***} {any|{** *destination destination- wildcard***}} [vlan** *vlan-id***] [cos** *cos cos-wildcard***] [ethtype** *eth-type***]**
  - **disable-port —** Indicates that the port is disabled if the condition is matched.
  - *source* — Specifies the MAC address of the host from which the packet was sent.
  - *source-wildcard* — Specifies wildcard bits to the source MAC address by placing 1s in bit positions to be ignored.
  - **any** — Specify a MAC address and mask. For example, to set 00:00:00:00:10:XX use the Mac address 00:00:00:00:10:00 and mask 00:00:00:00:00:FF.
  - *destination* — Specifies the MAC address of the host to which the packet is being sent.
  - *destination-wildcard* — Specifies wildcard bits to the destination MAC address by placing 1s in bit positions to be ignored.
  - *vlan-id* — Specifies the vlan id of the packet. (Range: 1 - 4093)

- *cos* — Specifies the packets's Class of Service (CoS). (Range: 0 - 7)
- *cos-wildcard* — Specifies wildcard bits to be applied to the CoS.
- *eth-type* — Specifies the packet's Ethernet type in hexadecimal format. (0 - 05dd-ffff {hex})

Default Configuration

No MAC access list is defined.

Command Mode

MAC-Access List Configuration mode.

User Guidelines

- MAC BPDU packets cannot be denied.
- Each MAC address in the ACL is a ACE (Access Control Element) and can only be removed by deleting the ACL using the **no ip access-list** Global Configuration mode command or the Web-based interface.

Example

The following example shows how to create a MAC ACL with rules.

```
Console(config)# mac access-list macl-1
Console (config-mac-acl)# deny 66:66:66:66:66:66
Console(config-mac-acl)# exit
Console(config)#
```

service-acl

The **service-acl** Interface (VLAN) Configuration mode command applies an ACL to the input interface. Use the **no** form of this command to detach an ACL from an input interface.

Syntax

- **service-acl input** *acl-name*
- **no service-acl input**
  - *acl-name* — Specifies the ACL to be applied to the input interface.

Default Configuration

This command has no default configuration.

Command Mode

Interface (Ethernet, Port-Channel) Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example, binds (services) an ACL to VLAN 2.

```
console# config
console(config)# mac access-list macA
console(config-mac-al)# permit a1:a1:a1:a1:a1:a1
00:00:00:00:00:11 any
console(config-mac-al)# exit
console(config)# interface ethernet e10
console(config-if)# service-acl input macA
console(config-if)#
```

show access-lists

The **show access-lists** Privileged EXEC mode command displays access control lists (ACLs) defined on the device.

Syntax

- **show access-lists** [*name*]
  - *name* — Name of the ACL.

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following example displays the access lists.

```
Console# show access-lists
MAC access list macl-1
deny host 66:66:66:66:66:66
```

show interfaces access-lists

The **show interfaces access-lists** Privileged EXEC mode command displays access lists applied on interfaces.

Syntax

- **show interfaces access-lists** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *Interface* — Specifies the Valid Ethernet port. (Full syntax: unit/port)
  - *port-channel-number* — Specifies the port-channel index.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays an ACLs applied on the device interfaces:

```
console# show access-lists
MAC access list macA
 permit              any
console# show interfaces access-lists
Interface            Input ACL
--------------       ---------------
e10                  macA
```

6

Address Table Commands

bridge address

The **bridge address** Interface Configuration (VLAN) mode command adds a MAC-layer station source address to the bridge table. Use the **no** form of this command to delete the MAC address.

Syntax

- **bridge address** *mac-address* {**ethernet** *interface* | **port-channel** *port-channel-number*} [**permanent** | **delete-on-reset** | **delete-on-timeout** | **secure**]
- **no bridge address** [*mac-address*]
  - *mac-address* — A valid MAC address.
  - *interface* — A valid Ethernet port.
  - *port-channel-number* — A valid port-channel number.
  - **permanent —** The address can only be deleted by the **no bridge address** command.
  - **delete-on-reset** — The address is deleted after reset.
  - **delete-on-timeout —** The address is deleted after "age out" time has expired.
  - **secure** — The address is deleted after the port changes mode to unlock learning (**no port security** command). This parameter is only available when the port is in the learning locked mode.

Default Configuration

No static addresses are defined. The default mode for an added address is **permanent**.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

- Using the **no** form of the command without specifying a MAC address deletes all static MAC addresses belonging to this VLAN.

Example

The following example adds a permanent static MAC-layer station source address 3aa2.64b3.a245 on port 1/e16 to the bridge table.

```
Console(config)# interface vlan 2
Console(config-if)# bridge address 3aa2.64b3.a245 ethernet 1/e16
permanent
```

bridge multicast filtering

The **bridge multicast filtering** Global Configuration mode command enables filtering Multicast addresses. Use the **no** form of this command to disable filtering Multicast addresses.

Syntax

- **bridge multicast filtering**
- **no bridge multicast filtering**

Default Configuration

Filtering Multicast addresses is disabled. All Multicast addresses are flooded to all ports.

Command Mode

Global Configuration mode.

User Guidelines

- If Multicast routers exist on the VLAN, do not change the unregistered Multicast addresses state to drop on the switch ports.
- If Multicast routers exist on the VLAN and IGMP-snooping is not enabled, use the **bridge multicast forward-all** command to enable forwarding all Multicast packets to the Multicast switches.

Example

The following example enables bridge Multicast filtering.

```
Console(config)# bridge multicast filtering
```

bridge multicast address

The **bridge multicast address** Interface Configuration (VLAN) mode command registers a MAC-layer Multicast address in the bridge table and statically adds ports to the group. Use the **no** form of this command to unregister the MAC address.

Syntax

- **bridge multicast address** {*mac-multicast-address* | *ip-multicast-address*}
- **bridge multicast address** {*mac-multicast-address* | *ip-multicast-address*} [**add** | **remove**] {**ethernet** *interface-list* | **port-channel** *port-channel-number-list*}
- **no bridge multicast address** {*mac-multicast-address* | *ip-multicast-address*}
  - **add** — Adds ports to the group. If no option is specified, this is the default option.
  - **remove** — Removes ports from the group.
  - *mac-multicast-address* — A valid MAC Multicast address.
  - *ip- multicast-address* — A valid IP Multicast address.
  - *interface-list* — Separate non-consecutive Ethernet ports with a comma and no spaces; a hyphen is used to designate a range of ports.
  - *port-channel-number-list* — Separate non-consecutive port-channels with a comma and no spaces; a hyphen is used to designate a range of ports.

Default Configuration

No Multicast addresses are defined.

Command Mode

Interface configuration (VLAN) mode.

User Guidelines

- If the command is executed without **add** or **remove**, the command only registers the group in the bridge database.
- Static Multicast addresses can only be defined on static VLANs.

Examples

The following example registers the MAC address:

```
Console(config)# interface vlan 8
Console(config-if)# bridge multicast address 01:00:5e:02:02:03
```

The following example registers the MAC address and adds ports statically.

```
Console(config)# interface vlan 8

Console(config-if)# bridge multicast address 01:00:5e:02:02:03
add ethernet 1/e1-e9, 2/e2
```

bridge multicast forbidden address

The **bridge multicast forbidden address** Interface Configuration (VLAN) mode command forbids adding a specific Multicast address to specific ports. Use the **no** form of this command to return to the default configuration.

Syntax

- **bridge multicast forbidden address** {*mac-multicast-address* | *ip-multicast-address*} {**add** | **remove**} {**ethernet** *interface-list* | **port-channel** *port-channel-number-list*}
- **no bridge multicast forbidden address** {*mac-multicast-address* | *ip-multicast-address*}
  - **add** — Adds ports to the group.
  - **remove** — Removes ports from the group.
  - *mac-multicast-address* — A valid MAC Multicast address.
  - *ip- multicast-address* — A valid IP Multicast address.
  - *interface-list* — Separate non-consecutive Ethernet ports with a comma and no spaces; hyphen is used to designate a range of ports.
  - *port-channel-number-list* — Separate non-consecutive valid port-channels with a comma and no spaces; a hyphen is used to designate a range of port-channels.

Default Configuration

No forbidden addresses are defined.

Command Modes

Interface Configuration (VLAN) mode.

User Guidelines

- Before defining forbidden ports, the Multicast group should be registered.

Examples

The following example forbids MAC address 0100.5e02.0203 on port 2/e9 within VLAN 8.

```
Console(config)# interface vlan 8
Console(config-if)# bridge multicast address 0100.5e.02.0203
Console(config-if)# bridge multicast forbidden address
0100.5e02.0203 add ethernet 2/e9
```

bridge multicast unregistered

The **bridge multicast unregistered** Interface Configuration mode command configures the forwarding state of unregistered multicast addresses. Use the **no** form of this command to return to default.

Syntax

- **bridge multicast unregistered** {**forwarding** | **filtering**}
- **no bridge multicast unregistered**
  - **forwarding** — Forward unregistered multicast packets.
  - **filtering** — Filter unregistered multicast packets. See usage guidelines for the case where the port is a router port.

Default Configuration

Forwarding

Command Modes

Interface configuration (Ethernet, Port-Channel) mode

Default Configuration

- Unregistered multicast filtering should not be enabled on ports that are connected to routers, because the 224.0.0.x address range should not be filtered. Routers would not necessarily send IGMP reports for the 224.0.0.x range.

Examples

This example configures the forwarding state of unregistered multicast addresses to allow forwarding.

```
Console (config)# bridge multicast unregistered forwarding
```

bridge multicast forward-all

The **bridge multicast forward-all** Interface Configuration (VLAN) mode command enables forwarding all Multicast packets on a port. Use the **no** form of this command to restore the default configuration.

Syntax

- **bridge multicast forward-all** {**add** | **remove**} {**ethernet** *interface-list* | **port-channel** *port-channel-number-list*}
- **no bridge multicast forward-all**
  - **add** — Force forwarding all Multicast packets.
  - **remove** — Do not force forwarding all Multicast packets.
  - *interface-list* — Separate non-consecutive Ethernet ports with a comma and no spaces; a hyphen is used to designate a range of ports.
  - *port-channel-number-list* — Separate non-consecutive port-channels with a comma and no spaces; a hyphen is used to designate a range of port-channels.

Default Configuration

This setting is disabled.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example forwards all Multicast packets on port 1/e8.

```
Console(config)# interface vlan 2
Console(config-if)# bridge multicast forward-all add
ethernet 1/e8
```

bridge multicast forbidden forward-all

The **bridge multicast forbidden forward-all** Interface Configuration (VLAN) mode command forbids a port to be a forward-all-Multicast port. Use the **no** form of this command to restore the default configuration.

Syntax

- **bridge multicast forbidden forward-all** {**add** | **remove**} {**ethernet** *interface-list* | **port-channel** *port-channel-number-list*}
- **no bridge multicast forbidden forward-all**
  - **add** — Forbids forwarding all Multicast packets.
  - **remove** — Does not forbid forwarding all Multicast packets.
  - *interface-list* — Separates non-consecutive Ethernet ports with a comma and no spaces; a hyphen is used to designate a range of ports.
  - *port-channel-number-list* — Separates non-consecutive port-channels with a comma and no spaces; a hyphen is used to designate a range of port-channels.

Default Configuration
: This setting is disabled.

Command Mode
: Interface Configuration (VLAN) mode.

User Guidelines

- IGMP snooping dynamically discovers Multicast router ports. When a Multicast router port is discovered, all the Multicast packets are forwarded to it unconditionally.
- This command prevents a port from becoming a Multicast router port.

Example

The following example forbids forwarding all Multicast packets to 1/e1 with VLAN 2.

```
Console(config)# interface vlan 2
Console(config-if)# bridge multicast forbidden forward-all add
ethernet 1/e1
```

bridge aging-time

The **bridge aging-time** Global Configuration mode command sets the Address Table aging time. Use the **no** form of this command to restore the default configuration.

Syntax

- **bridge aging-time** *seconds*
- **no bridge aging-time**
  - *seconds* — Time in seconds. (Range: 10 - 630 seconds)

Default Configuration

The default setting is 300 seconds.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example sets the bridge aging time to 250.

```
Console(config)# bridge aging-time 250
```

clear bridge

The **clear bridge** Privileged EXEC mode command removes any learned entries from the forwarding database.

Syntax

- **clear bridge**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example clears the bridge tables.

```
Console# clear bridge
```

port security

The **port security** Interface Configuration mode command locks the port, thereby, blocking unknown traffic and preventing the port from learning new addresses. Use the **no** form of this command to return to the default configuration.

Syntax

- **port security** [**forward** | **discard | discard-shutdown**] [**trap** *seconds*]
- **no port security**
  - **forward** — Forwards packets with unlearned source addresses, but does not learn the address.
  - **discard** — Discards packets with unlearned source addresses. This is the default if no option is indicated.
  - **discard-shutdown** — Discards packets with unlearned source addresses. The port is also shut down.
  - *seconds* — Sends SNMP traps and defines the minimum amount of time in seconds between consecutive traps. (Range: 1 - 1000000)

Default Configuration

This setting is disabled.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

There are no user guidelines for this command. 802.1x multiple host mode must be enabled.

Example

The following example enables port 1/e1 to forward all packets without learning addresses of packets from unknown sources and sends traps every 100 seconds if a packet with an unknown source address is received.

```
Console(config)# interface ethernet 1/e1
Console(config-if)# port security forward trap 100
```

port security mode

The **port security mode** Interface Configuration mode command configures the port security mode. Use the **no** form of this command to return to the default configuration.

Syntax

- **port security mode** {**lock** | **max-addresses**}
- **no port security mode**
  - **lock** — Saves the current dynamic MAC addresses associated with the port and disables learning, relearning and aging.
  - **max-addresses** — Deletes the current dynamic MAC addresses associated with the port. Learns up to the maximum addresses allowed on the port. Relearning and aging are enabled.

Default Configuration
This setting is disabled.

Command Mode
Interface Configuration (Ethernet, port-channel) mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example sets port security mode to dynamic for Ethernet interface 1/e7.

```
Console(config)# interface ethernet 1/e7
Console(config-if)# port security mode dynamic
```

port security max

The **port security max** Interface Configuration (Ethernet, port-channel) mode command configures the maximum number of addresses that can be learned on the port while the port is in port security mode. Use the **no** form of this command to return to the default configuration.

Syntax

- **port security max** *max-addr*
- **no port security max**
  - *max-addr* — Maximum number of addresses that can be learned by the port. (Range: 1 - 128)

Default Configuration
The default setting is 1 address.

Command Mode
Interface Configuration (Ethernet, port-channel) mode.

User Guidelines
This command is only relevant in dynamic learning modes.

Example

The following example sets the maximum number of addresses that are learned on port 1/e7 before it is locked to 20.

```
Console(config)# interface ethernet 1/e7
Console(config-if)# port security mode dynamic
Console(config-if)# port security max 20
```

port security routed secure-address

The **port security routed secure-address** Interface Configuration (Ethernet, port-channel) mode command adds a MAC-layer secure address to a routed port. Use the **no** form of this command to delete a MAC address.

Syntax

- **port security routed secure-address** *mac-address*
- **no port security routed secure-address** *mac-address*
  - *mac-address* — A valid MAC address.

Default Configuration
No addresses are defined.

Command Mode
Interface configuration (Ethernet, port-channel) mode; cannot be configured for a range of interfaces (range context).

User Guidelines

- The command enables adding secure MAC addresses to a routed port in port security mode.
- The command is available when the port is a routed port and in port security mode. The address is deleted if the port exits the security mode or is not a routed port.

Example

The following example adds the MAC-layer address 66:66:66:66:66:66 to port 1/e1.

```
Console(config)# interface ethernet 1/e1
Console(config-if)# port security routed secure-address
66:66:66:66:66:66
```

show bridge address-table

The **show bridge address-table** Privileged EXEC mode command displays all entries in the bridge-forwarding database.

Syntax

- **show bridge address-table** [**vlan** *vlan*] [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *vlan* — Specifies a valid VLAN, such as VLAN 1.
  - *interface* — A valid Ethernet port.
  - *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- Internal usage VLANs (VLANs that are automatically allocated on ports with a defined Layer 3 interface) are presented in the VLAN column by a port number and not by a VLAN ID.
- "Special" MAC addresses that were not statically defined or dynamically learned are displayed in the MAC Address Table. This includes, for example, MAC addresses defined in ACLs.

Example

The following example displays all classes of entries in the bridge-forwarding database.

```
Console# show bridge address-table

Aging time is 300 sec

Vlan         mac address             Port        Type
---------    --------------          ----        -------
1            00:60:70:4C:73:FF       5/e8        dynamic
1            00:60:70:8C:73:FF       5/e8        dynamic
200          00:10:0D:48:37:FF       5/e9        static
```

show bridge address-table static

The **show bridge address-table static** Privileged EXEC mode command displays statically created entries in the bridge-forwarding database.

Syntax

- **show bridge address-table static** [**vlan** *vlan*] [**ethernet** *interface* | **port-channel** *port-channel-number*]

Parameters

- *vlan* — Specifies a valid VLAN, such as VLAN 1.
- *interface* — A valid Ethernet port number.
- *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays all static entries in the bridge-forwarding database.

```
Console# show bridge address-table static

Aging time is 300 sec

vlan      mac address           port      type
----      -----------------     ----      -----------------
1         00:60:70:4C:73:FF     1/e8      Permanent
1         00:60:70:8C:73:FF     1/e8      delete-on-timeout
200       00:10:0D:48:37:FF     1/e9      delete-on-reset
```

show bridge address-table count

The **show bridge address-table count** Privileged EXEC mode command displays the number of addresses present in the Forwarding Database.

Syntax

- **show bridge address-table count** [**vlan** *vlan*][**ethernet** *interface-number* | **port-channel** *port-channel-number*]
  - *vlan* — Specifies a valid VLAN, such as VLAN 1.
  - *interface* — A valid Ethernet port.
  - *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the number of addresses present in all VLANs.

```
Console# show bridge address-table count

Capacity: 8192
Free: 8083
Used: 109

Secure addresses: 2
Static addresses: 1
Dynamic addresses: 97
Internal addresses: 9
```

show bridge multicast address-table

The **show bridge multicast address-table** Privileged EXEC mode command displays Multicast MAC address or IP Address Table information.

Syntax

- **show bridge multicast address-table** [**vlan** *vlan-id*] [**address** *mac-multicast-address* | *ip-multicast-address*] [**format ip** | **format mac**]
  - *vlan-id* — A valid VLAN ID value.
  - *mac-multicast-address* — A valid MAC Multicast address.
  - *ip-multicast-address* — A valid IP Multicast address.
  - **format ip|mac** — Multicast address format. Can be **ip** or **mac**. If the format is unspecified, the default is **mac**.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- A MAC address can be displayed in IP format only if it is in the range of 0100.5e00.0000-0100.5e7f.ffff.

Example

The following example displays Multicast MAC address and IP Address Table information.

```
Console# show bridge multicast address-table

Vlan      MAC Address           Type           Ports
----      --------------        -------        ----------
1         01:00:5e:02:02:03     static         1/e1, 2/e2
19        01:00:5e:02:02:08     static         1/e1-e8
19        00:00:5e:02:02:08     dynamic        1/e9-e11

Forbidden ports for Multicast addresses:

Vlan      MAC Address           Ports
----      --------------        -----
1         01:00:5e:02:02:03     2/e8
19        01:00:5e:02:02:08     2/e8

Console# show bridge multicast address-table format ip

Vlan      IP/MAC Address        Type           Ports
----      -----------------     ------         ---------
1         224-239.130|2.2.3     static         1/e1,2/e2
19        224-239.130|2.2.8     static         1/e1-8
19        224-239.130|2.2.8     dynamic        1/e9-11

Forbidden ports for Multicast addresses:

Vlan      IP/MAC Address        Ports
----      -----------------     ------
1         224-239.130|2.2.3     2/e8
19        224-239.130|2.2.8     2/e8
```

NOTE: A Multicast MAC address maps to multiple IP addresses as shown above.

show bridge multicast filtering

The **show bridge multicast filtering** Privileged EXEC mode command displays the Multicast filtering configuration.

Syntax

- **show bridge multicast filtering** *vlan-id*
  - *vlan_id* — A valid VLAN ID value.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example displays the Multicast configuration for VLAN 1.

```
Console # show bridge multicast filtering 1
Filtering: Enabled
VLAN: 1

Port            Static                  Status
-------         -----------------       -----------
1/e14           Forbidden               Filter
1/e15           Forward                 Forward(s)
1/e16           -                       Forward(d)
```

show bridge multicast address-table static

The **show bridge multicast address-table static** Privileged EXEC mode command displays the statically configured multicast addresses.

Syntax

- **show bridge multicast address-table static** [**vlan** *vlan-id*] [**address** *mac-multicast-address* | *ip-multicast-address*] [**source** *ip-address*]
  - *vlan-id* — Indicates the VLAN ID. This has to be a valid VLAN ID value.
  - *mac-multicast-address* — A valid MAC multicast address.
  - *ip-multicast-address* — A valid IP multicast address.
  - *ip-address* — Source IP address.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

A MAC address can be displayed in IP format only if it's in the range 0100.5e00.0000 through 0100.5e7f.ffff.

Example

```
Console# show bridge multicast address-table static

MAC-GROUP table

Vlan        MAC Address                Type             Ports
----        --------------             -------          ----------
1           0100.9923.8787             static           1/e1, 2/e2

Forbidden ports for multicast addresses:

Vlan        MAC Address                Ports
----        --------------             -----

IPv4-GROUP Table

Vlan        IP/MAC Address             Type             Ports
----        -----------------          ------           ---------
1           231.2.2.3                  dynamic          1/e1, 2/e2
19          231.2.2.8                  static           1/e1-e8
19          231.2.2.8                  dynamic          1-9-11

Forbidden ports for multicast addresses:

Vlan        MAC Address                Ports
----        --------------             -----
1           231.2.2.3                  2/8
19          231.2.2.8                  2/8
IPv4-SRC-GROUP Table:

Vlan        Group Address              Source Address   Type Ports
----        --------------             -------          ----------

Forbidden ports for multicast addresses:

Vlan        Group Address              Source Address   Ports
----        --------------             -------          ----------
```

show bridge multicast filtering

The **show bridge multicast filtering** Privileged EXEC mode command displays the Multicast filtering configuration.

Syntax

- **show bridge multicast filtering** *vlan-id*
  - *vlan-id* — VLAN ID value.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the Multicast configuration for VLAN 1.

```
Console# show bridge multicast filtering 1

Filtering: Enabled
VLAN: 1

Port        Forward-Unregistered    Forward-All
            Static      Status      Static        Status
----        ---------   ---------   ---------     ----------
1/e1        Forbidden   Filter      Forbidden     Filter
1/e2        Forward     Forward(s)  Forward       Forward(s)
1/e3        -           Forward(d)  -             Forward(d)
```

show ports security

The **show ports security** Privileged EXEC mode command displays the port-lock status.

Syntax

- **show ports security** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — A valid Ethernet port.
  - *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays all classes of entries in the port-lock status.

```
Console # show ports security

Port    Status    Learning  Action   Maximum   Trap      Frequenc
                                                         y
-----   -------             -------  -------   --------  --------
1/e1    Disabled  Lock      -        1         -         -
1/e2    Disabled  Lock      -        1         -         -
1/e3    Disabled  Lock      -        1         -         -
1/e4    Disabled  Lock      -        1         -         -
1/e5    Disabled  Lock      -        1         -         -
1/e6    Disabled  Lock      -        1         -         -
1/e7    Disabled  Lock      -        1         -         -
1/e8    Disabled  Lock      -        1         -         -
1/e9    Disabled  Lock      -        1         -         -
1/e10   Disabled  Lock      -        1         -         -
1/e11   Disabled  Lock      -        1         -         -
1/e12   Disabled  Lock      -        1         -         -
```

```
1/e13   Disabled   Lock      -        1          -          -
1/e14   Disabled   Lock      -        1          -          -
1/e15   Disabled   Lock      -        1          -          -
1/e16   Disabled   Lock      -        1          -          -
1/e17   Disabled   Lock      -        1          -          -
1/e18   Disabled   Lock      -        1          -          -
1/e19   Disabled   Lock      -        1          -          -
1/e20   Disabled   Lock      -        1          -          -
1/e21   Disabled   Lock      -        1          -          -
1/e22   Disabled   Lock      -        1          -          -

Frequency: Minimum time in seconds between consecutive traps
Counter: Number of actions since last trap
```

show ports security addresses

The **show ports security addresses** Privileged EXEC mode command displays the current dynamic addresses in locked ports.

Syntax

- **show ports security addresses** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — A valid Ethernet port.
  - *port-channel-number* — A valid port-channel number

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays dynamic addresses in currently locked ports.

```
Console# show ports security addresses

Port      Status       Learning         Current        Maximum
----      --------     --------         -------        -------
1/e1      Disabled     Lock             -              1
1/e2      Disabled     Lock             -              1
1/e3      Enabled      Max-addresses    0              1
1/e4      Port is a member in port-channel ch1
1/e5      Disabled     Lock             -              1
1/e6      Enabled      Max-addresses    0              10
ch1       Enabled      Max-addresses    0              50
ch2       Enabled      Max-addresses    0              128
```

The following example displays dynamic addresses in currently locked port 1/e1.

```
Console# show ports security addresses ethernet 1/e1

Port      Status         Learning       Current        Maximum
----      --------       --------       -------        -------
1/e1      Disabled       Lock           -              1
```

7

Clock

clock set

The **clock set** Privileged EXEC mode command manually sets the system clock.

Syntax

- **clock set** *hh:mm:ss day month year*

  or

- **clock set** *hh:mm:ss month day year*
  - *hh:mm:ss* — Current time in hours (military format), minutes, and seconds (hh: 0 - 23, mm: 0 - 59, ss: 0 - 59).
  - *day* — Current day (by date) in the month (1 - 31).
  - *month* — Current month using the first three letters by name (Jan, …, Dec).
  - *year* — Current year (2000 - 2097).

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example sets the system time to 13:32:00 on the 7th March 2002.

```
Console# clock set 13:32:00 7 Mar 2002
```

clock source

The **clock source** Global Configuration mode command configures an external time source for the system clock. Use **no** form of this command to disable external time source.

Syntax

- **clock source** {**sntp**}
- **no clock source**
  - **sntp** — SNTP servers

Default Configuration
No external clock source.

Command Mode
Global Configuration mode

User Guidelines
There are no user guidelines for this command.

Examples

The following example configures an external time source for the system clock.

```
Console(config)# clock source sntp
```

clock timezone

The **clock timezone** Global Configuration mode command sets the time zone for display purposes. Use the **no** form of this command to set the time to the Coordinated Universal Time (UTC).

Syntax

- **clock timezone** *hours-offset* [**minutes** *minutes-offset*] [**zone** *acronym*]
- **no clock timezone**
  - *hours-offset* — Hours difference from UTC. (Range: -12 – +13)
  - *minutes-offset* — Minutes difference from UTC. (Range: 0 – 59)
  - *acronym* — The acronym of the time zone. (Range: Up to 4 characters)

Default Configuration
Clock set to UTC.

Command Mode
Global Configuration mode.

User Guidelines

- The system internally keeps time in UTC, so this command is used only for display purposes and when the time is manually set.

Examples

The following example sets the timezone to 6 hours difference from UTC.

```
Console(config)# clock timezone -6 zone CST
```

clock summer-time

The **clock summer-time** Global Configuration mode command configures the system to automatically switch to summer time (daylight saving time). Use the **no** form of this command to configure the software not to automatically switch to summer time.

Syntax

- **clock summer-time recurring** {**usa** | **eu** | {*week day month hh:mm week day month hh:mm*}} [**offset** *offset*] [**zone** *acronym*]
- **clock summer-time date** *date month year hh:mm date month year hh:mm* [**offset** *offset*] [**zone** *acronym*]
- **clock summer-time date** *month date year hh:mm month date year hh:mm* [**offset** *offset*] [**zone** *acronym*]
- **no clock summer-time recurring**
  - **recurring** — Indicates that summer time should start and end on the corresponding specified days every year.
  - **date** — Indicates that summer time should start on the first specific date listed in the command and end on the second specific date in the command.
  - **usa** — The summer time rules are the United States rules.
  - **eu** — The summer time rules are the European Union rules.
  - *week* — Week of the month. (Range: 1 - 5, **first**, **last**)
  - *day* — Day of the week (Range: first three letters by name, like **sun**)
  - *date* — Date of the month. (Range: 1 - 31)
  - *month* — Month. (Range: first three letters by name, like Jan)
  - *year* — Year - no abbreviation (Range: 2000 - 2097)
  - *hh:mm* — Time in military format, in hours and minutes. (Range: hh: 0 - 23, mm:0 - 59)
  - *offset* — Number of minutes to add during summer time. (Range: 1 - 1440)
  - *acronym* — The acronym of the time zone to be displayed when summer time is in effect. (Range: Up to 4 characters)

Default Configuration

Summer time is disabled.

offset — Default is 60 minutes.

acronym — If unspecified default to the timezone acronym.

If the timezone has not been defined, the default is UTC.

Command Mode

Global Configuration mode.

User Guidelines

- In both the **date** and **recurring** forms of the command, the first part of the command specifies when summer time begins, and the second part specifies when it ends. All times are relative to the local time zone. The start time is relative to standard time. The end time is relative to summer time. If the starting month is chronologically after the ending month, the system assumes that you are in the southern hemisphere.
- USA rule for daylight saving time:
  - Start: Second Sunday in March
  - End: First Sunday in November
  - Time: 2 am local time
- EU rule for daylight saving time:
  - Start: Last Sunday in March
  - End: Last Sunday in October
  - Time: 1.00 am (01:00)

Examples

The following example sets summer time starting on the first Sunday in March at 2 am and finishing on the first Sunday in November at 2 am.

```
Console(config)# clock summer-time recurring first sun mrch 2:00
first sun nov 2:00
```

sntp authentication-key

The **sntp authentication-key** Global Configuration mode command defines an authentication key for Simple Network Time Protocol (SNTP). Use the **no** form of this command to remove the authentication key for SNTP.

Syntax

- **sntp authentication-key** *number* **md5** *value*
- **no sntp authentication-key** *number*
  - *number* — Key number (Range: 1 - 4294967295)
  - *value* — Key value (Range: up to 8 characters)

Default Configuration
No authentication key is defined.

Command Mode
Global Configuration mode.

User Guidelines

- Multiple keys can be generated.

Examples

The following example defines the authentication key for SNTP.

```
Console(config)# sntp authentication-key 8 md5 ClkKey
```

sntp authenticate

The **sntp authenticate** Global Configuration mode command allows authentication for received Simple Network Time Protocol (SNTP) traffic from servers. Use the **no** form of this command to disable the feature.

Syntax

- **sntp authenticate**
- **no sntp authenticate**

Default Configuration
No authentication

Command Mode
Global Configuration mode.

User Guidelines

- The command is relevant for both Unicast and Broadcast.

Examples

The following example defines the authentication key for SNTP and allows authentication.

```
Console(config)# sntp authentication-key 8 md5 ClkKey
Console(config)# sntp trusted-key 8
Console(config)# sntp authenticate
```

sntp trusted-key

The **sntp trusted-key** Global Configuration mode command authenticates the identity of a system to which Simple Network Time Protocol (SNTP) will synchronize. Use the **no** form of this command to disable authentication of the identity of the system.

Syntax

- **sntp trusted-key** *key-number*
- **no sntp trusted-key** *key-number*
  - *key-number* — Key number of authentication key to be trusted. (Range: 1 - 4294967295)

Default Configuration

No keys are trusted.

Command Mode

Global Configuration mode.

User Guidelines

- The command is relevant for both received Unicast and Broadcast.
- If there is at least 1 trusted key, then unauthenticated messages will be ignored.

Examples

The following example authenticates the identity of system 8.

```
Console(config)# sntp authentication-key 8 md5 ClkKey
Console(config)# sntp trusted-key 8
Console(config)# sntp authenticate
```

sntp client poll timer

The **sntp client poll timer** Global Configuration mode command sets the polling time for the Simple Network Time Protocol (SNTP) client. Use the **no** form of this command to return to default configuration.

Syntax

- **sntp client poll timer** *seconds*
- **no sntp client poll timer**
  - *seconds* — Polling interval in seconds (Range: 60 - 86400)

Default Configuration
Polling interval is 1024 seconds.

Command Mode.
Global Configuration mode

User Guidelines
There are no user guidelines for this command.

Examples

The following example sets the polling time for the Simple Network Time Protocol (SNTP) client to 120 seconds.

```
Console(config)# sntp client poll timer 120
```

sntp broadcast client enable

The **sntp broadcast client enable** Global Configuration mode command enables Simple Network Time Protocol (SNTP) Broadcast clients. Use the **no** form of this command to disable SNTP Broadcast clients.

Syntax

- **sntp broadcast client enable**
- **no sntp broadcast client enable**

Default Configuration
The SNTP Broadcast client is disabled.

Command Mode
Global Configuration mode.

User Guidelines

- Use the **sntp client enable** Interface Configuration mode command to enable the SNTP client on a specific interface.

Examples

The following example enables the SNTP Broadcast clients.

```
Console(config)# sntp broadcast client enable
```

sntp anycast client enable

The **sntp anycast client enable** Global Configuration mode command enables SNTP Anycast client. Use the **no** form of this command to disable the SNTP Anycast client.

Syntax

- **sntp anycast client enable**
- **no sntp anycast client enable**

Default Configuration

The SNTP Anycast client is disabled.

Command Mode

Global Configuration mode.

User Guidelines

- Polling time is determined by the **sntp client poll timer** Global Configuration mode command.
- Use the **sntp client enable** Interface Configuration mode command to enable the SNTP client on a specific interface.

Examples

The following example enables SNTP Anycast clients.

```
console(config)# sntp anycast client enable
```

sntp client enable

The **sntp client enable** Global Configuration mode command enables the Simple Network Time Protocol (SNTP) Broadcast and Anycast client on an interface. Use the **no** form of this command to disable the SNTP client.

Syntax

- **sntp client enable** {**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *number*}
- **no sntp client enable** {**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *number*}
  - **ethernet** *interface-number* — Ethernet port number.
  - **vlan** *vlan-id* — VLAN number.
  - **port-channel** *number* — Port channel number.

Default Configuration
Disabled.

Command Mode
Global Configuration mode.

User Guidelines

- Use the **sntp Broadcast client enable** Global configuration command to enable Broadcast clients globally.
- Use the **sntp Anycast client enable** Global configuration command to enable Anycast clients globally.

Examples

The following example enables the SNTP client on the interface.

```
Console (config)# sntp client enable
```

sntp client enable (Interface)

The **sntp client enable** Interface Configuration (Ethernet, port-channel, VLAN) mode command enables the Simple Network Time Protocol (SNTP) client on an interface. This applies to both receive Broadcast and Anycast updates. Use the **no** form of this command to disable the SNTP client.

Syntax

- **sntp client enable**
- **no sntp client enable**

Default Configuration
The SNTP client is disabled on an interface.

Command Mode
Interface configuration (Ethernet, port-channel, VLAN) mode.

User Guidelines

- Use the **sntp broadcast client enable** Global Configuration mode command to enable Broadcast clients globally.
- Use the **sntp anycast client enable** Global Configuration mode command to enable Anycast clients globally.

Examples

The following example enables the SNTP client on Ethernet port 1/e3.

```
Console(config)# interface ethernet 1/e3
Console(config-if)# sntp client enable
```

sntp unicast client enable

The **sntp unicast client enable** Global Configuration mode command enables the device to use the Simple Network Time Protocol (SNTP) to request and accept SNTP traffic from servers. Use the **no** form of this command to disable requesting and accepting SNTP traffic from servers.

Syntax

- **sntp unicast client enable**
- **no sntp unicast client enable**

Default Configuration
The SNTP Unicast client is disabled.

Command Mode
Global Configuration mode.

User Guidelines

- Use the **sntp server** Global Configuration mode command to define SNTP servers.

Examples

The following example enables the device to use the Simple Network Time Protocol (SNTP) to request and accept SNTP traffic from servers.

```
Console(config)# sntp unicast client enable
```

sntp unicast client poll

The **sntp unicast client poll** Global Configuration mode command enables polling for the Simple Network Time Protocol (SNTP) predefined Unicast servers. Use the **no** form of this command to disable the polling for SNTP client.

Syntax

- **sntp unicast client poll**
- **no sntp unicast client poll**

Default Configuration
: Polling is disabled.

Command Mode
: Global Configuration mode.

User Guidelines

- Polling time is determined by the **sntp client poll timer** Global Configuration mode command.

Examples

The following example enables polling for Simple Network Time Protocol (SNTP) predefined Unicast clients.

```
Console(config)# sntp unicast client poll
```

sntp server

The **sntp server** Global Configuration mode command configures the device to use the Simple Network Time Protocol (SNTP) to request and accept SNTP traffic from a specified server. Use the **no** form of this command to remove a server from the list of SNTP servers.

Syntax

- **sntp server** {*ip4-address* | *ip6-address* | *hostname*}[**poll**] [**key** *keyid*]
- **no sntp server** {*ip4-address* | *ip6-address* | *hostname*}
  - *ip4-address* — IPv4 server address.
  - *ipv6-address* — IPv6 server address. When the IPv6 address is a Link Local address (IPv6Z address), the outgoing interface name must be specified. Refer to the usage guidelines for the interface name syntax.
  - *hostname* — Hostname of the server. (Range: 1 - 158 characters)
  - **poll** — Enable polling.
  - *keyid* — Authentication key to use when sending packets to this peer. (Range:1 - 4294967295)

Default Configuration

No servers are defined.

Command Mode

Global Configuration mode.

User Guidelines

- Up to 8 SNTP servers can be defined.
- Use the **sntp unicast client enable** Global Configuration mode command to enable predefined Unicast clients globally.
- To enable polling you should also use the **sntp unicast client poll** Global Configuration mode command for global enabling.
- Polling time is determined by the **sntp client poll timer** Global Configuration mode command.
- Polling time is determined by the **sntp client poll timer** Global Configuration mode command.
- The IPv6Z address format: <*ipv6-link-local-address*>%<*interface-name*>
  - *interface-name* — **vlan**<*integer*> | **ch**<*integer*> | **isatap**<*integer*> | <*physical-port-name*> | 0
  - *integer* — <*decimal-number*> | <*integer*><*decimal-number*>
  - *decimal-number* — 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
  - *physical-port-name* — Designated port number, for example 1/e16.

- If the egress interface is not specified, the default interface is selected. Specifying interface zone=0 is the same as not defining an egress interface.

Examples

The following example configures the device to accept SNTP traffic from the server on 192.1.1.1.

```
Console(config)# sntp server 192.1.1.1
```

show clock

The **show clock** User EXEC mode command displays the time and date from the system clock.

Syntax

- **show clock [detail]**
  - **detail** — Shows timezone and summertime configuration.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

- The symbol that precedes the show clock display indicates the following:

Symbol	Description
*	Time is not authoritative.
(blank)	Time is authoritative.
.	Time is authoritative, but SNTP is not synchronized.

Example

The following example displays the time and date from the system clock.

```
Console> show clock
15:29:03 PDT(UTC-7) Jun 17 2002
Time source is SNTP

Console> show clock detail
15:29:03 PDT(UTC-7) Jun 17 2002
Time source is SNTP

Time zone:
Acronym is PST
Offset is UTC-8

Summertime:
Acronym is PDT
Recurring every year.
Begins at first Sunday of April at 2:00.
Ends at last Sunday of October at 2:00.
Offset is 60 minutes.
```

show sntp configuration

The **show sntp configuration** Privileged EXEC mode command shows the configuration of the Simple Network Time Protocol (SNTP).

Syntax

- **show sntp configuration**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays the current SNTP configuration of the device.

```
Console# show sntp configuration

Polling interval: 7200 seconds

MD5 Authentication keys: 8, 9
Authentication is required for synchronization.
Trusted Keys: 8, 9

Unicast Clients: Enabled
Unicast Clients Polling: Enabled

Server              Polling         Encryption Key
------------        -------         --------------
176.1.1.8           Enabled         9
176.1.8.179         Disabled        Disabled

Broadcast Clients: Enabled
Anycast Clients: Enabled
Broadcast and Anycast Interfaces: 1/e1, 1/e3
```

show sntp status

The **show sntp status** Privileged EXEC mode command shows the status of the Simple Network Time Protocol (SNTP).

Syntax

- **show sntp status**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example shows the status of the SNTP.

```
Console# show sntp status
Clock is synchronized, stratum 4, reference is 176.1.1.8, unicast
Reference time is AFE2525E.70597B34 (00:10:22.438 PDT Jul 5 1993)

Unicast servers:
Server       Status     Last response                      Offset   Delay
                                                           [mSec]   [mSec]
-----------  -------    ---------------------------        ------   ------
176.1.1.8    Up         19:58:22.289 PDT Feb 19 2002       7.33     117.79
176.1.8.179  Unknown    12:17.17.987 PDT Feb 19 2002       8.98     189.19

Anycast server:
Server       Interface  Status  Last response              Offset   Delay
                                                           [mSec]   [mSec]
---------    -------    -----   --------------------------  ------   -----
176.1.11.8   VLAN 118   Up      9:53:21.789 PDT Feb 19 2002  7.19     119.89

Broadcast:
Interface    Interface         Last response
---------    ---------         ----------------------------
176.9.1.1    VLAN 119          19:17:59.792 PDT Feb 19 2002
```

8

Configuration and Image Files

copy

The **copy** Privileged EXEC mode command copies any file from a source to a destination.

Syntax

- **copy** *source-url destination-url* [**snmp**]
  - *source-url* — The location URL or reserved keyword of the source file to be copied.
  - *destination-url* — The destination file URL or reserved keyword of the destination file.
  - **snmp —** Used only when copying from/to **startup-config**. Specifies that the destination/source file is in SNMP format

  The following table displays keywords and URL prefixes:

Keyword	Source or destination
flash	Source or destination URL for Flash memory. It's the default in case a URL is specified without a prefix
running-config	Represents the current running configuration file.
startup-config	Represents the startup configuration file.
image	If source file, represent the active image file. If destination file, represent the non-active image file.
boot	Boot file.
tftp:	Source or destination URL for a TFTP network server. The syntax for this alias is **tftp**:*//host/***[**directory**]***/filename*. The host can be either IP address or hostname. An out-of-band IP address can be specified as described in the usage guidelines.
xmodem:	Source for the file from a serial connection that uses the Xmodem protocol.
unit://member/**startup-config**	Configuration file used during initialization (startup) on one of the units.
unit://member/**image**	Image file on one of the units. For copy from master to all units you can use "*" in the member field.
null:	Null destination for copies or files. A remote file can be copied to null to determine its size.

backup-config	Represents the backup configuration file.
unit://*member*/**backup-config**	Backup configuration file on one of the units.
logging	Copy from a syslog file.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- The location of a file system dictates the format of the source or destination URL.
- The entire copying process may take several minutes and differs from protocol to protocol and from network to network.

Understanding Invalid Combinations of Source and Destination

Some invalid combinations of source and destination exist. Specifically, the following cannot be copied:

- If the source file and destination file are the same file.
- **xmodem** cannot be a destination. Can only be copied to **image**, **boot** and **null**.
- **tftp** cannot be the source and destination on the same copy.
- *.prv files can't be copied.
- Copy to or from the slave units is for image and boot files only.

The following table describes copy characters:

Character	Description
!	For network transfers, indicates that the copy process is taking place. Each exclamation point indicates successful transfer of ten packets (512 bytes each).
.	For network transfers, indicates that the copy process timed out. Generally, many periods in a row means that the copy process may fail.

Copying image file from a Server to Flash Memory

Use the **copy source-url image** command to copy an image file from a server to Flash memory.

Copying boot file from a Server to Flash Memory

Use the **copy source-url boot** command to copy a boot file from a server to Flash memory.

Copying a Configuration File from a Server to the Running Configuration

Use the **copy source-url running-config** command to load a ’configuration file’ from a network server to the device ’running configuration’. The configuration is added to the ’running configuration’ as if the commands were typed in the command-line interface (CLI). The resulting configuration file is a combination of the previous ’running configuration’ and the loaded ’configuration file", with the loaded "configuration file’ having precedence.

Copying a Configuration File from a Server to the Startup Configuration

Use the **copy source-url startup-config** command to copy a "configuration file" from a network server to the device ’startup configuration’. These commands replace the startup configuration file with the copied configuration file.

Storing the Running or Startup Configuration on a Server

Use the copy **running-config destination-url** command to copy the current configuration file to a network server using TFTP. Use the copy **startup-config destination-url** command to copy the ’startup configuration’ file to a network server.

The configuration file copy can serve as a backup copy.

Saving the Running Configuration to the Startup Configuration

Use the copy **running-config startup-config** command to copy the ’running configuration’ to the ’startup configuration’.

Backup the Running Configuration or Startup Configuration to a Backup Configuration file

Use the **copy running-config flash: //FILE_NAME** to backup the running configuration to the backup configuration file. Use the **copy startup-config flash: //FILE_NAME** command to backup the startup configuration to the backup configuration file.

Example

The following example copies a system image named file1 from the TFTP server with an IP address of 172.16.101.101 to non active image file.

```
console# copy tftp://172.16.101.101/file1 image
Accessing file 'file1' on 172.16.101.101...
Loading file1 from 172.16.101.101:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!! [OK]
Copy took 0:01:11 [hh:mm:ss]
```

delete

The **delete** Privileged EXEC mode command deletes a file from a flash memory device.

Syntax

- **delete** *url*
  - *url* — The location URL or reserved keyword of the file to be deleted. (Range: 1 - 160 characters)

  The following table displays keywords and URL prefixes:

Keyword	Source or Destination
flash:	Source or destination URL for flash memory. It is the default in case a URL is specified without a prefix.
startup-config	Represents the startup configuration file.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- *.sys, *.prv, image-1 and image-2 files cannot be deleted.

Examples

The following example deletes file **test** from flash memory.

```
Console# delete flash:test
Delete flash:test? [confirm]
```

delete startup-config

The **delete startup-config** Privileged EXEC mode command deletes the startup-config file.

Syntax

- **delete startup-config**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example deletes the startup-config file.

```
Console# delete startup-config
```

dir

The **dir** Privileged EXEC mode command displays a list of files on a flash file system.

Syntax

- **dir**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays files in the flash directory.

```
Console# dir
Directory of flash:
File Name       Permission Size       Modification Date  Modification Time
---------       ---------- ----       -----------------  -----------------
Image-1         rw         4325376    01-Jun-2003        01:04:21
Image-2         rw         4325376    01-Jun-2003        21:28:10
aaafile.prv     --         131072     01-Jun-2003        01:01:19
sshkeys.prv     --         262144     01-Jun-2003        01:01:05
syslog1.sys     r-         262144     01-Jun-2003        02:22:48
syslog2.sys     r-         262144     01-Jun-2003        02:22:48
directry.prv    --         262144     01-Jun-2003        01:01:02
startup-config  rw         1523       08-Feb-2005        09:02:31

Total size of flash: 15597568 bytes
Free size of flash: 5759287 bytes
```

more

The **more** Privileged EXEC mode command displays a file.

Syntax

- **more** *url*
  - *url* — The location URL or reserved keyword of the file to be displayed. (Range: 1 - 160 characters)

The following table displays keywords and URL prefixes:

Keyword	Source or Destination
flash:	Source or destination URL for flash memory. It is the default in case a URL is specified without a prefix.
running-config	Represents the current running configuration file.
startup-config	Represents the startup configuration file.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- Files are displayed in ASCII format, except for image files, which are displayed in hexadecimal format.
- *.prv and *.sys files cannot be displayed.

Example

The following example displays the contents of file **configuration.bak**.

```
Console# more configuration.bak
interface range ethernet 1/e(1-4)
duplex half
exit
interface range ethernet 2/g(1-4)
switchport mode general
exit
vlan database
vlan 2
exit
interface range ethernet 2/g(1-4)
switchport general allowed vlan add 2
exit
interface range ethernet 1/e(1-4)
no negotiation
exit
```

rename

The **rename** Privileged EXEC mode command renames a file.

Syntax

- **rename** *url new-url*
  - *url* — The location URL. (Range: 1 - 160 characters)
  - *new-url* — New URL. (Range: 1 - 160 characters)

  The following table displays keywords and URL prefixes:

Keyword	Source or Destination
flash:	Source or destination URL for flash memory. It is the default in case a URL is specified without a prefix.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- *.sys and *.prv files cannot be renamed.

Examples

The following example renames the configuration backup file.

```
Console# rename configuration.bak m-config.bak
```

boot system

The **boot system** Privileged EXEC mode command specifies the system image that the device loads at startup.

Syntax

- **boot system** [**unit** *unit*] {**image-1** | **image-2**}
  - *unit* — Specifies the unit number.
  - **image-1** — Specifies image 1 as the system startup image.
  - **image-2** — Specifies image 2 as the system startup image.

Default Configuration

If the unit number is unspecified, the default setting is the master unit number.

Command Mode

Privileged EXEC mode.

User Guidelines

- Use the **show bootvar** command to find out which image is the active image.

Examples

The following example loads system image 1 at device startup.

```
Console# boot system image-1
```

show running-config

The **show running-config** Privileged EXEC mode command displays the contents of the currently running configuration file.

Syntax

- **show running-config**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- This command displays the factory default settings at the end of the running configuration file contents.

Example

The following example displays the contents of the running configuration file.

```
console# show running-config
voice vlan oui-table add 0001e3 Siemens_AG_phone________
voice vlan oui-table add 00036b Cisco_phone_____________
voice vlan oui-table add 000fe2 H3C_Aolynk______________
voice vlan oui-table add 0060b9 Philips_and_NEC_AG_phone
voice vlan oui-table add 00d01e Pingtel_phone___________
voice vlan oui-table add 00e075 Polycom/Veritel_phone___
voice vlan oui-table add 00e0bb 3Com_phone______________
interface ethernet e2
port monitor e3
port monitor e4
port monitor e5
port monitor e6
exit
```

```
Default settings:

Service tag: service tag 0
SW version 1.0.0.1 (date Aug  9 2007 time 10:06:42)

Fast Ethernet Ports
-------------------------------
no shutdown
speed 100
duplex full
negotiation
flow-control off
mdix auto
no back-pressure

Gigabit Ethernet Ports
----------------------------
no shutdown
speed 1000
duplex full
negotiation
flow-control off
mdix auto
no back-pressure
console#
```

show startup-config

The **show startup-config** Privileged EXEC mode command displays the contents of the startup configuration file.

Syntax

- **show startup-config**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays the contents of the running configuration file.

```
Console# show startup-config
software version 1.1

hostname device

interface ethernet 1/e1
ip address 176.242.100.100 255.255.255.0
duplex full
speed 100

interface ethernet 1/e2
ip address 176.243.100.100 255.255.255.0
duplex full
speed 100
```

show bootvar

The **show bootvar** Privileged EXEC mode command displays the active system image file that is loaded by the device at startup.

Syntax

- **show bootvar** [**unit** *unit*]
  - *unit* — Specifies the unit number.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays the active system image file that is loaded by the device at startup.

```
Console# show bootvar
Image         Filename      Version       Date          Status
1             image-1       1.0.0.1                     Active*
2             image-2       1.0.0.2                     Not active
"*" designates that the image was selected for the next boot
```

9

DHCP Snooping

ip dhcp snooping

The **ip dhcp snooping** Global Configuration mode command globally enables DHCP snooping. Use the **no** form of this command to return to the default settings.

Syntax

- **ip dhcp snooping**
- **no ip dhcp snooping**

Default Configuration

The default configuration is disabled.

Command Mode

Global Configuration mode.

User Guidelines

- For any DHCP snooping configuration to take effect, you must globally enable DHCP snooping. DHCP snooping is not active until you enable snooping on a VLAN by using the **ip dhcp snooping vlan** global configuration command.

Example

The following example globally enables DHCP snooping:.

```
console(config)# ip dhcp snooping
```

ip dhcp snooping vlan

The **ip dhcp snooping vlan** Global Configuration mode command enables DHCP snooping on a VLAN. Use the **no** form of this command to disable DHCP snooping on a VLAN.

Syntax

- **ip dhcp snooping vlan** *vlan-id*
- **no ip dhcp snooping vlan** *vlan-id*
  - *vlan-id* — Specifies the VLAN ID.

Default Configuration

The default configuration is disabled.

Command Mode

Global Configuration mode.

User Guidelines

- You must first globally enable DHCP snooping before enabling DHCP snooping on a VLAN.

Example

The following example enables DHCP snooping on VLAN 1000:

```
console(config)# ip dhcp snooping vlan 1000
```

ip dhcp snooping trust

The **ip dhcp snooping trust** Interface Configuration (Ethernet, Port-channel) mode command configures a port as trusted for DHCP snooping purposes. Use the **no** form of this command to return to the default settings.

Syntax

- **ip dhcp snooping trust**
- **no ip dhcp snooping trust**

Default Configuration

The default configuration is that the interface is not trusted.

Command Mode

Interface Configuration (Ethernet, Port-channel) mode.

User Guidelines

- Configure as trusted ports those that are connected to a DHCP server or to other switches or routers. Configure as untrusted ports those that are connected to DHCP clients.

Example

The following example configures Ethernet port 1/e15 as trusted for DHCP snooping purposes.

```
console(config)# interface ethernet 1/e15
console(config-if)# ip dhcp snooping trust
```

ip dhcp snooping information option allowed-untrusted

The **ip dhcp snooping information option allowed-untrusted** Global Configuration mode command configures a switch to accept DHCP packets with option-82 information from an untrusted port. Use the **no** form of this command to configure the switch to drop these packets from an untrusted port.

Syntax

- **ip dhcp snooping information option allowed-untrusted**
- **no ip dhcp snooping information option allowed-untrusted**

Default Configuration
: The default configuration is to discard DHCP packets with option-82 information from an untrusted port.

Command Mode
: Global Configuration mode.

User Guidelines
: There are no user guidelines for this command.

Example

The following example configures a switch to accept DHCP packets with option-82 information from an untrusted port:.

```
console(config)#ip dhcp snooping information option allowed-
untrusted
```

ip dhcp snooping verify

The **ip dhcp snooping verify** Global Configuration mode command configures a switch to verify on an untrusted port that the source MAC address in a DHCP packet matches the client hardware address. Use the **no** form of this command to not verify the MAC addresses.

Syntax

- **ip dhcp snooping verify**
- **no ip dhcp snooping verify**

Default Configuration
: The default configuration is that the switch verifies the source MAC address in a DHCP packet that is received on untrusted ports matches the client hardware address in the packet.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example configures a switch to verify on an untrusted port that the source MAC address in a DHCP packet matches the client hardware address.

```
console(config)#ip dhcp snooping verify
```

ip dhcp snooping database

The **ip dhcp snooping database** Global Configuration mode command configures the DHCP snooping binding file. Use the **no** form of this command to delete the binding file.

Syntax

- **ip dhcp snooping database**
- **no ip dhcp snooping database**

Default Configuration
The URL is not defined.

Command Mode
Global Configuration mode.

User Guidelines

- To ensure that the lease time in the database is accurate, Simple Network Time Protocol (SNTP) is enabled and configured.
- The switch writes binding changes to the binding file only when the switch system clock is synchronized with SNTP.

Example

The following example configures the DHCP snooping binding file.

```
console(config)#ip dhcp snooping database
```

ip dhcp snooping database update-freq

The **ip dhcp snooping database update-freq** Global Configuration mode command configures the update frequency of the DHCP snooping binding file. Use the **no** form of this command to return to default.

Syntax

- **ip dhcp snooping database update-freq** *seconds*
- **no ip dhcp snooping database update-freq**
  - *seconds* — Specifies the update frequency in seconds. (Range 600 – 86400)

Default Configuration
The default configuration is 1200.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example configures the update frequency of the DHCP snooping binding file to be 24000 seconds.

```
console(config)# ip dhcp snooping database update-freq 24000
```

ip dhcp snooping binding

The **ip dhcp snooping binding** Privileged EXEC mode command configures the DHCP snooping binding database and adds binding entries to the database. Use the **no** form of this command to delete entries from the binding database.

Syntax

- **ip dhcp snooping binding** *mac-address vlan-id ip-address* {**ethernet** *interface* | **port-channel** *port-channel-number*} **expiry** *seconds*
- **no ip dhcp snooping database binding** *mac-address vlan-id*
  - *mac-address* — Specifies a MAC address.
  - *vlan-id* — Specifies a VLAN number.
  - *ip-address* — Specifies an IP address.
  - *interface* — Specifies an Ethernet port.

- *port-channel-number* — Specifies a Port-channel number.
- **expiry** *seconds* — Specifies the interval, in seconds, after which the binding entry is no longer valid. (Range 10 – 4294967295 seconds)

Default Configuration

The default configuration is that no static binding exists.

Command Mode

Privileged EXEC mode.

User Guidelines

- After entering this command an entry is added to the DHCP snooping database. If a DHCP snooping binding file exists, the entry is also added to that file.
- The entry is displayed in the show commands as a “DHCP Snooping entry”.

Example

The following example configures the DHCP snooping binding database and adds binding entries to the database.

```
Console# ip dhcp snooping binding 3aa2.64b3.a245 1000
131.108.1.27 ethernet 1/e16 expiry 3000
```

clear ip dhcp snooping database

The **clear ip dhcp snooping database** Privileged EXEC mode command clears the DHCP snooping binding database.

Syntax

- **clear ip dhcp snooping database**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example clears the DHCP binding database:

```
Console# clear ip dhcp snooping database
```

show ip dhcp snooping

The **show ip dhcp snooping** User EXEC mode command displays the DHCP snooping configuration.

Syntax

- **show ip dhcp** snooping [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — Specifies an Ethernet port.
  - *port-channel-number* — Specifies a Port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the DHCP snooping configuration.

```
console> show ip dhcp snooping

DHCP snooping is Enabled

DHCP snooping is configured on following VLANs: 2

DHCP snooping database is Disabled

Verification of hwaddr field is Enabled

DHCP snooping file update frequency is configured to: 1200
seconds



Interface  Trusted
----       -----------
e15        yes
```

show ip dhcp snooping binding

The **show ip dhcp snooping binding** User EXEC mode command displays the DHCP snooping binding database and configuration information for all interfaces on a switch.

Syntax

- **show ip dhcp snooping binding** [**mac-address** *mac-address*] [**ip-address** *ip-address*] [**vlan** *vlan-id*] [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *mac-address* — Specifies a MAC address.
  - *ip-address* — Specifies an IP address.
  - *vlan-id* — Specifies a VLAN number.
  - *interface* — Specifies an Ethernet port.
  - *port-channel-number* — Specifies a Port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the DHCP snooping configuration.

```
Console# show ip dhcp snooping binding

Total number of binding: 2
 MAC         IP         Lease      Type       VLAN       Interface
Adreess    Address    (sec)
---------  --------   ---------  ---------  ---------  --------

console#
```

10

Ethernet Configuration Commands

interface ethernet

The **interface ethernet** Global Configuration mode command enters the interface configuration mode to configure an Ethernet type interface.

Syntax

- **interface ethernet** *interface*
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)

Default Configuration
This command has no default configuration.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example enables configuring Ethernet port 5/e18.

```
Console(config)# interface ethernet 5/e18
```

interface range ethernet

The **interface range ethernet** Global Configuration mode command configures multiple Ethernet type interfaces at the same time.

Syntax

- **interface range ethernet** {*port-range* | **all**}
  - *port-range* — List of valid ports. Where more than one port is listed, separate non-consecutive ports with a comma and no spaces, use a hyphen to designate a range of ports.
  - **all** — All Ethernet ports.

Default Configuration
This command has no default configuration.

Command Mode
Global Configuration mode.

User Guidelines

- Commands under the interface range context are executed independently on each active interface in the range. If the command returns an error on one of the active interfaces, it does not stop executing commands on other active interfaces.

Example

The following example shows how ports 5/e18 to 5/e20 and 3/e1 to 3/24 are grouped to receive the same command.

```
Console(config)# interface range ethernet 5/e18-5/e20,3/e1-3/e24
Console(config-if)#
```

shutdown

The **shutdown** Interface Configuration (Ethernet, port-channel) mode command disables an interface. Use the **no** form of this command to restart a disabled interface.

Syntax

- **shutdown**
- **no shutdown**

Default Configuration
The interface is enabled.

Command Mode
Interface Configuration (Ethernet, port-channel) mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following example disables Ethernet port 1/e5 operations.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# shutdown
```

The following example restarts the disabled Ethernet port.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# no shutdown
```

description

The **description** Interface Configuration (Ethernet, port-channel) mode command adds a description to an interface. Use the **no** form of this command to remove the description.

Syntax

- **description** *string*
- **no description**
  - *string* — Comment or a description of the port to enable the user to remember what is attached to the port. (Range: 1 - 64 characters)

Default Configuration
The interface does not have a description.

Command Mode
Interface Configuration (Ethernet, port-channel) mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example adds a description to Ethernet port 1/e5.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# description "RD SW#3"
```

speed

The **speed** Interface Configuration (Ethernet, port-channel) mode command configures the speed of a given Ethernet interface when not using auto-negotiation. Use the **no** form of this command to restore the default configuration.

Syntax

- **speed** {**10** | **100** | **1000**}
  - **10** — Forces 10 Mbps operation.
  - **100** — Forces 100 Mbps operation.
  - **1000** — Forces 1000 Mbps operation.

Default Configuration

Maximum port capability.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example configures the speed operation of Ethernet port 1/e5 to 100 Mbps operation.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# speed 100
```

duplex

The **duplex** Interface Configuration (Ethernet) mode command configures the full/half duplex operation of a given Ethernet interface when not using auto-negotiation. Use the **no** form of this command to restore the default configuration.

Syntax

- **duplex** {**half** | **full**}
- **no duplex**
  - **half** — Forces half-duplex operation
  - **full** — Forces full-duplex operation

Default Configuration

The interface is set to full duplex.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- When configuring a particular duplex mode on the port operating at 10/100 Mbps, disable the auto-negotiation on that port.
- Half duplex mode can be set only for ports operating at 10 Mbps or 100 Mbps.

Example

The following example configures the duplex operation of Ethernet port 1/e5 to full duplex operation.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# duplex full
```

negotiation

The **negotiation** command enables auto negotiation operation for the speed and duplex parameters of a given interface. Use the **no** form of this command to disable it.

Syntax

- **negotiation** *[capability1 [capability2…capability5]]*
- **no negotiation**
  - *capability* — Specifies the capabilities to advertise. (Possible values: 10h, 10f, 100h,100f, 1000f)

Default Configuration

Auto-negotiation is enabled.

User Guidelines

- There are no user guidelines for this command.

Example

The following example enables auto negotiation of Ethernet port 5.

```
(config)# interface ethernet 1/e5
(config-if)# negotiation
(config-if)#
```

flowcontrol

The **flowcontrol** Interface Configuration (Ethernet, port-channel) mode command configures flow control on a given interface. Use the **no** form of this command to disable flow control.

Syntax

- **flowcontrol** {**auto | on** | **off**}
- **no flowcontrol**
  - **auto** — Indicates auto-negotiation
  - **on** — Enables flow control.
  - **off** — Disables flow control.

Default Configuration
Flow control is off.

Command Mode
Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- Negotiation should be enabled for **flow control auto**.

Example

The following example enables flow control on port 1/e5.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# flowcontrol on
```

mdix

The **mdix** Interface Configuration (Ethernet) mode command enables cable crossover on a given interface. Use the **no** form of this command to disable cable crossover.

Syntax

- **mdix {on | auto}**
- **no mdix**
  - **on** — Manual mdix
  - **auto** — Automatic mdi/mdix

Default Configuration

The default setting is **on**.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- **Auto:** All possibilities to connect a PC with cross or normal cables are supported and are automatically detected.
- **On**: It is possible to connect to a PC only with a normal cable and to connect to another device only with a cross cable.
- **No**: It is possible to connect to a PC only with a cross cable and to connect to another device only with a normal cable.

Example

The following example enables automatic crossover on port 1/e5.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# mdix auto
```

back-pressure

The **back-pressure** Interface Configuration (Ethernet) mode command enables back pressure on a given interface. Use the **no** form of this command to disable back pressure.

Syntax

- **back-pressure**
- **no back-pressure**

Default Configuration

Back pressure is enabled.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- Back pressure cannot be configured on trunks.

Example

The following example enables back pressure on port 1/e5.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# back-pressure
```

clear counters

The **clear counters** User EXEC mode command clears statistics on an interface.

Syntax

- **clear counters** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — Valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example clears the counters for interface 1/e1.

```
Console> clear counters ethernet 1/e1
```

set interface active

The **set interface active** Privileged EXEC mode command reactivates an interface that was shutdown.

Syntax

- **set interface active** {**ethernet** *interface* | **port-channel** *port-channel-number*}
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — Valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines

- This command is used to activate interfaces that were configured to be active, but were shutdown by the system for some reason (for example **port security**.

Example

The following example reactivates interface 1/e5.

```
Console# set interface active ethernet 1/e5
```

show interfaces advertise

The **show interfaces advertise** Privileged EXEC mode command displays autonegotiation data.

Syntax

- **show interfaces advertise [ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — Valid port-channel number.

Default Configuration
This command has no default configuration.

Command Modes
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following examples display autonegotiation information.

```
Console# show interfaces advertise

Port    Type           Neg         Operational Link Advertisement
----    -----------    -------     ------------------------------
1/e1    100M-Copper    Enabled     --
1/e2    100M-Copper    Enabled     --
1/e3    100M-Copper    Enabled     --
1/e4    100M-Copper    Enabled     --
1/e5    100M-Copper    Enabled     100f, 100h, 10f, 10h
1/e6    100M-Copper    Enabled     --
1/e7    100M-Copper    Enabled     --
1/e8    100M-Copper    Enabled     --
1/e9    100M-Copper    Enabled     --
1/e10   100M-Copper    Enabled     --
1/e11   100M-Copper    Enabled     --
1/e12   100M-Copper    Enabled     --
1/e13   100M-Copper    Enabled     --
1/e14   100M-Copper    Enabled     --
1/e15   100M-Copper    Enabled     --
1/e16   100M-Copper    Enabled     --
1/e17   100M-Copper    Enabled     --
1/e18   100M-Copper    Enabled     --
1/e19   100M-Copper    Enabled     --
1/e20   100M-Copper    Enabled     --
```

show interfaces configuration

The **show interfaces configuration** Privileged EXEC mode command displays the configuration for all configured interfaces.

Syntax

- **show interfaces configuration [ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — Valid port-channel number.

Default Configuration

This command has no default configuration.

Command Modes

Privileged EXEC mode.

User Guidelines

- To view information on autonegotiation capabilities, use the **show interfaces advertise** Privileged EXEC mode command.

Example

The following example displays the configuration of all configured interfaces.

```
Console# show interfaces configuration

Port    Type     Duplex  Speed  Neg      Flow  Link   Back      Mdix
                                         Ctrl  State  Pressure  Mode
----    -------  ------  -----  -------  ----  -----  --------  ----
        ----
1/e1    100M-    Full    100    Enabled  Off   Up     Disabled  Auto
        Copper
1/e2    100M-    Full    100    Enabled  Off   Up     Disabled  Auto
        Copper
1/e3    100M-    Full    100    Enabled  Off   Up     Disabled  Auto
        Copper
1/e4    100M-    Full    100    Enabled  Off   Up     Disabled  Auto
        Copper
1/e5    100M-    Full    100    Enabled  Off   Up     Disabled  Auto
        Copper
1/e6    100M-    Full    100    Enabled  Off   Up     Disabled  Auto
        Copper
1/e7    100M-    Full    100    Enabled  Off   Up     Disabled  Auto
        Copper
```

```
1/e8    100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e9    100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e10   100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e11   100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e12   100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e13   100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e14   100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e15   100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e16   100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e17   100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e18   100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
1/e19   100M-Copper    Full    100    Enabled  Off   Up     Disabled  Auto
```

show interfaces status

The **show interfaces status** Privileged EXEC mode command displays the status of all configured interfaces.

Syntax

- **show interfaces status [ethernet** *interface*| **port-channel** *port-channel-number*]
  - *interface* — A valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the status of all configured interface.

```
Console# show interfaces status

Port   Type          Duplex  Speed  Neg      Flow  Link   Back       Mdix
                                             Ctrl  State  Pressure   Mode
----   -----------   ------  -----  -------  ----  -----  --------   ----
1/e1   100M-Copper   --      --     --       --    Down   --         --
1/e2   100M-Copper   --      --     --       --    Down   --         --
1/e3   100M-Copper   --      --     --       --    Down   --         --
1/e4   100M-Copper   --      --     --       --    Down   --         --
1/e5   100M-Copper   Full    100    Enabled  Off   Up     Disabled   On
1/e6   100M-Copper   --      --     --       --    Down   --         --
1/e7   100M-Copper   --      --     --       --    Down   --         --
1/e8   100M-Copper   --      --     --       --    Down   --         --
1/e9   100M-Copper   --      --     --       --    Down   --         --
1/e10  100M-Copper   --      --     --       --    Down   --         --
1/e11  100M-Copper   --      --     --       --    Down   --         --
1/e12  100M-Copper   --      --     --       --    Down   --         --
1/e13  100M-Copper   --      --     --       --    Down   --         --
1/e14  100M-Copper   --      --     --       --    Down   --         --
1/e15  100M-Copper   --      --     --       --    Down   --         --
1/e16  100M-Copper   --      --     --       --    Down   --         --
1/e17  100M-Copper   --      --     --       --    Down   --         --
1/e18  100M-Copper   --      --     --       --    Down   --         --
1/e19  100M-Copper   --      --     --       --    Down   --         --
```

show interfaces description

The **show interfaces description** Privileged EXEC mode command displays the description for all configured interfaces.

Syntax

- **show interfaces description [ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Modes

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays descriptions of configured interfaces.

```
Console# show interfaces description

Port       Description
----       -----------
1/e1       lab
1/e2
1/e3
1/e4
1/e5
1/e6
ch1
ch2
```

show interfaces counters

The **show interfaces counters** User EXEC mode command displays traffic seen by the physical interface.

Syntax

- **show interfaces counters** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — A valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Modes

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays traffic seen by the physical interface.

```
Console# show interfaces counters

Port    InOctets      InUcastPkts     InMcastPkts   InBcastPkts
----    --------      -----------     -----------   -----------
1/e1    183892        0               0             0
2/e1    0             0               0             0
3/e1    123899        0               0             0

Port    OutOctets     OutUcastPkts    OutMcastPkts  OutBcastPkts
-----   ----------    ------------    ------------  ------------
1/e1    9188          0               0             0
2/e1    0             0               0             0
3/e1    8789          0               0             0
```

```
Ch      InOctets      InUcastPkts     InMcastPkts   InBcastPkts
---     --------      ----------      -----------   -----------
1       27889         0               0             0

Ch      OutOctets     OutUcastPkts    OutMcastPkts  OutBcastPkts
---     ---------     ------------    ------------  ------------
1       23739         0               0             0
```

The following example displays counters for Ethernet port 1/e1.

```
Console# show interfaces counters ethernet 1/e1

Port    InOctets     InUcastPkts     InMcastPkts     InBcastPkts
------  -----------  --------------  -----------     -----------
1/e1    183892       0               0               0

Port    OutOctets    OutUcastPkts    OutMcastPkts    OutBcastPkts
------  -----------  --------------  ------------    ------------
1/e1    9188         0               0               0

FCS Errors: 8
Single Collision Frames: 0
Late Collisions: 0
Oversize Packets: 0
Internal MAC Rx Errors: 0
Symbol Errors: 0
Received Pause Frames: 0
Transmitted Pause Frames: 0
```

The following table describes the fields shown in the display.

Field	Description
InOctets	Counted received octets.
InUcastPkts	Counted received Unicast packets.
InMcastPkts	Counted received Multicast packets.
InBcastPkts	Counted received Broadcast packets.
OutOctets	Counted transmitted octets.
OutUcastPkts	Counted transmitted Unicast packets.
OutMcastPkts	Counted transmitted Multicast packets.
OutBcastPkts	Counted transmitted Broadcast packets.
FCS Errors	Counted received frames that are an integral number of octets in length but do not pass the FCS check.
Single Collision Frames	Counted frames that are involved in a single collision, and are subsequently transmitted successfully.
Late Collisions	Number of times that a collision is detected later than one slotTime into the transmission of a packet.
Oversize Packets	Counted frames received that exceed the maximum permitted frame size.
Internal MAC Rx Errors	Counted frames for which reception fails due to an internal MAC sublayer receive error.
Received Pause Frames	Counted MAC Control frames received with an opcode indicating the PAUSE operation.
Transmitted Pause Frames	Counted MAC Control frames transmitted on this interface with an opcode indicating the PAUSE operation.

port storm-control include-multicast

The **port storm-control include-multicast** Interface Configuration (Ethernet) mode command counts Multicast packets in Broadcast storm control. Use the **no** form of this command to disable counting Multicast packets.

Syntax

- **port storm-control include-multicast**
- **no port storm-control include-multicast**

  Count unknown Unicast packets.

Default Configuration

Multicast packets are not counted.

Command Modes
Interface Configuration (Ethernet) mode.

User Guidelines

- To control Multicasts storms, use the **port storm-control broadcast enable** and **port storm-control broadcast rate** commands.

Example

The following example enables counting Broadcast and Multicast packets on Ethernet port 2/e3.

```
Console(config)# interface ethernet 2/e3
Console(config-if)# port storm-control include-multicast
```

port storm-control broadcast enable

The **port storm-control broadcast enable** Interface Configuration (Ethernet) mode command enables Broadcast storm control. Use the **no** form of this command to disable Broadcast storm control.

Syntax

- **port storm-control broadcast enable**
- **no port storm-control broadcast enable**

Default Configuration
Broadcast storm control is disabled.

Command Modes
Interface Configuration (Ethernet) mode.

User Guidelines

- Use the **port storm-control broadcast rate** Interface Configuration (Ethernet) mode command, to set the maximum allowable Broadcast rate.
- Use the **port storm-control include-multicast** Interface Configuration (Ethernet) mode command to count Multicast packets in the storm control calculation.
- The command can be enabled on specific port only if **rate-limit** interface configuration command is not enabled on that port.

Example

The following example enables storm control on Ethernet port 1/e5.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# port storm-control broadcast enable
```

port storm-control broadcast rate

The **port storm-control broadcast rate** Interface Configuration (Ethernet) mode command configures the maximum Broadcast rate. Use the **no** form of this command to return to the default configuration.

Syntax

- **port storm-control broadcast rate** *rate*
- **no port storm-control broadcast rate**
  - *rate* —Maximum kilobytes per second of Broadcast and Multicast traffic on a port. (Range: 70 - 1000000)

Default Configuration

The default configuration is disabled.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- Use the **port storm-control broadcast enable** Interface Configuration mode command to enable Broadcast storm control.

Example

The following example configures the maximum storm control Broadcast rate at 900 Kbits/Sec on Ethernet port 1/e5.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# port storm-control broadcast rate 900
```

show ports storm-control

The **show ports storm-control** Privileged EXEC mode command displays the storm control configuration.

Syntax

- **show ports storm-control** [*interface*]
  - *interface* — A valid Ethernet port. (Full syntax: *unit/port*)

Default Configuration

This command has no default configuration.

Command Modes

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the storm control configuration.

```
Console# show ports storm-control

Port     State     Rate       Included
                   [Kbits/
                   Sec]
----     --------  ---------  ------------------------------.
1/e1     Disabled  3500       Broadcast
1/e2     Disabled  3500       Broadcast
1/e3     Disabled  3500       Broadcast
1/e4     Disabled  3500       Broadcast, Multicast
1/e5     Disabled  3500       Broadcast
1/e6     Disabled  3500       Broadcast
1/e7     Disabled  3500       Broadcast
1/e8     Disabled  3500       Broadcast
1/e9     Disabled  3500       Broadcast
```

11

GVRP Commands

gvrp enable (Global)

GARP VLAN Registration Protocol (GVRP) is an industry-standard protocol designed to propagate VLAN information from device to device. With GVRP, a single device is manually configured with all desired VLANs for the network, and all other devices on the network learn these VLANs dynamically.

The **gvrp enable** Global Configuration mode command enables GVRP globally. Use the **no** form of this command to disable GVRP on the device.

Syntax

- **gvrp enable**

  no gvrp enable

Default Configuration
GVRP is globally disabled.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example enables GVRP globally on the device.

```
Console(config)# gvrp enable
```

gvrp enable (Interface)

The **gvrp enable** Interface Configuration (Ethernet, port-channel) mode command enables GVRP on an interface. Use the **no** form of this command to disable GVRP on an interface.

Syntax

- **gvrp enable**
- **no gvrp enable**

Default Configuration

GVRP is disabled on all interfaces.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- An access port does not dynamically join a VLAN because it is always a member in only one VLAN.
- Membership in an untagged VLAN is propagated in the same way as in a tagged VLAN. That is, the PVID is manually defined as the untagged VLAN VID.

Example

The following example enables GVRP on Ethernet port 1/e6.

```
Console(config)# interface ethernet 1/e6
Console(config-if)# gvrp enable
```

garp timer

The **garp timer** Interface Configuration (Ethernet, Port channel) mode command adjusts the values of the join, leave and leaveall timers of GARP applications. Use the **no** form of this command to return to the default configuration.

Syntax

- **garp timer** {**join** | **leave** | **leaveall**} *timer_value*
- **no garp timer**
  - {**join** | **leave** | **leaveall**} — Indicates the type of timer.
  - *timer_value* — Timer values in milliseconds in multiples of 10. (Range: 10 - 2147483647)

Default Configuration

Following are the default timer values:

- Join timer — 200 milliseconds
- Leave timer — 600 milliseconds
- Leavall timer — 10000 milliseconds

Command Mode
Interface configuration (Ethernet, port-channel) mode.

User Guidelines

- The following relationship must be maintained between the timers:
  - Leave time must be greater than or equal to three times the join time.
  - Leave-all time must be greater than the leave time.
- Set the same GARP timer values on all Layer 2-connected devices. If the GARP timers are set differently on Layer 2-connected devices, the GARP application will not operate successfully.

Example

The following example sets the leave timer for Ethernet port 1/e6 to 900 milliseconds.

```
Console(config)# interface ethernet 1/e6
Console(config-if)# garp timer leave 900
```

gvrp vlan-creation-forbid

The **gvrp vlan-creation-forbid** Interface Configuration (Ethernet, port-channel) mode command disables dynamic VLAN creation or modification. Use the **no** form of this command to enable dynamic VLAN creation or modification.

Syntax

- **gvrp vlan-creation-forbid**
- **no gvrp vlan-creation-forbid**

Default Configuration
Dynamic VLAN creation or modification is enabled.

Command Mode
Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- This command forbids dynamic VLAN creation from the interface. The creation or modification of dynamic VLAN registration entries as a result of the GVRP exchanges on an interface are restricted only to those VLANs for which static VLAN registration exists.

Example

The following example disables dynamic VLAN creation on Ethernet port 1/e6.

```
console(config)# interface ethernet 1/e6
console(config-if)# gvrp vlan-creation-forbid
```

gvrp registration-forbid

The **gvrp registration-forbid** Interface Configuration (Ethernet, port-channel) mode command deregisters all dynamic VLANs on a port and prevents VLAN creation or registration on the port. Use the **no** form of this command to allow dynamic registration of VLANs on a port.

Syntax

- **gvrp registration-forbid**
- **no gvrp registration-forbid**

Default Configuration

Dynamic registration of VLANs on the port is allowed.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example forbids dynamic registration of VLANs on Ethernet port 1/e6.

```
Console(config)# interface ethernet 1/e6
Console(config-if)# gvrp registration-forbid
```

clear gvrp statistics

The **clear gvrp statistics** Privileged EXEC mode command clears all GVRP statistical information.

Syntax

- **clear gvrp statistics** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — A valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — A valid port-channel number.

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example clears all GVRP statistical information on Ethernet port 1/e6.

```
console# clear gvrp statistics ethernet 1/e6
```

show gvrp configuration

The **show gvrp configuration** User EXEC mode command displays GVRP configuration information, including timer values, whether GVRP and dynamic VLAN creation is enabled, and which ports are running GVRP.

Syntax

- **show gvrp configuration** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — A valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — A valid port-channel number.

Default Configuration
This command has no default configuration.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays GVRP configuration information:

```
Console> show gvrp configuration

GVRP Feature is currently enabled on the device.

                                                    Timers (milliseconds)
Port(s)  Status   Registration   Dynamic VLAN    Join   Leave   Leave All
                                Creation
------   -------  ------------   -----------     ----   -----   ---------
2/e1     Enabled  Normal         Enabled         200    600     10000
4/e4     Enabled  Normal         Enabled         200    600     10000
```

show gvrp statistics

The **show gvrp statistics** User EXEC mode command displays GVRP statistics.

Syntax

- **show gvrp statistics** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — A valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example shows GVRP statistical information.

```
Console> show gvrp statistics

GVRP Statistics:
Legend:
rJE  :   Join Empty Received       rJIn:   Join In Received
rEmp :   Empty Received            rLIn:   Leave In Received
rLE  :   Leave Empty Received      rLA :   Leave All Received
sJE  :   Join Empty Sent           sJIn:   Join In Sent
sEmp :   Empty Sent                sLIn:   Leave In Sent
sLE  :   Leave Empty Sent          sLA :   Leave All Sent
Port   rJE  rJIn  rEmp  rLIn   rLE   rLA   sJE  sJIn  sEmp  sLIn
sLE   sLA
```

show gvrp error-statistics

The **show gvrp error-statistics** User EXEC mode command displays GVRP error statistics.

Syntax

- **show gvrp error-statistics** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — A valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays GVRP statistical information.

```
Console> show gvrp error-statistics
GVRP Error Statistics:
Legend:
INVPROT :  Invalid Protocol Id        INVALEN :  Invalid Attribute Length
INVATYP :  Invalid Attribute Type     INVEVENT:  Invalid Event
INVAVAL :  Invalid Attribute Value
 Port INVPROT INVATYP INVAVAL INVALEN INVEVENT
```

12

IGMP Snooping Commands

ip igmp snooping (Global)

The **ip igmp snooping** Global Configuration mode command enables Internet Group Management Protocol (IGMP) snooping. Use the **no** form of this command to disable IGMP snooping.

Syntax

- **ip igmp snooping**
- **no ip igmp snooping**

Default Configuration
IGMP snooping is disabled.

Command Mode
Global Configuration mode.

User Guidelines

- IGMP snooping can only be enabled on static VLANs. It must not be enabled on Private VLANs or their community VLANs.

Example

The following example enables IGMP snooping.

```
Console(config)# ip igmp snooping
```

ip igmp snooping (Interface)

The **ip igmp snooping** Interface Configuration (VLAN) mode command enables Internet Group Management Protocol (IGMP) snooping on a specific VLAN. Use the **no** form of this command to disable IGMP snooping on a VLAN interface.

Syntax

- **ip igmp snooping**
- **no ip igmp snooping**

Default Configuration
IGMP snooping is disabled.

Command Mode
Interface Configuration (VLAN) mode.

User Guidelines

- IGMP snooping can only be enabled on static VLANs. It must not be enabled on Private VLANs or their community VLANs.

Example

The following example enables IGMP snooping on VLAN 2.

```
Console(config)# interface vlan 2
Console(config-if)# ip igmp snooping
```

ip igmp snooping mrouter

The **ip igmp snooping mrouter** Interface Configuration (VLAN) mode command enables automatic learning of Multicast router ports in the context of a specific VLAN. Use the **no** form of this command to remove automatic learning of Multicast router ports.

Syntax

- **ip igmp snooping mrouter learn-pim-dvmrp**
- **no ip igmp snooping mrouter learn-pim-dvmrp**

Default Configuration
Automatic learning of Multicast router ports is enabled.

Command Mode
Interface Configuration (VLAN) mode.

User Guidelines

- Multicast router ports can be configured statically using the **bridge multicast forward-all** Interface Configuration (VLAN) mode command.

Example

The following example enables automatic learning of Multicast router ports on VLAN 2.

```
Console(config) # interface vlan 2
Console(config-if)# ip igmp snooping mrouter learn-pim-dvmrp
```

ip igmp snooping host-time-out

The **ip igmp snooping host-time-out** Interface Configuration (VLAN) mode command configures the host-time-out. If an IGMP report for a Multicast group was not received for a host-time-out period from a specific port, this port is deleted from the member list of that Multicast group. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip igmp snooping host-time-out** *time-out*
- **no ip igmp snooping host-time-out**
  - *time-out* — Host timeout in seconds. (Range: 1 - 2147483647)

Default Configuration
The default host-time-out is 260 seconds.

Command Mode
Interface Configuration (VLAN) mode.

User Guidelines
The timeout should be at least greater than 2*query_interval+max_response_time of the IGMP router.

Example

The following example configures the host timeout to 300 seconds.

```
Console(config)# interface vlan 2
Console(config-if)# ip igmp snooping host-time-out 300
```

ip igmp snooping mrouter-time-out

The **ip igmp snooping mrouter-time-out** Interface Configuration (VLAN) mode command configures the mrouter-time-out. The **ip igmp snooping mrouter-time-out** Interface Configuration (VLAN) mode command is used for setting the aging-out time after Multicast router ports are automatically learned. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip igmp snooping mrouter-time-out** *time-out*
- **no ip igmp snooping mrouter-time-out**
  - *time-out* — Multicast router timeout in seconds (Range: 1 - 2147483647)

Default Configuration

The default value is 300 seconds.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the Multicast router timeout to 200 seconds.

```
Console(config)# interface vlan 2
Console(config-if)# ip igmp snooping mrouter-time-out 200
```

ip igmp snooping leave-time-out

The **ip igmp snooping leave-time-out** Interface Configuration (VLAN) mode command configures the leave-time-out. If an IGMP report for a Multicast group was not received for a leave-time-out period after an IGMP Leave was received from a specific port, this port is deleted from the member list of that Multicast group. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip igmp snooping leave-time-out** {*time-out* | **immediate-leave**}
- **no ip igmp snooping leave-time-out**
  - *time-out* — Specifies the leave-time-out in seconds for IGMP queries. (Range: 0 - 2147483647)
  - **immediate-leave** — Indicates that the port should be immediately removed from the members list after receiving IGMP Leave.

Default Configuration

The default leave-time-out configuration is 10 seconds.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

- The leave timeout should be set greater than the maximum time that a host is allowed to respond to an IGMP query.
- Use **immediate leave** only where there is just one host connected to a port.

Example

The following example configures the host leave-time-out to 60 seconds.

```
Console(config)# interface vlan 2
Console(config-if)# ip igmp snooping leave-time-out 60
```

ip igmp snooping querier enable

The **ip igmp snooping querier enable** Interface Configuration mode command enables Internet Group Management Protocol (IGMP) querier on a specific VLAN. Use the **no** form of this command to disable IGMP querier on a VLAN interface.

Syntax

- **ip igmp snooping querier enable**
- **no ip igmp snooping querier enable**

Default Configuration

Disabled.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

- IGMP snooping querier can be enabled on a VLAN only if IGMP snooping is enabled for that VLAN.
- No more than one switch can be configured as an IGMP Querier for a VLAN.
- When IGMP Snooping Querier is enabled, it starts after host-time-out/2 with no IGMP traffic detected from a Multicast router.
- The IGMP Snooping Querier would disable itself if it detects IGMP traffic from a Multicast router. It would restart itself after host-time-out/2.
- Following are the IGMP Snooping Querier parameters as function of the IGMP Snooping parameters:
- QueryMaxResponseTime: host-time-out/15.
- QueryInterval: host-time-out/ 3.

Example

The following example enables IGMP querier on VLAN 2.

```
console# config
console(config)# interface vlan 2
VLAN 2 does not exist.
All settings will be applied to VLAN 2 when it is created.
console(config-if-ghost-vlan)# ip igmp snooping querier enable
console(config-if-ghost-vlan)#
```

ip igmp snooping querier address

The **ip igmp snooping querier address** Interface Configuration mode command defines the source IP address used by the IGMP Snooping querier. Use the no form of this command to return to default.

Syntax

- **ip igmp snooping querier address ip-address**
- **no ip igmp snooping querier address**

Default Configuration

If an IP address is configured for the VLAN, it is used as the source address of the IGMP snooping querier.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

- If an IP address is not configured by this command, and no IP address is configured for the IGMP querier VLAN interface, the qurier is disabled.

Example

The following example enables IGMP querier on a specific VLAN.

```
console(config)# interface vlan 2
VLAN 2 does not exist.
All settings will be applied to VLAN 2 when it is created.
console(config-if-ghost-vlan)# ip igmp snooping querier enable
console(config-if-ghost-vlan)# ip igmp snooping querier address
% missing mandatory parameter
console(config-if-ghost-vlan)# ip igmp snooping querier address
1.1.1.1
console(config-if-ghost-vlan)#
```

show ip igmp snooping mrouter

The **show ip igmp snooping mrouter** User EXEC mode command displays information on dynamically learned Multicast router interfaces.

Syntax

- **show ip igmp snooping mrouter** [**interface** *vlan-id*]
  - *vlan-id* — VLAN number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays Multicast router interfaces in VLAN 1000.

```
Console> Stack# show ip igmp snooping mrouter interface 1

VLAN        Ports             Static            Forbidden
------      -------           ----------        ------------
1           3/e41
```

show ip igmp snooping interface

The **show ip igmp snooping interface** User EXEC mode command displays IGMP snooping configuration.

Syntax

- **show ip igmp snooping interface** *vlan-id*
  - *vlan-id* — VLAN number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The example displays IGMP snooping information.

```
Console # show ip igmp snooping interface 1000
IGMP Snooping is globally enabled

IGMP Snooping admin: Enabled
Hosts and routers IGMP version: 2
IGMP snooping oper mode: Enabled
IGMP snooping querier admin: Enabled
IGMP snooping querier oper: Enabled
IGMP snooping querier address admin:
IGMP snooping querier address oper: 172.16.1.1



IGMP host timeout is 300 sec
IGMP Immediate leave is disabled. IGMP leave timeout is 10 sec
IGMP mrouter timeout is 300 sec
Automatic learning of multicast router ports is enabled
```

show ip igmp snooping groups

The **show ip igmp snooping groups** User EXEC mode command displays Multicast groups learned by IGMP snooping.

Syntax

- **show ip igmp snooping groups** [**vlan** *vlan-id*] [**address** *ip-multicast-address*]
  - *vlan-id* — VLAN number.
  - *ip-multicast-address* — IP Multicast address.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

- To see the full Multicast Address Table (including static addresses) use the **show bridge multicast address-table** Privileged EXEC command.

Example

The following example shows IGMP snooping information on Multicast groups.

```
Console> show ip igmp snooping groups

Vlan         IP Address           Querier        Ports
----         ------------------   --------       ------------
1            224-239.130|2.2.3    Yes            1/e1, 2/e2
19           224-239.130|2.2.8    Yes            1/e9-e11

IGMP Reporters that are forbidden statically:
-------------------------------------------
Vlan         IP Address           Ports
----         ------------------   ------------
1            224-239.130|2.2.3    1/e19
```

13

IP Addressing Commands

ip address

The **ip address** Interface Configuration (Ethernet, VLAN, port-channel) mode command sets an IP address. Use the **no** form of this command to remove an IP address.

Syntax

ip address *ip-address* {*mask* | *prefix-length*}

no ip address [*ip-address*]

- *ip-address* — Valid IP address
- *mask* — Valid network mask of the IP address.
- *prefix-length* — Specifies the number of bits that comprise the IP address prefix. The prefix length must be preceded by a forward slash (/). (Range: 8 - 30)

Default Configuration

No IP address is defined for interfaces.

Command Mode

Interface Configuration (Ethernet, VLAN, port-channel) mode.

User Guidelines

- An IP address cannot be configured for a range of interfaces (range context).

Example

The following example configures VLAN 1 with IP address 131.108.1.27 and subnet mask 255.255.255.0.

```
Console(config)# interface vlan 1
Console(config-if)# ip address 131.108.1.27 255.255.255.0
```

ip address dhcp

The **ip address dhcp** Interface Configuration (Ethernet, VLAN, port-channel) mode command acquires an IP address for an Ethernet interface from the Dynamic Host Configuration Protocol (DHCP) server. Use the **no** form of this command to deconfigure an acquired IP address.

Syntax

- **ip address dhcp** [**hostname** *host-name*]
- **no ip address dhcp**
  - *host-name* — Specifies the name of the host to be placed in the DHCP option 12 field. This name does not have to be the same as the host name specified in the **hostname** Global Configuration mode command. (Range: 1-20 characters)

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet, VLAN, port-channel) mode.

User Guidelines

- The **ip address dhcp** command allows any interface to dynamically learn its IP address by using the DHCP protocol.
- Some DHCP servers require that the DHCPDISCOVER message have a specific host name. The **ip address dhcp hostname** *host-name* command is most typically used when the host name is provided by the system administrator.
- If the device is configured to obtain its IP address from a DHCP server, it sends a DHCPDISCOVER message to provide information about itself to the DHCP server on the network.
- If the **ip address dhcp** command is used with or without the optional keyword, the DHCP option 12 field (host name option) is included in the DISCOVER message. By default, the specified DHCP host name is the globally configured host name of the device. However, the **ip address dhcp hostname** *host-name* command can be used to place a different host name in the DHCP option 12 field.
- The **no ip address dhcp** command deconfigures any IP address that was acquired, thus sending a DHCPRELEASE message.

Example

The following example acquires an IP address for Ethernet port 1/e16 from DHCP.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# ip address dhcp
```

ip default-gateway

The **ip default-gateway** Global Configuration mode command defines a default gateway (router). Use the **no** form of this command to return to the default configuration.

Syntax

- **ip default-gateway** *ip-address*
- **no ip default-gateway**
  - *ip-address* — Valid IP address of the default gateway.

Default Configuration

No default gateway is defined.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example defines default gateway 192.168.1.1.

```
Console(config)# ip default-gateway 192.168.1.1
```

show ip interface

The **show ip interface** User EXEC mode command displays the usability status of configured IP interfaces.

Syntax

- **show ip interface** [**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *port-channel number.*]
  - *interface-number* — Valid Ethernet port.
  - *vlan-id* — Valid VLAN number.
  - *port-channel number.* — Valid Port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example the displays the configured IP interfaces and their types.

```
Console# show ip interface

Gateway IP Address      Type                Activity status
------------------      ------              ---------------
10.7.1.1                Static              Active


IP address              Interface           Type
-------------           ---------           -------
10.7.1.192/24           VLAN 1              Static
10.7.2.192/24           VLAN 2              DHCP
```

arp

The **arp** Global Configuration mode command adds a permanent entry in the Address Resolution Protocol (ARP) cache. Use the **no** form of this command to remove an entry from the ARP cache.

Syntax

- **arp** *ip_addr hw_addr* {**ethernet** i*nterface-number* | **vlan** *vlan-id* | **port-channel** *port-channel number.*}
- **no arp** *ip_addr* {**ethernet** i*nterface-number* | **vlan** *vlan-id* | **port-channel** *port-channel number.*}
  - *ip_addr* — Valid IP address or IP alias to map to the specified MAC address.
  - *hw_addr* — Valid MAC address to map to the specified IP address or IP alias.
  - *interface-number* — Valid Ethernet port.
  - *vlan-id* — Valid VLAN number**.**
  - *port-channel number* — Valid Port-channel number.

Default Configuration
This command has no default configuration.

Command Mode
Global Configuration mode.

User Guidelines

- The software uses ARP cache entries to translate 32-bit IP addresses into 48-bit hardware addresses. Because most hosts support dynamic resolution, static ARP cache entries do not generally have to be specified.

Example

The following example adds IP address 198.133.219.232 and MAC address 00:00:0c:40:0f:bc to the ARP table.

```
Console(config)# arp 198.133.219.232 00:00:0c:40:0f:bc ethernet
1/e6
```

arp timeout

The **arp timeout** Global Configuration mode command configures how long an entry remains in the ARP cache. Use the **no** form of this command to return to the default configuration.

Syntax

- **arp timeout** *seconds*
- **no arp timeout**
  - *seconds* — Time (in seconds) that an entry remains in the ARP cache. (Range: 1 - 40000000)

Default Configuration
The default timeout is 60000 seconds.

Command Mode
Global Configuration mode.

User Guidelines

- It is recommended not to set the timeout value to less than 3600.

Example

The following example configures the ARP timeout to 12000 seconds.

```
Console(config)# arp timeout 12000
```

clear arp-cache

The **clear arp-cache** Privileged EXEC mode command deletes all dynamic entries from the ARP cache.

Syntax

- **clear arp-cache**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example deletes all dynamic entries from the ARP cache.

```
Console# clear arp-cache
```

show arp

The **show arp** Privileged EXEC mode command displays entries in the ARP table.

Syntax

- **show arp** [**ip-address** *ip-address*] [**mac-address** *mac-address*] [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *ip-address* — Displays the ARP entry of a specific IP address.
  - *mac-address* — Displays the ARP entry of a specific MAC address.
  - *interface* — Displays the ARP entry of a specific Ethernet port interface.
  - *port-channel-number* — Displays the ARP entry of a specific Port-channel number interface.

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays entries in the ARP table.

```
Console# show arp
ARP timeout: 80000 Seconds

Interface     IP address         HW address            Status
---------     ----------         -----------------     -------
1/e1          10.7.1.102         00:10:B5:04:DB:4B     Dynamic
2/e2          10.7.1.135         00:50:22:00:2A:A4     Static
```

ip domain-lookup

The **ip domain-lookup** Global Configuration mode command enables the IP Domain Naming System (DNS)-based host name-to-address translation. Use the **no** form of this command to disable DNS-based host name-to-address translation.

Syntax

- **ip domain-lookup**
- **no ip domain-lookup**

Default Configuration
IP Domain Naming System (DNS)-based host name-to-address translation is enabled.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following example enables IP Domain Naming System (DNS)-based host name-to-address translation.

```
Console(config)# ip domain-lookup
```

ip domain-name

The **ip domain-name** Global Configuration mode command defines a default domain name used by the software to complete unqualified host names (names without a dotted-decimal domain name). Use the **no** form of this command to remove the default domain name.

Syntax

- **ip domain-name** *name*
- **no ip domain-name**
  - *name* — Specifies the default domain name used to complete unqualified host names. Do not include the initial period that separates an unqualified name from the domain name. (Range: 1 - 158 characters)

Default Configuration

A default domain name is not defined.

Command Mode

Global Configuration mode.

User Guidelines

- This command enables host name-to-address translation. The preference in name-to-address resolution is determined by the type of host name-to-address entry. Static entries are read first, followed by DHCP entries and DNS-protocol entries.

Examples

The following example defines default domain name dell.com.

```
Console(config)# ip domain-name dell.com
```

ip name-server

The **ip name-server** Global Configuration mode command defines the available name servers. Use the **no** form of this command to remove a name server.

Syntax

- **ip name-server** *server-address* [*server-address2 … server-address8*]
- **no ip name-server** [*server-address1 … server-address8*]
  - *server-address* — Specifies IP addresses of the name server.

Default Configuration
No name server addresses are specified.

Command Mode
Global Configuration mode.

User Guidelines

- The preference of the servers is determined by the order in which they were entered.
- Up to 8 servers can be defined using one command or using multiple commands.

Examples

The following example sets the available name server.

```
Console(config)# ip name-server 176.16.1.18
```

ip host

The **ip host** Global Configuration mode command defines static host name-to-address mapping in the host cache. Use the **no** form of this command to remove the host name-to-address mapping.

Syntax

- **ip host** *name address*
- **no ip host** *name*
  - *name* — Name of the host (Range: 1 - 158 characters)
  - *address* — Associated IP address.

Default Configuration
No host is defined.

Command Mode
Global Configuration mode.

User Guidelines

- Up to 64 host name-to address mapping entries are permitted in the host cache.

Examples

The following example defines a static host name-to-address mapping in the host cache.

```
Console(config)# ip host accounting.dell.com 176.10.23.1
```

clear host

The **clear host** Privileged EXEC mode command deletes entries from the host name-to-address cache.

Syntax

- **clear host** {*name* | *****}
  - *name* — Specifies the host entry to be removed. (Range: 1 - 158 characters)
  - ***** — Removes all entries.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example deletes all entries from the host name-to-address cache.

```
Console# clear host *
```

clear host dhcp

The **clear host dhcp** Privileged EXEC mode command deletes entries from the host name-to-address mapping received from Dynamic Host Configuration Protocol (DHCP).

Syntax

- **clear host dhcp** {*name* | *****}
  - *name* — Specifies the host entry to be removed. (Range: 1 - 158 characters)
  - ***** — Removes all entries.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- This command deletes the host name-to-address mapping temporarily until the next renewal of the IP address.

Examples

The following example deletes all entries from the host name-to-address mapping.

```
Console# clear host dhcp *
```

show hosts

The **show hosts** Privileged EXEC mode command displays the default domain name; a list of name server hosts; the static and the cached list of host names and addresses.

Syntax

- **show hosts** [*name*]
  - *name* — Specifies the host name. (Range: 1 - 158 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays host information.

```
Console# show hosts
Host name: Device
Default domain is gm.com, sales.gm.com, usa.sales.gm.com(DHCP)
Name/address lookup is enabled
Name servers (Preference order): 176.16.1.18 176.16.1.19
Configured host name-to-address mapping:
Host                                Addresses
----                                ---------
accounting.gm.com                   176.16.8.8 176.16.8.9 (DHCP)

Cache:                TTL(Hours)
Host                Total  Elapsed  Type      Addresses
----                -----  -------  ------    ---------
www.stanford.edu     72       3     IP        171.64.14.203
```

14

IPv6 Addressing

ipv6 enable

The **ipv6 enable** Interface Configuration mode command enables IPv6 processing on an interface. Use the **no** form of this command to disable IPv6 processing on an interface.

Syntax

- **ipv6 enable** [**no-autoconfig**]
- **no ipv6 enable**
  - **no-autoconfig** — Enables IPv6 processing on an interface without a stateless address autoconfiguration procedure.

Default Configuration

IPv6 is disabled. When the interface is enabled unless using the no-autoconfig parameter, stateless address autoconfiguration procedure is enabled.

Command Mode

Interface Configuration (Ethernet, VLAN, Port-channel) mode. This command cannot be configured for a range of interfaces (range context).

User Guidelines

- The **ipv6 enable** command automatically configures an IPv6 link-local unicast address on the interface while also enabling the interface for IPv6 processing. The **no ipv6** enable command removes the entire IPv6 interface configuration.
- To enable stateless address autoconfiguration on an enabled IPv6 interface, use the **ipv6 address autoconfig** command.

Example

The following example enables IPv6 processing onVLAN 1.

```
Console (config)# interface vlan 1
Console (config-if)# ipv6 enable
```

ipv6 address autoconfig

The **ipv6 address autoconfig** Interface Configuration mode command enables automatic configuration of IPv6 addresses using stateless autoconfiguration on an interface. Addresses are configured depending on the prefixes received in Router Advertisement messages. , Use the no form of this command to disable address autoconfiguration on the interface.

Syntax

- **ipv6 address autoconfig**
- **no ipv6 address autoconfig**

Default Configuration
Address autoconfiguration is enabled on the interface, no addresses are assigned by default.

Command Mode
Interface Configuration (Ethernet, VLAN, Port-channel) mode.

User Guidelines

- When address autoconfig is enabled, router solicitation ND procedure is initiated to discover a router and assign IP addresses to the interface, based on the advertised on-link prefixes.
- When disabling address autoconfig, automatically generated addresses assigned to the interface are removed.
- The default state of the address autoconfig is 'enabled'. To enable an IPv6 interface without address autoconfig, use the **enable ipv6 no-autoconfig** command.

Example

The following example enables automatic configuration of IPv6 addresses using stateless autoconfiguration on VLAN 1.

```
Console (config)# interface vlan 1
Console (config-if)# ipv6 address autoconfig
```

ipv6 icmp error-interval

The **ipv6 icmp error-interval** Global Configuration mode command configures the rate limit interval and bucket size parameters for IPv6 Internet Control Message Protocol (ICMP) error messages. Use the **no** form of this command to return the interval to its default setting.

Syntax

- **ipv6 icmp error-interval** *milliseconds* [*bucketsize*]
- **no ipv6 icmp error-interval**
  - *milliseconds* — The time interval between tokens being placed in the bucket, each token represents a single ICMP error message. (Range: 0 - 2147483647)
  - *bucketsize* — The maximum number of tokens stored in the bucket. (Range: 1 - 200)

Default Configuration
The default interval is 100ms and the default bucketsize is 10 tokens.

Command Mode
Global Configuration mode.

User Guidelines

- To set the average icmp error rate limit, calculate the interval by the following formula:

  Average Packets Per Second = (1/ interval) * bucket size

Example

The following example configures the rate limit interval to 200ms and bucket size to 20 tokens for IPv6 Internet Control Message Protocol (ICMP) error messages.

```
Console (config)# ipv6 icmp error-interval 200 10
```

show ipv6 icmp error-interval

The **show ipv6 error-interval** command Privileged EXEC mode command displays the IPv6 ICMP error interval setting.

Syntax

- **show ipv6 icmp error-interval**

Default Configuration
This command has no default setting.

Command Mode
Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example displays the IPv6 ICMP error interval setting..

```
Console> show ipv6 icmp error-interval
Rate limit interval: 100 ms
Bucket size: 10 tokens
```

ipv6 address

The **ipv6 address** Interface Configuration mode command configures an IPv6 address for an interface. use the **no** form of this command to remove the address from the interface.

Syntax

- **ipv6 address** *ipv6-address/prefix-length* [**eui-64**] [**anycast**]
- **no ipv6 address** [*ipv6-address/prefix-length*] [**eui-64**]
  - *ipv6-address* — The IPv6 network assigned to the interface. The address is specified in hexadecimal using 16-bit values between colons.
  - *prefix-length* — The length of the IPv6 prefix. A decimal value that indicates how many of the high-order contiguous bits of the address comprise the prefix (the network portion of the address). A slash mark must precede the decimal. (Range: 3-128 only 64 when the **eui-64** parameter is used)
  - **eui-64** — Specifies to build an interface ID in the low order 64 bits of the IPv6 address based on the interface MAC address.
  - **anycast** — Indicates that this address is an anycast address.

Default Configuration

No IP address is defined for the interface.

Command Mode

Interface Configuration (Ethernet, VLAN, Port-channel) mode. Cannot be configured for a range of interfaces (range context).

User Guidelines

- If the value specified for the */prefix-length* argument is greater than 64 bits, the prefix bits have precedence over the interface ID.
- Using the **no ipv6 address** command without arguments removes all manually configured IPv6 addresses from an interface, including link local manually configured addresses.

Example

The following example configures an IPv6 address FE80::260:3EFF:FE11:6770 for interface g1.

```
Console# Console (config)# interface g1
Console (config-if)# ipv6 address FE80::260:3EFF:FE11:6770
```

ipv6 address link-local

The **ipv6 address link-local** Interface Configuration mode command configures an IPv6 link-local address for an interface. Use the **no** form of this command to return to the default link local address on the interface.

Syntax

- **ipv6 address** *ipv6-address* **link-local**
- **no ipv6 address link-local**

- *ipv6-address* — The IPv6 network address assigned to the interface. The address is specified in hexadecimal using 16-bit values between colons.

Default Configuration

IPv6 is enabled on the interface. Link local address of the interface is FE80::EUI64 (interface MAC address).

Command Mode

Interface configuration (Ethernet, VLAN, Port-channel). Cannot be configured for a range of interfaces (range context).

User Guidelines

- Using the **no ipv6 link-local address** command removes the manually configured link local IPv6 address from an interface. Multiple IPv6 addresses can be configured per interface, but only one link-local address. When the **no ipv6 link-local address** command is used, the interface is reconfigured with the standard link local address (the same IPv6 link-local address that is set automatically when the **enable ipv6** command is used). The system automatically generates a link-local address for an interface when IPv6 processing is enabled on the interface. To manually specify a link-local address to be used by an interface, use the **ipv6 link-local address** command. The system supports only 64 bits prefix length for link-local addresses.

Example

The following example assigns FE80::260:3EFF:FE11:6770 as the link-local address.

```
Console# Console (config)# interface g1
Console (config-if)# ipv6 address FE80::260:3EFF:FE11:6770 link-
local
```

ipv6 unreachables

The **ipv6 unreachables** Interface Configuration mode command enables the generation of Internet Control Message Protocol for IPv6 (ICMPv6) unreachable messages for any packets arriving on a specified interface. Use the **no** form of this command to prevent the generation of unreachable messages.

Syntax

- **ipv6 unreachables**
- **no ipv6 unreachables**

Default Configuration

ICMP unreachable messages are sent by default.

Command Mode
Interface configuration mode (Ethernet, VLAN, Port-channel).

User Guidelines

- If a packet addressed to one of the interface's IP address with TCP/UDP port not assigned is received, and ICMP unreachable messages is enabled, the device sends an ICMP unreachable message. To disable sending ICMP unreachable messages on the interface, use the **no ipv6 unreachables** command

Example

The following example enables the generation of Internet Control Message Protocol for IPv6 (ICMPv6) unreachable messages for any packets arriving on interface g1.

```
Console# Console (config)# interface g1
Console (config-if)# ipv6 unreachables
```

ipv6 default-gateway

The **ipv6 default-gateway** Global Configuration mode command defines an IPv6 default gateway. Use the **no** form of this command to remove the default gateway.

Syntax

- **ipv6 default-gateway** *ipv6-address*
- **no ipv6 default-gateway**
  - *ipv6-address* — IPv6 address of the next hop that can be used to reach that network. When the IPv6 address is a Link Local address (IPv6Z address), the outgoing interface name must be specified. Refer to the usage guidelines for the interface name syntax.

Default Configuration
No default gateway is defined.

Command Mode
Global Configuration mode.

User Guidelines

- The IPv6Z address format: <*ipv6-link-local-address*>%<*interface-name*>
  - *interface-name* — **vlan**<*integer*> | **ch**<*integer*> | **isatap**<*integer*> | <*physical-port-name*> | 0
  - *integer* — <*decimal-number*> | <*integer*><*decimal-number*>
  - *decimal-number* — 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
  - *physical-port-name* — Designated port number, for example 1/e16.

- Configuring a new default GW without deleting the previous configured information overwrites the previous configuration.
- A configured default GW has a higher precedence over automatically advertised (via router advertisement message).
- If the egress interface is not specified, the default interface will be selected. Specifying interface zone=0 is equal to not defining an egress interface.

Example

The following example defines an IPv6 default gateway.

```
Console(config)# ipv6 default-gateway fe80::11
```

ipv6 mld join-group

The **ipv6 mld join-group** interface configuration command configures Multicast Listener Discovery (MLD) reporting for a specified group. To cancel reporting and leave the group, use the **no** form of this command.

Syntax

- **ipv6 mld join-group** *group-address*
- **no ipv6 mld join-group** *group-address*
  - group-address — The multicast group IPv6 address.

Default Configuration

This command has no default setting.

Command Mode

Interface configuration (Ethernet, VLAN, Port-channel).

User Guidelines

- The **ipv6 mld join-group** command configures MLD reporting for a specified group. The packets that are addressed to a specified group address will be passed up to the client process in the device.

Example

The following example configures MLD reporting for specific groups.

```
Console(config-if)# ipv6 mld join-group ff02::10
```

ipv6 mld version

The **ipv6 mld version** interface configuration command changes the Multicast Listener Discovery Protocol (MLD) version. To change to the default version, use the **no** form of this command.

Syntax

- **ipv6 mld version** {**1** | **2**}
- **no ipv6 mld version**
  - 1 — Specifies MLD version 1.
  - 2 — Specifies MLD version 2.

Default Configuration
MLD version 2.

Command Mode
Interface configuration (Ethernet, VLAN, Port-channel).

User Guidelines

- There are no user guidelines for this command.

Example

The following example defines an IPv6 default gateway.

```
Console(config-if)# ipv6 mld version 1
```

show ipv6 interface

The **show ipv6 interface** Privileged EXEC mode command displays the usability status of interfaces configured for IPv6.

Syntax

- **show ipv6 interface** [**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *number*]
  - **ethernet** *interface-number* — Ethernet port number
  - **vlan** *vlan-id* — VLAN number
  - **port-channel** *number* — Port channel number

Default Configuration
Displays all IPv6 interfaces.

Command Mode
Privileged EXEC mode.

User Guidelines

- To display IPv6 neighbor discovery cache information, use the **show ipv6 neighbors** command in the privileged EXEC mode.

Examples

The following examples displays the usability status of interfaces configured for IPv6.

```
Console# show ipv6 interface
Interface                 IP addresses                Type
----------                -----------------           -----
1/e1                      7001::5668/64 [ANY]         manual
1/e2                      6001::1234/64               manual
1/e3                      fe80::22/64                 manual
1/e4                      ff02::1                     linklayer
1/e5                      ff02::78                    manual
1/e6                      ff02::1:ff00:22             manual
1/e7                      ff02::1:ff00:1234           manual
1/e8                      ff02::1:ff00:5668           manual
VLAN 1                    2002:1:1:1:200:b0ff:fe00:: other
VLAN 1                    3001::1/64                  manual
VLAN 1                     4004::55/64 [ANY]          manual
VLAN 1                    fe80::200:b0ff:fe00:0       linklayer
VLAN 1                    ff02::1                     linklayer
VLAN 1                    ff02::77                    manual
VLAN 1                    ff02::1:ff00:0              manual
VLAN 1                    ff02::1:ff00:1              manual
VLAN 1                    ff02::1:ff00:55             manual


Default Gateway IP        Type                        Interface  State
address
-------------------       -------                     --------   -------
fe80::77                  Static                      VLAN 1     unreachable
fe80::200:cff:fe4a:dfa8   Dynamic                     VLAN 1     stale
```

```
Console# show ipv6 interface vlan 15
IPv6 is disabled

Console# show ipv6 interface vlan 1
Number of ND DAD attempts: 1
MTU size: 1500
Stateless Address Autoconfiguration state: enabled
ICMP unreachable message state: enabled
MLD version: 2

IP addresses              Type                      DAD State
----------------          ------                    ---------
2002:1:1:1:200:b0ff:fe00  other                     Active
::
3001::1/64                manual                    Active
4004::55/64 [ANY]         manual                    Active
fe80::200:b0ff:fe00:0     linklayer                 Active
ff02::1                   linklayer                 Active
ff02::77                  manual                    ------
ff02::1:ff00:0            manual                    ------
ff02::1:ff00:1            manual                    ------
ff02::1:ff00:55           manual                    ------
```

show IPv6 route

The **show ipv6 route** Privileged EXEC mode command displays the current state of the IPv6 routing table.

Syntax

- **show ipv6 route**

Default Configuration

This command has no default setting.

Command Mode

Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example displays the current state of the IPv6 routing table.

```
Console> show ipv6 route
Codes: L - Local, S - Static, I - ICMP, ND - Router Advertisment
The number in the brackets is the metric.


S  ::/0 via fe80::77 [0] VLAN 1 Lifetime Infinite
ND ::/0 via fe80::200:cff:fe4a:dfa8 [0] VLAN 1 Lifetime 1784 sec
L  2001::/64 is directly connected, g2 Lifetime Infinite
L  2002:1:1:1::/64 is directly connected, VLAN 1 Lifetime 2147467
sec
L  3001::/64 is directly connected, VLAN 1 Lifetime Infinite
L  4004::/64 is directly connected, VLAN 1 Lifetime Infinite
L  6001::/64 is directly connected, g2 Lifetime Infinite
```

ipv6 nd dad attempts

The **ipv6 nd dad attempts** Interface Configuration mode command configures the number of consecutive neighbor solicitation messages that are sent on an interface while duplicate address detection is performed on the unicast IPv6 addresses of the interface. Use the **no** form of this command to return the number of messages to the default value.

Syntax

- **ipv6 nd dad attempts** *attempts-number*
- **no ipv6 nd dad attempts**

- *attempts-number* — The number of neighbor solicitation messages. Configuring a value of 0 disables duplicate address detection processing on the specified interface; a value of 1 configures a single transmission without follow-up transmissions. (Range: 0 - 600)

Default Configuration

Duplicate address detection on unicast IPv6 addresses with the sending of one (1) neighbor solicitation message is enabled.

Command Mode

Interface configuration (Ethernet, VLAN, Port-channel). Cannot be configured for a range of interfaces (range context).

User Guidelines

- Duplicate address detection verifies the uniqueness of new unicast IPv6 addresses before the addresses are assigned to interfaces (the new addresses remain in a tentative state while duplicate address detection is performed). Duplicate address detection uses neighbor solicitation messages to verify the uniqueness of unicast IPv6 addresses.
- An interface returning to administratively “up” restarts duplicate address detection for all of the unicast IPv6 addresses on the interface. While duplicate address detection is performed on the link-local address of an interface, the state for the other IPv6 addresses is still set to TENTATIVE. When duplicate address detection is completed on the link-local address, duplicate address detection is performed on the remaining IPv6 addresses.
- When duplicate address detection identifies a duplicate address, the state of the address is set to DUPLICATE and the address is not used. If the duplicate address is the link-local address of the interface, the processing of IPv6 packets is disabled on the interface and an error message is displayed.
- All configuration commands associated with the duplicate address remain as configured while the state of the address is set to DUPLICATE.
- If the link-local address for an interface changes, duplicate address detection is performed on the new link-local address and all of the other IPv6 address associated with the interface are regenerated (duplicate address detection is performed only on the new link-local address).
- Until DAD process is completed, an IPv6 address is in tentative state and can not be used for data transfer. It is recommended to limit the configured value.

Example

The following example configures the number of consecutive neighbor solicitation messages that are sent on an interface while duplicate address detection is performed on the unicast IPv6 addresses of the interface to 10.

```
Console# Console (config)# interface g1
Console (config-if)# ipv6 nd dad attempts 10
```

ipv6 host

The **ipv6 host** Global Configuration mode command defines a static host name-to-address mapping in the host name cache. Use the **no** form of this command to remove the host name-to-address mapping.

Syntax

- **ipv6 host** *name ipv6-address1* [*ipv6-address2...ipv6-address4*]
- no **ipv6 host name**
  - *name* — Name of the host. (Range: 1 - 158 characters)
  - *ipv6-address1* — Associated IPv6 address. The address is specified in hexadecimal using 16-bit values between colons. When the IPv6 address is a Link Local address (IPv6Z address), the outgoing interface name must be specified. Refer to the usage guidelines for the interface name syntax.
  - *ipv6-address2-4* (optional) — Addition IPv6 addresses that may be associated with the host's name

Default Configuration

No host is defined.

Command Mode

Global Configuration mode.

User Guidelines

- The IPv6Z address format: <*ipv6-link-local-address*>%<*interface-name*>
- *interface-name* — **vlan**<*integer*> | **ch**<*integer*> | **isatap**<*integer*> | <*physical-port-name*> | 0
- *integer* — <*decimal-number*> | <*integer*><*decimal-number*>
- *decimal-number* — 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
- *physical-port-name* — Designated port number, for example 1/e16.

Example

The following example defines a static host name-to-address mapping in the host name cache.

```
Console (config)# ipv6 host ABC fe80::11 fe80::22
```

ipv6 neighbor

The **ipv6 neighbor** Global Configuration mode command configures a static entry in the IPv6 neighbor discovery cache. Use the **no** form of this command to remove a static IPv6 entry from the IPv6 neighbor discovery cache.

Syntax

- **ipv6 neighbor** *ipv6_addr hw_addr* {**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *number* }

- **no ipv6 neighbor** *ipv6_addr* {**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *number*}
  - *ipv6_addr* — IPv6 address to map to the specified MAC address.
  - *hw_addr* — MAC address to map to the specified IPv6 address.
  - **ethernet** *interface-number* — Valid port number.
  - **vlan** *vlan-id* — VLAN number.
  - **port-channel** *number* — Port channel number.

Default Configuration

This command has no default setting.

Command Mode

Global Configuration mode.

User Guidelines

- The **ipv6 neighbor** command is similar to the **arp** (global) command.
- If an entry for the specified IPv6 address already exists in the neighbor discovery cache, learned through the IPv6 neighbor discovery process, the entry is automatically converted to a static entry.
- Use the **show ipv6 neighbors** command to view static entries in the IPv6 neighbor discovery cache.

Example

The following example configures a static entry in the IPv6 neighbor discovery cache.

```
Console (config)# ipv6 neighbor ff02::78 00:02:85:0E:1C:00
ethernet 1/e16 vlan 1 port-channel 1
```

ipv6 set mtu

The **ipv6 mtu** Privileged EXEC mode command sets the Maximum Transmission Unit (MTU) size of IPv6 packets sent on an interface. Use the default parameter to restore the default MTU size.

Syntax

- **ipv6 set mtu** {**ethernet** *interface* | **vlan** *vlan-id*| **port-channel** *port-channel-number*} { *bytes* | **default**}
  - **ethernet** *interface* — Valid interface number.
  - **vlan** *vlan-id* — VLAN number.
  - **port-channel** *port-channel-number* — Valid Port Channel index.
  - *bytes* — MTU in bytes with a minimum is 1280 bytes.
  - **default**— Sets the default MTU size to 1500 bytes.

Default Configuration
1500 bytes.

Command Mode
Privileged EXEC mode.

User Guidelines
This command is intended for debugging and testing purposes and should be used only by technical support personnel.

Example

The following example sets the Maximum Transmission Unit (MTU) size of IPv6 packets sent on an interface to 1700.

```
Console> ipv6 set mtu ethernet 1/e16 1700
```

show ipv6 neighbors

The **show ipv6 neighbors** Privileged EXEC mode command displays IPv6 neighbor discovery cache information.

Syntax

- **show ipv6 neighbors** {**static** | **dynamic**}[**ipv6-address** *ipv6-address*] [**mac-address** *mac-address*]
  - **static** — Display static neighbor discovery cash entries.
  - **dynamic** — Display dynamic neighbor discovery cash entries.
  - *ipv6-address* — Display the neighbor discovery cache information entry of a specific IPv6 address.
  - *mac-address* — Display the neighbor discovery cache information entry of a specific MAC address.

Command Mode
Privileged EXEC mode.

User Guidelines

- The associated interface of a MAC address can be aged out from the FDB table, so the Interface field can be empty.
- When an ARP entry is associated with an IP interface that is defined on a port or port-channel, the VLAN field is empty.
- The possible neighbor cash states are:

  INCMP (Incomplete) — Address resolution is being performed on the entry. Specifically, a Neighbor Solicitation has been sent to the solicited-node multicast address of the target, but the corresponding Neighbor Advertisement has not yet been received.

REACH (Reachable) — Positive confirmation was received within the last ReachableTime milliseconds that the forward path to the neighbor was functioning properly. While REACHABLE, no special action takes place as packets are sent.

STALE — More than ReachableTime milliseconds have elapsed since the last positive confirmation was received that the forward path was functioning properly. While stale, no action takes place until a packet is sent.

DELAY — More than ReachableTime milliseconds have elapsed since the last positive confirmation was received that the forward path was functioning properly, and a packet was sent within the last DELAY_FIRST_PROBE_TIME seconds. If no reachability confirmation is received within DELAY_FIRST_PROBE_TIME seconds of entering the DELAY state, a Neighbor Solicitation is sent and the state is changed to PROBE.

PROBE — A reachability confirmation is actively sought by retransmitting Neighbor Solicitations every RetransTimer milliseconds until a reachability confirmation is received.

Example

The following example displays IPv6 neighbor discovery cache information.

```
Console# show ipv6 neighbors dynamic


Interface   IPv6 address                 HW address          State
-------     ----------                  ---------           -------
VLAN 1      2031:0:130F::010:B504:DBB4   00:10:B5:04:DB:4B   REACH
VLAN 1      2031:0:130F::050:2200:2AA4   00:50:22:00:2A:A4   REACH
```

clear ipv6 neighbors

The **clear ipv6 neighbors** Privileged EXEC mode command deletes all entries in the IPv6 neighbor discovery cache, except static entries.

Syntax

- **clear ipv6 neighbors**

Default Configuration

This command has no default setting.

Command Mode

Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example deletes all entries in the IPv6 neighbor discovery cache, except static entries.

```
Console> clear ipv6 neighbors
```

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LACP Commands

lacp system-priority

The **lacp system-priority** Global Configuration mode command configures the system priority. Use the **no** form of this command to return to the default configuration.

Syntax

- **lacp system-priority** *value*
- **no lacp system-priority**
  - *value* — Specifies system priority value. (Range: 1 - 65535)

Default Configuration
The default system priority is 1.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example configures the system priority to 120.

```
Console(config)# lacp system-priority 120
```

lacp port-priority

The **lacp port-priority** Interface Configuration (Ethernet) mode command configures physical port priority. Use the **no** form of this command to return to the default configuration.

Syntax

- **lacp port-priority** *value*
- **no lacp port-priority**
  - *value* — Specifies port priority. (Range: 1 - 65535)

Default Configuration
The default port priority is 1.

Command Mode
Interface Configuration (Ethernet) mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example defines the priority of Ethernet port 1/e6 as 247.

```
Console(config)# interface ethernet 1/e6
Console(config-if)# lacp port-priority 247
```

lacp timeout

The **lacp timeout** Interface Configuration (Ethernet) mode command assigns an administrative LACP timeout. Use the **no** form of this command to return to the default configuration.

Syntax

- **lacp timeout** {**long | short**}
- **no lacp timeout**
  - **long** — Specifies the long timeout value.
  - **short** — Specifies the short timeout value.

Default Configuration
The default port timeout value is **long**.

Command Mode
Interface Configuration (Ethernet) mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example assigns a long administrative LACP timeout to Ethernet port 1/e6 .

```
Console(config)# interface ethernet 1/e6
Console(config-if)# lacp timeout long
```

show lacp ethernet

The **show lacp ethernet** Privileged EXEC mode command displays LACP information for Ethernet ports.

Syntax

- **show lacp ethernet** *interface* [**parameters** | **statistics** | **protocol-state**]
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)
  - **parameters** — Link aggregation parameter information.
  - **statistics** — Link aggregation statistics information.
  - **protocol-state** — Link aggregation protocol-state information.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example display LACP information for Ethernet port 1/e1.

```
Console# show lacp ethernet 1/e1


Port 1/e1 LACP parameters:
     Actor
            system priority:          1
            system mac addr:          00:00:12:34:56:78
            port Admin key:           30
            port Oper key:            30
            port Oper number:         21
            port Admin priority:      1
            port Oper priority:       1
```

```
            port Admin timeout:        LONG
            port Oper timeout:         LONG
            LACP Activity:             ACTIVE
            Aggregation:               AGGREGATABLE
            synchronization:           FALSE
            collecting:                FALSE
            distributing:              FALSE
            expired:                   FALSE
     Partner
            system priority:           0
            system mac addr:           00:00:00:00:00:00
            port Admin key:            0
            port Oper key:             0
            port Oper number:          0
            port Admin priority:       0
            port Oper priority:        0
            port Oper timeout:         LONG
            LACP Activity:             PASSIVE
            Aggregation:               AGGREGATABLE
            synchronization:           FALSE
            collecting:                FALSE
            distributing:              FALSE
            expired:                   FALSE

Port 1/e1 LACP Statistics:
LACP PDUs sent:                        2
LACP PDUs received:                    2
```

```
Port 1/e1 LACP Protocol State:
     LACP State Machines:
            Receive FSM:               Port Disabled State
            Mux FSM:                   Detached State
            Periodic Tx FSM:           No Periodic State
     Control Variables:
            BEGIN:                     FALSE
            LACP_Enabled:              TRUE
            Ready_N:                   FALSE
            Selected:                  UNSELECTED
            Port_moved:                FALSE
            NNT:                       FALSE
            Port_enabled:              FALSE
     Timer counters:
            periodic tx timer:         0
            current while timer:       0
            wait while timer:          0
```

show lacp port-channel

The **show lacp port-channel** Privileged EXEC mode command displays LACP information for a port-channel.

Syntax

- **show lacp port-channel** [*port_channel_number*]
  - *port_channel_number* — Valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays LACP information about port-channel 1.

```
Console# show lacp port-channel 1
Port-Channel 1: Port Type 1000 Ethernet
      Actor
                System Priority:    1
                MAC Address:         00:02:85:0E:1C:00
                Admin Key:           29
                Oper Key:            29

       Partner
                System Priority:    0
                MAC Address:         00:00:00:00:00:00
                Oper Key:            14
```

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Line Commands

line

The **line** Global Configuration mode command identifies a specific line for configuration and enters the Line Configuration command mode.

Syntax

- **line** {**console** | **telnet** | **ssh**}
  - **console** — Console terminal line.
  - **telnet** — Virtual terminal for remote console access (Telnet).
  - **ssh** — Virtual terminal for secured remote console access (SSH).

Default Configuration
This command has no default configuration.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following example configures the device as a virtual terminal for remote console access.

```
Console(config)# line telnet
Console(config-line)#
```

speed

The **speed** Line Configuration mode command sets the line baud rate.

Syntax

- **speed** *bps*
  - *bps* — Baud rate in bits per second (bps). Possible values are 2400, 4800, 9600, 19200, 38400, 57600 and 115200.

Default Configuration

The default speed is 9600 bps.

Command Mode

Line Configuration (console) mode.

User Guidelines

- This command is available only on the line console.
- The configured speed is applied when Autobaud is disabled. This configuration applies only to the current session.

Examples

The following example configures the line baud rate to 115200.

```
Console(config)# line console
Console(config-line)# speed 115200
```

autobaud

The **autobaud** Line Configuration mode command sets the line for automatic baud rate detection (autobaud). To disable automatic baud rate detection, use the **no** form of the command.

Syntax

- **autobaud**
- **no autobaud**

Default Configuration

Autobaud is disabled.

Command Mode

Line Configuration (console) mode.

User Guidelines

- This command is available only on the line console.
- To start communication using Autobaud, press **<Enter>** twice. This configuration applies only to the current session.

Examples

The following example enables autobaud.

```
Console(config)# line console
Console(config-line)# autobaud
```

exec-timeout

The **exec-timeout** Line Configuration mode command sets the interval that the system waits until user input is detected. Use the **no** form of this command to return to the default configuration.

Syntax

- **exec-timeout** *minutes* [*seconds*]
- **no exec-timeout**
  - *minutes* — Specifies the number of minutes. (Range: 0 - 65535)
  - *seconds* — Specifies additional time intervals in seconds. (Range: 0 - 59)

Default Configuration

The default configuration is 10 minutes.

Command Mode

Line Configuration mode.

User Guidelines

- To specify no timeout, enter the **exec-timeout** 0 command.

Examples

The following example configures the interval that the system waits until user input is detected to 20 minutes.

```
Console(config)# line console
Console(config-line)# exec-timeout 20
```

history

The **history** Line Configuration mode command enables the command history function. Use the **no** form of this command to disable the command history function.

Syntax

- **history**
- **no history**

Default Configuration

The command history function is enabled.

Command Mode

Line Configuration mode.

User Guidelines

- This command enables the command history function for a specified line. To enable or disable the command history function for the current terminal session, use the **terminal history** user EXEC mode command.

Example

The following example enables the command history function for telnet.

```
Console(config)# line telnet
Console(config-line)# history
```

history size

The **history size** Line Configuration mode command configures the command history buffer size for a particular line. Use the **no** form of this command to reset the command history buffer size to the default configuration.

Syntax

- **history size** *number-of-commands*
- **no history size**
  - *number-of-commands* — Number of commands that the system records in its history buffer. (Range: 10 - 256)

Default Configuration

The default history buffer size is 10.

Command Mode
Line Configuration mode.

User Guidelines
This command configures the command history buffer size for a particular line. To configure the command history buffer size for the current terminal session, use the **terminal history size** User EXEC mode command.

Example

The following example changes the command history buffer size to 100 entries for a particular line.

```
Console(config-line)# history size 100
```

terminal history

The **terminal history** User EXEC command enables the command history function for the current terminal session. Use the **no** form of this command to disable the command history function.

Syntax

- **terminal history**
- **no terminal history**

Default Configuration
The default configuration for all terminal sessions is defined by the **history** line configuration command.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following example disables the command history function for the current terminal session.

```
Console# no terminal history
```

terminal history size

The **terminal history size** User EXEC command configures the command history buffer size for the current terminal session. Use the **no** form of this command to reset the command history buffer size to the default setting.

Syntax

- **terminal history size** *number-of-commands*
- **no terminal history size**
  - *number-of-commands* — Specifies the number of commands the system may record in its command history buffer. (Range: 10 - 256)

Default Configuration

The default command history buffer size is 10.

Command Mode

User EXEC mode.

User Guidelines

- The **terminal history size** User EXEC command configures the size of the command history buffer for the current terminal session. To change the default size of the command history buffer, use the **history** line configuration command.
- The maximum number of commands in all buffers is 256.

Examples

The following example configures the command history buffer size to 20 commands for the current terminal session.

```
Console> terminal history size 20
```

show line

The **show line** User EXEC mode command displays line parameters.

Syntax

- **show line [console** | **telnet** | **ssh**]
  - **console** — Console terminal line.
  - **telnet** — Virtual terminal for remote console access (Telnet).
  - **ssh** — Virtual terminal for secured remote console access (SSH).

Default Configuration

If the line is not specified, the default value is console.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays the line configuration.

```
Console> show line

Console configuration:
          Interactive timeout: Disabled
          History: 10
          Baudrate: 9600
          Databits: 8
          Parity: none
          Stopbits: 1

Telnet configuration:
          Interactive timeout: 10 minutes 10 seconds
          History: 10

SSH configuration:
          Interactive timeout: 10 minutes 10 seconds
          History: 10
```

17

Management ACL

management access-list

The **management access-list** Global Configuration mode command configures a management access list and enters the Management Access-list Configuration command mode. Use the **no** form of this command to delete an access list.

Syntax

- **management access-list** *name*
- **no management access-list** *name*
  - *name* — Access list name. (Range: 1-32 characters)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

- Use this command to configure a management access list. The command enters the Access-list Configuration mode, where permit and deny access rules are defined using the **permit (Management)** and **deny (Management)** commands.
- If no match criteria are defined, the default is deny.
- If you re-enter an access list context, the new rules are entered at the end of the access list.
- Use the **management access-class** command to select the active access list.
- The active management list cannot be updated or removed.
- Management ACL requires a valid management interface, which is a port, VLAN, or port channel with an IP address or console interface. Management ACL only restricts access to the device for management configuration or viewing.

Examples

The following example creates a management access list called mlist, configures management Ethernet interfaces 1/e1 and 2/e9 and makes the new access list the active list.

```
Console(config)# management access-list mlist
Console(config-macl)# permit ethernet 1/e1
Console(config-macl)# permit ethernet 2/e9
Console(config-macl)# exit
Console(config)# management access-class mlist
```

The following example creates a management access list called mlist, configures all interfaces to be management interfaces except Ethernet interfaces 1/e1 and 2/e9 and makes the new access list the active list.

```
Console(config)# management access-list mlist
Console(config-macl)# deny ethernet 1/e1
Console(config-macl)# deny ethernet 2/e9
Console(config-macl)# permit
Console(config-macl)# exit
Console(config)# management access-class mlist
```

permit (Management)

The **permit** Management Access-List Configuration mode command defines a permit rule.

Syntax

- **permit** [**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *port-channel-number*] [**service** *service*]
- **permit ip-source** {*ipv4-address* | *ipv6-address/prefix-length*} [**mask** *mask* | *prefix-length*] [**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *number*] [**service** *service*]
  - **ethernet** *interface-number* — A valid Ethernet port number.
  - **vlan** *vlan-id* — A valid VLAN number.
  - **port-channel** *port-channel-number* — A valid port channel index.
  - *ipv4-address* — Source IPv4 address.
  - *ipv6-address/prefix-length* — Source IPv6 address and prefix length. The prefix length is optional.

- **mask** *mask* — A valid network mask of the source IP address.
- **mask** *prefix-length* — Number of bits that comprise the source IP address prefix. The prefix length must be preceded by a forward slash (/). (Range: 0 - 32)
- **service** *service* — Service type. Possible values: **telnet**, **ssh**, **http, https** and **snmp**.

Default Configuration

If no permit rule is defined, the default is set to deny**.**

Command Mode

Management Access-list Configuration mode.

User Guidelines

- Rules with Ethernet, VLAN and port-channel parameters are valid only if an IP address is defined on the appropriate interface.
- The system supports up to 128 management access rules.

Example

The following example permits all ports in the mlist access list.

```
Console(config)# management access-list mlist
Console(config-macl)# permit
```

deny (Management)

The **deny** Management Access-List Configuration mode command defines a deny rule.

Syntax

- **deny** [**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *port-channel-number*] [**service** *service*]
- **deny ip-source** {*ipv4-address* | *ipv6-address/prefix-length*}[**mask** *mask* | *prefix-length*] [**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *number*] [**service** *service*]
  - **ethernet** *interface-number* — A valid Ethernet port number.
  - **vlan** *vlan-id* — A valid VLAN number.
  - **port-channel** *number* — A valid port-channel number.
  - *ipv4-address* — Source IPv4 address.
  - *ipv6-address/prefix-length* — Source IPv6 address and prefix length. The prefix length is optional.
  - **mask** *mask* — A valid network mask of the source IP address.

- **mask** *prefix-length* — Specifies the number of bits that comprise the source IP address prefix. The prefix length must be preceded by a forward slash (/). (Range: 0-32)
- **service** *service* — Service type. Possible values: **telnet**, **ssh**, **http, https** and **snmp**.

Default Configuration

This command has no default configuration.

Command Mode

Management Access-list Configuration mode.

User Guidelines

- Rules with Ethernet, VLAN and port-channel parameters are valid only if an IP address is defined on the appropriate interface.
- The system supports up to 128 management access rules.

Example

The following example denies all ports in the access list called mlist.

```
Console(config)# management access-list mlist
Console(config-macl)# deny
```

management access-class

The **management access-class** Global Configuration mode command restricts management connections by defining the active management access list. Use the **no** form of this command to disable this restriction.

Syntax

- **management access-class** {**console-only** | *name*}
- **no management access-class**
  - *name* — Specifies the name of the access list to be used. (Range: 1-32 characters)
  - **console-only** — Indicates that the device can be managed only from the console.

Default Configuration

If no access list is specified, an empty access list is used.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures an access list called mlist as the management access list.

```
Console(config)# management access-class mlist
```

show management access-list

The **show management access-list** Privileged EXEC mode command displays management access-lists.

Syntax

- **show management access-list** [*name*]
  - *name* — Specifies the name of a management access list. (Range: 1 - 32 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the mlist management access list.

```
Console# show management access-list mlist
mlist
-----
         permit ethernet 1/e1
         permit ethernet 2/e2
! (Note: all other access implicitly denied)
```

show management access-class

The **show management access-class** Privileged EXEC mode command displays the active management access list.

Syntax

- **show management access-class**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays information about the active management access list.

```
Console# show management access-class
Management access-class is enabled, using access list mlist
```

18

LLDP Commands

lldp enable (global)

The **lldp enable** Global Configuration mode command in enables Link Layer Discovery Protocol **(**LLDP**)**. Use the **no** form of this command to disable LLDP.

Syntax

- **lldp enable**
- **no lldp enable**

Default Configuration
The command is enabled.

Command Mode
Global Configuration mode.

User Guidelines

- There are no guidelines for this command.

Example

The following example enables Link Layer Discovery Protocol (LLDP) .

```
console (config)# lldp enable
```

lldp enable (interface)

The **lldp enable** Interface Configuration mode command enables Link Layer Discovery Protocol (LLDP) on an interface. Use the **no** form of this command to disable LLDP on an interface.

Syntax

- **lldp enable** [rx | tx | both]
- **no lldp enable**
  - *rx* — Receive only LLDP packets.
  - *tx* — Transmit only LLDP packets.
  - *both* — Receive and transmit LLDP packets (default)

Default Configuration

Enabled in both modes.

Command Modes

Interface Configuration (Ethernet)mode.

User Guidelines

- LLDP manages LAG ports individually. LLDP sends separate advertisements on each port in a LAG. LLDP data received through LAG ports is stored individually per port.
- LLDP operation on a port is not dependent on STP state of a port. I.e. LLDP frames are sent and received on blocked ports. If a port is controlled by 802.1X, LLDP operates only if the port is authorized.

Examples

The following example enables Link Layer Discovery Protocol (LLDP) on an interface.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# lldp enable
```

lldp timer

The **lldp timer command** Global Configuration mode command specifies how often the software sends Link Layer Discovery Protocol (LLDP) updates. Use the **no** form of this command to revert to the default setting.

Syntax

- **lldp timer** *seconds*
- **no lldp timer**
  - *seconds* — Specifies in seconds how often the software sends LLDP update. (Range: 5 - 32768 seconds) .

Default Configuration

Default — 30 seconds.

Command Modes

Global Configuration mode.User Guidelines

- There are no user guidelines for this command.

Examples

The following example specifies how often the software sends Link Layer Discovery Protocol (LLDP) updates.

```
Console (config) # lldp timer
```

lldp hold-multiplier

The **lldp hold-multiplier** Global Configuration mode command specifies the amount of time the receiving device holds a Link Layer Discovery Protocol (LLDP) packet before discarding it. Use the **no** form of this command to revert to the default setting.

Syntax

- **lldp hold-multiplier** *number*
- **no lldp hold-multiplier**
  - *number* — Specifies the hold time to be sent in the LLDP update packets as a multiple of the timer value. (Range: 2-10)

Default Configuration

The default configuration is 4.

Command Modes

Global Configuration mode.

User Guidelines

- The actual time-to-live value used in LLDP frames can be expressed by the following formula: TTL = min(65535, LLDP-Timer * LLDP-HoldMultiplier). For example, if the value of LLDP timer is '30', and the value of the LLDP hold multiplier is '4', then the value '120' is encoded in the TTL field in the LLDP header.

Examples

The following example specifies how often the software sends Link Layer Discovery Protocol (LLDP) updates.

```
Console (config) # lldp hold-multiplier 6
```

lldp reinit-delay

The **lldp reinit-delay** Global Configuration mode command specifies the minimum time an LLDP port waits before reinitializing LLDP transmission. Use the **no** form of this command to revert to the default setting.

Syntax

- **lldp reinit-delay** *seconds*
- **no lldp reinit-delay**
  - seconds — Specifies the minimum time in seconds an LLDP port waits before reinitializing LLDP transmission. (Range 1-10 seconds)

Default Configuration

2 seconds

Command Modes

Global Configuration mode.

User Guidelines

- There are no user guidelines for this command.

Examples

The following example specifies the minimum time an LLDP port will wait before reinitializing LLDP transmission.

```
Console (config) # lldp reinit-delay 6
```

lldp tx-delay

The **lldp tx-delay** Global Configuration mode command specifies the delay between successive LLDP frame transmissions initiated by value/status changes in the LLDP local systems MIB. Use the **no** form of this command to revert to the default setting.

Syntax

- **lldp tx-delay** *seconds*
- **no lldp tx-delay**

Parameters

- *seconds* — Specifies the delay in seconds between successive LLDP frame transmissions initiated by value/status changes in the LLDP local systems MIB. Range 1-8192 second.

Default Configuration

The default value is 2 seconds

Command Modes

Global Configuration mode.

Usage Guidelines

- It is recommended that the TxDelay be less than 0.25 of the LLDP timer interval.

Examples

The following example specifies the delay between successive LLDP frame transmissions initiated by value/status changes in the LLDP local systems MIB.

```
Console (config) # lldp tx-delay 7
```

lldp optional-tlv

To specify which optional TLVs from the basic set should be transmitted, use the **lldp optional-tlv** command in interface configuration mode. Use the **no** form of this command to revert to the default setting.

Syntax

lldp optional-tlv tlv1 [tlv2 … tlv5]

no lldp optional-tlv

- *tlv* — Specifies TLV that should be included. Available optional TLVs are: port-desc, sys-name, sys-desc, sys-cap, 802.3-mac-phy.

Default Configuration

No optional TLV is transmitted.

Command Modes

Interface configuration (Ethernet)

User Guidelines

- There are no user guidelines for this command.

Example

The following example specifies which optional TLV (2)s from the basic set should be transmitted.

```
Console(config)# interface ethernet g1
Console(config-if)# lldp optional-tlv sys-name
```

lldp management-address

The **lldp management-address** Interface Configuration mode command specifies the management address advertised from an interface. Use the **no** form of this command to cease advertising management address information.

Syntax

- **lldp management-address ip** *ip-address*
- **no management-address ip**
  - *ip-address* — Specifies the management address to advertise.

Default Configuration

No IP address is advertised.

Command Modes

Interface configuration (Ethernet) mode.

User Guidelines

- Each port can advertise one IP address.
- Only static IP addresses can be advertised.

Example

The following example specifies management address that would be advertised from an interface.

```
Console(config)# interface ethernet g1
Console(config-if)# lldp management-address 192.168.0.1
```

lldp med enable

The **lldp med enable** Interface Configuration mode command enables Link Layer Discovery Protocol (LLDP) Media Endpoint Discovery (MED) on an interface. Use the **no** form of this command to disable LLDP MED on an interface.

Syntax

- **lldp med enable** [*tlv1* … *tlv3*]
- **no lldp med enable**
  - *tlv* — Specifies TLV that should be included. Available TLVs are: network-policy, location, poe-pse. The capabilities TLV is always included if LLDP–MED is enabled.

Default Configuration

LLDP is disabled.

Command Modes

Interface Configuration (Ethernet) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example enables Link Layer Discovery Protocol (LLDP) Media Endpoint Discovery (MED) on an interface as network-policy.

```
Console(config)# interface ethernet g1
Console(config-if)# lldp med enable network-policy
```

lldp med network-policy (global)

The **lldp med network-policy** Global Configuration mode command defines LLDP MED network policy. Use the **no** form of this command to remove LLDP MED network policy.

Syntax

- **lldp med network-policy** *number application* [**vlan** *id*] [**vlan-type** {**tagged** | **untagged**}] [**up** *priority*] [**dscp** *value*]
- **no lldp med network-policy** *number*
  - *number* — Network policy sequential number.
  - *application* — The name or the number of the primary function of the application defined for this network policy. Available application names are: voice, voice-signaling, guest-voice, guest-voice-signaling, softphone-voice, video-conferencing, streaming-video, video-signaling.
  - **vlan** *id* — VLAN identifier for the application.
  - **vlan-type** — Specifies if the application is using a ‘tagged’ or an ‘untagged’ VLAN.
  - **up** *priority* — User Priority (Layer 2 priority) to be used for the specified application.
  - **dscp** *value* — DSCP value to be used for the specified application.

Default Configuration

No Network policy is defined.

Command Modes

Global configuration mode.

User Guidelines

- Use the **lldp med network-policy** interface configuration command to attach a network policy to a port.
- Up to 32 network policies can be defined.

Example

The following example defines the LLDP MED network policy. To remove LLDP MED network policy.

```
Console(config)# lldp tx-delay
```

lldp med network-policy (interface)

The **lldp med network-policy** Interface Configuration (Ethernet) mode command attaches a LLDP MED network policy to a port. Use the **no** form of this command to remove an LLDP MED network policy from a port.

Syntax

- **lldp med network-policy** {*add / remove*}*number*
- **no lldp med network-policy** *number*
  - *number* — Network policy sequential number.
  - *add* — Specifies **attach** to a port.
  - *remove* — Specifies **remove** from a porty.

Default Configuration

No network policy is attached.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

There are no guidelines for this command.

Example

The following example attaches a LLDP MED network policy to a port.

```
Console(config)# interface ethernet 1/e1
Console(config-if)# lldp med enable
```

lldp med location

The **lldp med location** Interface Configuration mode command configures location information for the Link Layer Discovery Protocol (LLDP) Media Endpoint Discovery (MED) for an interface. Use the **no** form of this command to delete location information for an interface.

Syntax

- **lldp med location coordinate** *data*
- **no lldp med location coordinate**

- **lldp med location civic-address** *data*
- **no lldp med location civic-address**

- **lldp med location ecs-elin** *data*
- **no lldp med location ecs-elin**
  - *coordinate* — The location is specified as coordinates
  - *civic-address* — The location is specified as civic address
  - *ecs-elin* — The location is specified as ECS ELIN
  - *data* — The data format is as defined in ANSI/TIA 1057. Specifies the location as dotted hexadecimal data: Each byte in hexadecimal character strings is two hexadecimal digits. Each byte can be separated by a period or colon.

Default Configuration

The location is not configured.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

There are no guidelines for this command.

Example

The following example configures location information for the LLDP MED for an interface.

```
console# config
console(config)# interface ethernet e6
console(config-if)# lldp med location civic-address
01:01:01:01:02:03
console(config-if)#
```

clear lldp rx

The **clear lldp rx** Privileged EXEC mode command restarts the LLDP RX state machine and clears the neighbors table.

Syntax

- **clear lldp rx** [ethernet interface]
  - *Interface* — Ethernet port

Command Modes

Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example restarts the LLDP RX state machine and clearing the neighbors table.

```
console(config)# exit
console# clear lldp rx
console#
```

show lldp configuration

To display the Link Layer Discovery Protocol (LLDP) configuration, use the **show lldp configuration** command in privileged EXEC mode.

Syntax

- **show lldp configuration** [ethernet interface]
  - *Interface* — Ethernet port

Command Modes

Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example displays the Link Layer Discovery Protocol (LLDP) configuration.

```
console# show lldp configuration

Timer: 30 Seconds
Hold multiplier: 4
Reinit delay: 2 Seconds
Tx delay: 2 Seconds
```

Port	State	Optional TLVs	Address
1/e1	RX, TX	PD, SN, SD, SC	172.16.1.1
1/e2	TX	PD, SN	172.16.1.1
1/e3	Disabled		

show lldp med configuration

The **show lldp med configuration** Privileged EXEC mode command displays the Link Layer Discovery Protocol (LLDP) Media Endpoint Discovery (MED) configuration.

Syntax

- **show lldp med configuration** [**ethernet** *interface*]
  - *interface* — Ethernet port.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no guidelines for this command.

Example

The following example displays the Link Layer Discovery Protocol (LLDP) Media Endpoint Discovery (MED) configuration.

```
console# show lldp med configuration
Network policy 1
-------------------
Application type: Voice
VLAN ID: 2 tagged
Layer 2 priority: 0
DSCP: 0

Port         Capabilities  Network Policy  Location   PoE
----------   ----------    ----------      --------   ----
1/e1         Yes           Yes: 1          Yes        Yes
1/e2         Yes           Yes: 1          Yes        Yes
1/e3         Yes           No              No         Yes

console# show lldp med configuration ethernet 1/1

Port         Capabilities  Network Policy  Location   PoE
----------   ----------    ----------      --------   ----
1/e1         Yes           Yes: 1          Yes        Yes
```

show lldp local

To display the Link Layer Discovery Protocol (LLDP) information that is advertised from a specific port, use the **show lldp local** command in privileged EXEC mode.

Syntax

- show lldp local ethernet interface
  - *Interface* — Ethernet port

Command Modes

Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example displays the Link Layer Discovery Protocol (LLDP) information that is advertised from a specific port.

```
console# show lldp local ethernet 1/e1
Device ID: 0060.704C.73FF
Port ID: 1
Capabilities: Bridge
System Name: ts-7800-1
System description:
Port description:
Management address: 172.16.1.8
802.3 MAC/PHY Configuration/Status
Auto-negotiation support: Supported
Auto-negotiation status: Enabled
Auto-negotiation Advertised Capabilities: 100BASE-TX full duplex,
1000BASE-T full duplex
Operational MAU type: 1000BaseTFD

LLDP-MED capabilities: Network Policy, Location Identification
LLDP-MED Device type: Network Connectivity

LLDP-MED Network policy
Application type: Voice
Flags: Tagged VLAN
VLAN ID: 2
Layer 2 priority: 0
DSCP: 0

LLDP-MED Power over Ethernet
Device Type: Power Sourcing Entity
```

show lldp neighbors

Syntax

- **show lldp neighbors** [**ethernet** *interface*]
  - *Interface* — Ethernet port

Command Modes

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

User Guidelines

- There are no user guidelines for this command.

Example

The following example displays information about neighboring devices discovered using Link Layer Discovery Protocol (LLDP).

```
console# show lldp neighbors

Port  Device ID        Port ID  Hold      Capabilities  System
                                Time                    Name
```

```
----  ------           ----     ------    -------       --------
e1    0060.704C.73FE   1        117       B             ts-7800-2
e1    0060.704C.73FD   1        93        B             ts-7800-2
e2    0060.704C.73F C  9        1         B, R          ts-7900-1
e3    0060.704C.73FB   1        92        W             ts-7900-2
```

```
console# show lldp neighbors ethernet g1
Device ID: 0060.704C.73FE
Port ID: 1
Hold Time: 117
Capabilities: B
System Name: ts-7800-2
System description:
Port description:
Management address: 172.16.1.1
```

19

Login Banner

banner exec

The **banner exec** Global Configuration mode command specifies and enables a message to be displayed when an EXEC process is created (The user has successfully logged in). Use the **no** form of this command to delete the existing EXEC banner.

Syntax

- **banner exec** *d*

  message d

- **no banner exec**
  - *d* — Delimiting character, for example a pound sign (#). A delimiting character cannot be used in the banner message.
  - *message* — Message text. The message must start in a new line and can be a multi-line message. Tokens in the form $(token) in the message text can be included. Tokens are replaced with the corresponding configuration variable. Tokens are described in the usage guidelines.

Default Configuration
Disabled (no EXEC banner is displayed).

Command Mode
Global Configuration mode.

User Guidelines

- Follow this command with one or more blank spaces and a delimiting character. Then enter one or more lines of text, terminating the message with the second occurrence of the delimiting character.
- When a user connects to a device, the message-of-the-day (MOTD) banner appears first, followed by the login banner and prompts. After the user logs in to the device, the EXEC banner is displayed.
- To customize the banner, use tokens in the form $(token) in the message text.

  The following table displays the tokens.

Token	Information displayed in the banner
$(hostname)	Displays the host name for the device.
$(domain)	Displays the domain name for the device.
$(bold)	Indicates that the next text is a bold text. Using this token again indicates the end of the bold text.

$(inverse)	Indicates that the next text is an inverse text. Using this token again indicates the end of the inverse text.
$(contact)	Displays the system contact string.
$(location)	Displays the system location string.
$(mac-address)	Displays the base MAC address of the device.

- To disable the EXEC banner on a particular line or lines, use the no exec-banner line configuration command.

Example

The following example sets an EXEC banner that uses tokens. The percent sign (%) is used as a delimiting character. Notice that the $(token) syntax is replaced by the corresponding configuration variable.

```
Console# (config)# banner exec %
Enter TEXT message. End with the character '%'.


$(bold)Session activated.$(bold) Enter commands at the prompt.
%
```

When a user logs on to the system, the following output is displayed:

```
Session activated. Enter commands at the prompt.
```

banner login

The **banner login** Global Configuration mode command specifies and enables a message to be displayed before the username and password login prompts. Use the **no** form of this command to delete the existing Login banner.

Syntax

- **banner login**

  d message d

- **no banner login**
  - *d* — Delimiting character, for example a pound sign (#). A delimiting character cannot be used in the banner message.

- *message* — Message text. The message must start in a new line and can be a multi-line message. Tokens in the form $(token) in the message text can be included. Tokens are replaced with the corresponding configuration variable. Tokens are described in the usage guidelines.

Default Configuration

Disabled (no Login banner is displayed).

Command Mode

Global Configuration mode.

User Guidelines

- Follow this command with one or more blank spaces and a delimiting character. Then enter one or more lines of text, terminating the message with the second occurrence of the delimiting character.
- When a user connects to a device, the message-of-the-day (MOTD) banner appears first, followed by the login banner and prompts. After the user logs in to the device, the EXEC banner is displayed.
- To customize the banner, use tokens in the form $(token) in the message text.

  The following table displays the tokens.

Token	Information displayed in the banner
$(hostname)	Displays the host name for the device.
$(domain)	Displays the domain name for the device.
$(bold)	Indicates that the next text is a bold text. Using this token again indicates the end of the bold text.
$(inverse)	Indicates that the next text is an inverse text. Using this token again indicates the end of the inverse text.
$(contact)	Displays the system contact string.
$(location)	Displays the system location string.
$(mac-address)	Displays the base MAC address of the device.

- To disable the EXEC banner on a particular line or lines, use the no exec-banner line configuration command.

Example

The following example sets a Login banner that uses tokens. The percent sign (%) is used as a delimiting character. Notice that the $(token) syntax is replaced by the corresponding configuration variable.

```
Console (config)# banner login %
Enter TEXT message. End with the character '%'.


You have entered $(hostname).$(domain)
%
```

When the login banner is executed, the user will see the following banner:

```
You have entered host123.ourdomain.com
```

banner motd

The **banner motd** Global Configuration mode command specifies and enables a message-of-the-day banner. Use the **no** form of this command to delete the existing MOTD banner.

Syntax

- **banner motd**

  d message d

- **no banner motd**
  - *d* — Delimiting character, for example a pound sign (#). A delimiting character cannot be used in the banner message.
  - *message* — Message text. The message must start in a new line and can be a multi-line message. Tokens in the form $(token) in the message text can be included. Tokens are replaced with the corresponding configuration variable. Tokens are described in the usage guidelines.

Default Configuration

Disabled (no MOTD banner is displayed).

Command Mode

Global Configuration mode.

User Guidelines

- Follow this command with one or more blank spaces and a delimiting character. Then enter one or more lines of text, terminating the message with the second occurrence of the delimiting character.

- When a user connects to a device, the message-of-the-day (MOTD) banner appears first, followed by the login banner and prompts. After the user logs in to the device, the EXEC banner is displayed.
- To customize the banner, use tokens in the form $(token) in the message text.

  The following table displays the tokens.

Token	Information displayed in the banner
$(hostname)	Displays the host name for the device.
$(domain)	Displays the domain name for the device.
$(bold)	Indicates that the next text is a bold text. Using this token again indicates the end of the bold text.
$(inverse)	Indicates that the next text is an inverse text. Using this token again indicates the end of the inverse text.
$(contact)	Displays the system contact string.
$(location)	Displays the system location string.
$(mac-address)	Displays the base MAC address of the device.

- To disable the EXEC banner on a particular line or lines, use the no exec-banner line configuration command.

Example

The following example sets a MOTD banner that uses tokens. The percent sign (%) is used as a delimiting character. Notice that the $(token) syntax is replaced by the corresponding configuration variable..

```
Console (config)# banner motd %
Enter TEXT message. End with the character '%'.

$(bold)Upgrade$(bold) to all devices begins at March 12

%
```

When the login banner is executed, the user will see the following banner:

```
Upgrade to all devices begins at March 12
```

exec-banner

The **exec-banner** Line Configuration mode command enables the display of exec banners. Use the **no** form of this command to disable the display of exec banners.

Syntax

- **exec-banner**
- **no exec-banner**

Default Configuration
Enabled

Command Mode
Line Configuration mode

User Guidelines

- There are no user guidelines for this command.

Example

The following example enables the display of exec banners.

```
Console (config)# line console
Console(config-line)# exec-banner
```

login-banner

The **login-banner** Line Configuration mode command enables the display of login banners. Use the **no** form of this command to disable the display of login banners.

Syntax

- **login-banner**
- **no login-banner**

Default Configuration
Enabled.

Command Mode
Line Configuration mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example enables the display of login banners.

```
Console# Console (config)# line console
Console(config-line)# login-banner
```

motd-banner

The **motd-banner** Line Configuration mode command enables the display of message-of-the-day banners. Use the **no** form of this command to disable the display of motd banners.

Syntax

- **motd-banner**
- **no motd-banner**

Default Configuration

Enabled

Command Mode

Line Configuration mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example enables the display of message-of-the-day banners.

```
Console# Console (config)# line console
Console(config-line)# motd-banner
```

show banner

The **show banner** Privileged EXEC mode command displays the banners configuration.

Syntax

- **show banner motd**
- **show banner login**
- **show banner exec**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example displays the banners configuration.

```
Device> show motd

Console: Enabled
Telnet: Enabled
SSH: Enabled

MOTD Message
$(bold)Upgrade$(bold) to all devices begins at March 12
```

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PHY Diagnostics Commands

test copper-port tdr

The **test copper-port tdr** Privileged EXEC mode command uses Time Domain Reflectometry (TDR) technology to diagnose the quality and characteristics of a copper cable attached to a port.

Syntax

- **test copper-port tdr** *interface*
  - *interface* — A valid Ethernet port. (Full syntax: *unit/port*)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- The port to be tested should be shut down during the test, unless it is a combination port with fiber port active.
- The maximum length of the cable for the TDR test is 120 meter.

Examples

The following example results in a report on the cable attached to port 1/e3.

```
Console# test copper-port tdr 1/e3
Cable is open at 64 meters
Console# test copper-port tdr 2/e3
Can’t perform this test on fiber ports
```

show copper-ports tdr

The **show copper-ports tdr** User EXEC mode command displays information on the last Time Domain Reflectometry (TDR) test performed on copper ports.

- **show copper-ports tdr** [*interface*]
  - *interface* — A valid Ethernet port. (Full syntax: *unit/port*)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

- The maximum length of the cable for the TDR test is 120 meter.

Example

The following example displays information on the last TDR test performed on all copper ports.

```
Console> show copper-ports tdr

Port    Result          Length [meters]    Date
----    -------         --------           -----
1/e1    OK
1/e2    Short           50                 13:32:00 23 July 2005
1/e3    Test has not been performed
1/e4    Open            64                 13:32:00 23 July 2005
1/e5    OK              -                  -
```

show copper-ports cable-length

The **show copper-ports cable-length** User EXEC mode command displays the estimated copper cable length attached to a port.

Syntax

- **show copper-ports cable-length** [*interface*]
  - *interface* — A valid Ethernet port. (Full syntax: *unit/port*)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

- The port must be active and working in 100M or 1000M mode.

Example

The following example displays the estimated copper cable length attached to all ports.

```
Console> show copper-ports cable-length

Port        Length [meters]
----        --------------------
1/e1        < 50
1/e2        Copper not active
1/e3        110-140
1/g1        Fiber
```

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Power over Ethernet Commands

power inline

The **port inline** Interface Configuration (Ethernet) mode command configures the administrative mode of inline power on an interface.

Syntax

- **power inline {auto | never}**
  - **auto —** Enables the device discovery protocol and, if found, supplies power to the device.
  - **never —** Disables the device discovery protocol and stops supplying power to the device.

Default Configuration
The device discovery protocol is enabled.

Command Mode
Interface Configuration (Ethernet) mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example enables powered device discovery protocol on port 1/e1, so that power will be supplied to a discovered device.

```
Console(config)# interface ethernet 1/e1
Console(config-if)# power inline auto
```

power inline powered-device

The **power inline powered-device** Interface Configuration (Ethernet) mode command adds a comment or description of the powered device type to enable the user to remember what is attached to the interface. Use the **no** form of this command to remove the description.

Syntax

- **power inline powered-device** *pd-type*
- **no power inline powered-device**
  - *pd-type* **—** Specifies the type of powered device attached to the interface. (Range: 1 - 24 characters)

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures a description to an IP-phone to a powered device connected to Ethernet interface 1/e1.

```
Console(config)# interface ethernet 1/e1
Console(config-if)# power inline powered-device IP-phone
```

power inline priority

The **power inline priority** Interface Configuration (Ethernet) mode command configures the inline power management priority of the interface. Use the **no** form of this command to return to the default configuration.

Syntax

- **power inline priority {critical | high | low}**
- **no power inline priority**
  - **critical —** Indicates that operating the powered device is critical.
  - **high —** Indicates that operating the powered device has high priority.
  - **low—**Indicates that operating the powered device has low priority.

Default Configuration

The default setting is low priority.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- An unlimited number of ports can be configured as critical, high or low.
- As power becomes unavailable, critical and high ports continue to receive power at the expense of low ports.

Example

The following example configures the device connected to Ethernet interface 1/e1 as a high-priority powered device.

```
Console(config)# interface ethernet 1/e1
Console(config-if)# power inline priority high
```

power inline usage-threshold

The **power inline usage-threshold** Global Configuration mode command configures the threshold for initiating inline power usage alarms. Use the **no** form of this command to return to the default configuration.

Syntax

- **power inline usage-threshold** *percentage*
- **no power inline usage-threshold**
  - *percentage* — Specifies the threshold as a percentage to compare measured power. (Range: 1 - 99)

Default Configuration

The default threshold is 95 percent.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the power usage threshold for which alarms are sent to 80%.

```
console(config)# power inline usage-threshold 80
```

power inline traps enable

The **power inline traps enable** Global Configuration mode command enables inline power traps. Use the **no** form of this command to disable inline power traps.

Syntax

- **power inline traps enable**
- **no power inline traps**

Default Configuration
Inline power traps are disabled.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example enables inline power traps to be sent when a power usage threshold is exceeded.

```
Console(config)# power inline traps enable
```

show power inline

The **show power inline** User EXEC mode command displays the information about inline power.

Syntax

- **show power inline [interface** *interface*]
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)

Default Configuration
This command has no default configuration.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays information about inline power.

```
Console# show power inline
Unit    Power      Nominal     Consumed      Usage        Traps
                   Power       Power         Threshold

------  ---------  ---------   ------------  ----------   --------
1       off        1 Watts     0 Watts (0%)  95           Disable
2       on         370 Watts   0 Watts (0%)  95           Disable
3       off        1 Watts     0 Watts (0%)  95           Disable
4       on         370 Watts   0 Watts (0%)  95           Disable
5       off        1 Watts     0 Watts (0%)  95           Disable
6       on         370 Watts   0 Watts (0%)  95           Disable
7       off        1 Watts     0 Watts (0%)  95           Disable
8       on         370 Watts   0 Watts (0%)  95           Disable
        off        1 Watts     0 Watts (0%)  95           Disable
        on         370 Watts   0 Watts (0%)  95           Disable
        off        1 Watts     0 Watts (0%)  95           Disable
        on         370 Watts   0 Watts (0%)  95           Disable
```

```
Console> show power inline ethernet 1/e1

Port    Powered     State      Status        Priority     Class
        Device
----    ---------- -----      --------      ------       --------
2/e1                Auto       Searching     low          class0
2/e2                Auto       Searching     low          class0
2/e3                Auto       Searching     low          class0
2/e4                Auto       Searching     low          class0
2/e5                Auto       Searching     low          class0
2/e6                Auto       Searching     low          class0
2/e7                Auto       Searching     low          class0
2/e8                Auto       Searching     low          class0
2/e9                Auto       Searching     low          class0
2/e10               Auto       Searching     low          class0
2/e11               Auto       Searching     low          class0
2/e12               Auto       Searching     low          class0
2/e13               Auto       Searching     low          class0
2/e14               Auto       Searching     low          class0
2/e15               Auto       Searching     low          class0
2/e16               Auto       Searching     low          class0
2/e17               Auto       Searching     low          class0
2/e18               Auto       Searching     low          class0
2/e19               Auto       Searching     low          class0
2/e20               Auto       Searching     low          class0
2/e21               Auto       Searching     low          class0
2/e22               Auto       Searching     low          class0
```

2/e23	Auto	Searching	low	class0
2/e24	Auto	Searching	low	class0
2/e25	Auto	Searching	low	class0
2/e26	Auto	Searching	low	class0
2/e27	Auto	Searching	low	class0
2/e28	Auto	Searching	low	class0
2/e29	Auto	Searching	low	class0
2/e30	Auto	Searching	low	class0
2/e31	Auto	Searching	low	class0
2/e32	Auto	Searching	low	class0
2/e33	Auto	Searching	low	class0
2/e34	Auto	Searching	low	class0
2/e35	Auto	Searching	low	class0
2/e36	Auto	Searching	low	class0
2/e37	Auto	Searching	low	class0
2/e38	Auto	Searching	low	class0
2/e39	Auto	Searching	low	class0
2/e40	Auto	Searching	low	class0
2/e41	Auto	Searching	low	class0
2/e42	Auto	Searching	low	class0
2/e43	Auto	Searching	low	class0
2/e44	Auto	Searching	low	class0
2/e45	Auto	Searching	low	class0
2/e46	Auto	Searching	low	class0
2/e47	Auto	Searching	low	class0
2/e48	Auto	Searching	low	class0
4/e1	Auto	Off	low	class0

4/e2	Auto	Off	low	class0
4/e3	Auto	Off	low	class0
4/e4	Auto	Off	low	class0
4/e5	Auto	Off	low	class0
4/e6	Auto	Off	low	class0
4/e7	Auto	Off	low	class0
4/e8	Auto	Off	low	class0
4/e9	Auto	Off	low	class0
4/e10	Auto	Off	low	class0
4/e11	Auto	Off	low	class0
4/e12	Auto	Off	low	class0
4/e13	Auto	Off	low	class0
4/e14	Auto	Off	low	class0
4/e15	Auto	Off	low	class0
4/e16	Auto	Off	low	class0
4/e17	Auto	Off	low	class0
4/e18	Auto	Off	low	class0
4/e19	Auto	Off	low	class0
4/e20	Auto	Off	low	class0
4/e21	Auto	Off	low	class0
4/e22	Auto	Off	low	class0
4/e23	Auto	Off	low	class0
4/e24	Auto	Off	low	class0
6/e1	Auto	Off	low	class0
6/e2	Auto	Off	low	class0
6/e3	Auto	Off	low	class0
6/e4	Auto	Off	low	class0

```
6/e5                Auto        Off             low             class0
6/e6                Auto        Off             low             class0
6/e7                Auto        Off             low             class0
6/e8                Auto        Off             low             class0
6/e9                Auto        Off             low             class0
6/e10               Auto        Off             low             class0
6/e11               Auto        Off             low             class0
6/e12               Auto        Off             low             class0
6/e13               Auto        Off             low             class0
6/e14               Auto        Off             low             class0
6/e15               Auto        Off             low             class0
6/e16               Auto        Off             low             class0
6/e17               Auto        Off             low             class0
6/e18               Auto        Off             low             class0
```

The following table describes the significant fields shown in the example:

Field	Description
Power	The operational status of the inline power sourcing equipment.
Nominal Power	The nominal power of the inline power sourcing equipment in Watts.
Consumed Power	Measured usage power in Watts.
Usage Threshold	The usage threshold expressed in percents for comparing the measured power and initiating an alarm if threshold is exceeded.
Traps	Indicates if inline power traps are enabled.
Port	The Ethernet port number.
Powered Device	Description of the powered device type.
State	Indicates if the port is enabled to provide power. Can be: Auto or Never.
Priority	The priority of the port from the point of view of inline power management. Can be: Critical, High or Low.

Status	Describes the inline power operational status of the port. Can be: On, Off, Test-Fail, Testing, Searching or Fault.
Class	The power consumption range of the powered device. Can be:Class 0 (0.44 – 12.95), Class 1 (0.44 – 3.84), Class 2 (3.84 – 6.49) or Class 3 (6.49 – 12.95).
Overload Counter	Counts the number of overload conditions that has been detected.
Short Counter	Counts the number of short conditions that has been detected.
Denied Counter	Counts the number of times power has been denied.
Absent Counter	Counts the number of times power has been removed because powered device dropout was detected.
Invalid Signature Counter	Counts the number of times an invalid signature of a powered device was detected.

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Port Channel Commands

interface port-channel

The **interface port-channel** Global Configuration mode command enters the interface configuration mode to configure a specific port-channel.

Syntax

- **interface port-channel** *port-channel-number*
  - *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

- Eight aggregated links can be defined with up to eight member ports per port-channel. The aggregated links' valid IDs are 1-15.

Example

The following example enters the context of port-channel number 15.

```
console(config)# inter port-channel 15
console(config-if)# 1
```

interface range port-channel

The **interface range port-channel** Global Configuration mode command enters the interface configuration mode to configure multiple port-channels.

Syntax

- **interface range port-channel** {*port-channel-range* | **all**}
  - *port-channel-range* — List of valid port-channels to add. Separate non-consecutive port-channels with a comma and no spaces. A hyphen designates a range of port-channels.
  - **all** — All valid port-channels.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

- Commands under the interface range context are executed independently on each interface in the range.

Example

The following example groups port-channels 1, 2 and 6 to receive the same command.

```
Console(config)# interface range port-channel 1-2,6
```

channel-group

The **channel-group** Interface Configuration (Ethernet) mode command associates a port with a port-channel. Use the **no** form of this command to remove a port from a port-channel.

Syntax

- **channel-group** *port-channel-number* **mode** {**on** | **auto**}
- **no channel-group**
  - *port-channel_number* — Specifies the number of the valid port-channel for the current port to join.
  - **on** — Forces the port to join a channel without an LACP operation.
  - **auto** — Allows the port to join a channel as a result of an LACP operation.

Default Configuration
The port is not assigned to a port-channel.

Command Mode
Interface Configuration (Ethernet) mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example forces port 1/e1 to join port-channel 1 without an LACP operation.

```
Console(config)# interface ethernet 1/e1
Console(config-if)# channel-group 1 mode on
```

show interfaces port-channel

The **show interfaces port-channel** Privileged EXEC mode command displays port-channel information.

Syntax

- **show interfaces port-channel** [*port-channel-number*]
  - *port-channel-number* — Valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays information on all port-channels.

```
Console# show interfaces port-channel

Channel            Ports
-------            ---------------------------------
1                  Active: 1/e1, 2/e2
2                  Active: 2/e2, 2/e7 Inactive: 3/e1
3                  Active: 3/e3, 3/e8
```

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Port Monitor Commands

port monitor

The **port monitor** Interface Configuration Ethernet mode command starts a port monitoring session. Use the **no** form of this command to stop a port monitoring session.

Syntax

- **port monitor** *src-interface* **[rx | tx]**
- **no port monitor** *src-interface*
  - *src-interface* — Valid Ethernet port. (Full syntax: *unit/port*)
  - **rx —** Monitors received packets only.
  - **tx —** Monitors transmitted packets only.

Default Configuration

Monitors both received and transmitted packets.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- This command enables traffic on one port to be copied to another port, or between the source port (src-interface) and a destination port (the port being configured). Only a single target port can be defined per system.
- The port being monitored cannot be set faster than the monitoring port.
- The following restrictions apply to ports configured to be destination ports:
  - The port cannot be already configured as a source port.
  - The port cannot be a member in a port-channel.
  - An IP interface is not configured on the port.
  - GVRP is not enabled on the port.
  - The port is not a member in any VLAN, except for the default VLAN (will automatically be removed from the default VLAN).

- The following restrictions apply to ports configured to be source ports:
  - Port monitoring Source Ports must be simple ports, and not port-channels.
  - The port cannot be already configured as a destination port.
  - All the frames are transmitted as either always tagged or always untagged.

General Restrictions:

- Ports cannot be configured as a group using the **interface range ethernet** command.

NOTE: The Port Mirroring target must be a member of the Ingress VLAN of all Mirroring source ports. Therefore, Multicast and Broadcast frames in these VLANs are seen more than once. (Actually N+, where N equals four).
When both transmit (Tx) and receive (Rx) directions of more than one port are monitored, the capacity may exceed the bandwidth of the target port. In this case, the division of the monitored packets may not be equal. The user is advised to use caution in assigning port monitoring.

Example

The following example copies traffic on port 1/e8 (source port) to port 1/e1 (destination port).

```
Console(config)# interface ethernet 1/e1
Console(config-if)# port monitor 1/e8
```

show ports monitor

The **show ports monitor** User EXEC mode command displays the port monitoring status.

Syntax

- **show ports monitor**

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example shows how the port monitoring status is displayed.

```
console# config
console(config)# int ether 1/e2
console(config-if)# port monitor 1/e3
console(config-if)# port monitor 1/e4
console(config-if)# port monitor 1/e5
console(config-if)# port monitor 1/e6
console(config-if)# port monitor 1/e7
Too many monitoring sessions.
console(config-if)#
```

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QoS Commands

qos

The **qos** Global Configuration mode command enables quality of service (QoS) on the device. Use the **no** form of this command to disable QoS on the device.

Syntax

- **qos [basic]**
- **no qos**
  - basic — QoS basic mode.

Default Configuration
QoS is disabled on the device.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example enables QoS on the device.

```
Console(config)# qos
```

show qos

The **show qos** User EXEC mode command displays quality of service (QoS) for the device.

Syntax

- **show qos**

Default Configuration
This command has no default configuration.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays QoS attributes when QoS is disabled on the device.

```
console# show qos
Qos: basic
Basic trust: vpt
console#
```

priority-queue out num-of-queues

The **priority-queue out num-of-queues** Global Configuration mode command configures the number of expedite queues. Use the **no** form of this command to return to the default configuration.

Syntax

- **priority-queue out num-of-queues** *number-of-queues*
- **no priority-queue out num-of-queues**
  - *number-of-queues* — Assign the number of queues to be expedite queues. The expedite queues are the queues with higher indexes. (Values: 0 or 4)

Default Configuration
All queues are expedite queues.

Command Mode
Global Configuration mode.

User Guidelines

- When the specified number of expedite queues is 0, WRR scheduling mechanism is used to allocate weights to queues in the ratio 1:2:4:8
- When the specified number of expedite queues is 4, queues are allocated priorities according to the selected trust mode, i.e. according to VPT or DSCP.

Example

The following example configures the number of expedite queues as 0.

```
Console(config)# priority-queue out num-of-queues 0
```

traffic-shape

The **traffic-shape** Interface Configuration (Ethernet, Port-Channel) mode command sets the shaper on an egress port. Use the **no** form of this command to disable the shaper.

Syntax

- **traffic-shape** *committed-rate*
- **no traffic-shape**
  - *committed-rate* — Specifies the average traffic rate (CIR) in kbps. (Range: 64kbps - 1G)

Default Configuration

The default configuration is disabled.

Command Mode

Interface Configuration (Ethernet, Port-Channel) mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example sets the shaper on Ethernet port 1/e15 to 64kpbs committed rate.

```
console(config)# interface ethernet 1/e15
console(config-if) traffic-shape 64
```

rate-limit (Ethernet)

The **rate-limit** Interface Configuration (Ethernet) mode command limits the rate of the incoming traffic. Use the **no** form of this command to disable the rate limit.

Syntax

- **rate-limit** *rate*
- **no rate-limit**
  - *rate* — Specifies the maximum of kilobits per second of ingress traffic on a port. (Range: 62 – 1000000)

Default Configuration

The default configuration is disabled.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- The command can be enabled on a specific port only if **port storm-control broadcast enable** interface configuration command is not enabled on that port.

Example

The following example limits the rate of the incoming traffic on Ethernet port 1/e15 to 1000kpbs.

```
console(config)# interface ethernet 1/e15
console(config-if) rate-limit 1000
```

wrr-queue cos-map

The **wrr-queue cos-map** Global Configuration mode command maps Class of Service (CoS) values to a specific egress queue. return to the default configuration, use the **no** form of this command.

Syntax

- **wrr-queue cos-map** *queue-id cos0...cos7*
- **no wrr-queue cos-map** [*queue-id*]
  - *queue-id* — Specifies the queue number to which the CoS values are mapped.
  - *cos1...cos7* — Specifies CoS values to be mapped to a specific queue. (Range: 0 - 4)

Default Configuration

The map default values for 4 queues:

- Cos0 is mapped to queue 2
- Cos1 is mapped to queue 1
- Cos2 is mapped to queue 1
- Cos3 is mapped to queue 2
- Cos4 is mapped to queue 3
- Cos5 is mapped to queue 3
- Cos6 is mapped to queue 4
- Cos7 is mapped to queue 4

Command Mode
Global Configuration mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example maps CoS 7 to queue 2.

```
Console(config)# wrr-queue cos-map 2 7
```

show qos interface

The **show qos interface** User EXEC mode command displays interface QoS information.

Syntax

- **show qos interface** [**queuing** | **shapers** |**rate-limit**] [**ethernet** *interface-number* | **port-channel** *number*]
  - **queuing** — Displays the queue's strategy (WRR or EF) and the weight for WRR queues and the CoS to queue map and the EF priority.
  - **shapers** — Displays the shaper of the specified interface and the shaper for the queue on the specified interface.
  - **rate-limit** — Displays the rate-limit configuration.
  - **ethernet** *interface-number* — Valid Ethernet port number.
  - **port-channel** *number* — Valid port-channel number.

Default Configuration
There is no default configuration for this command.

Command Mode
User EXEC mode.

User Guidelines

- If no keyword is specified, port QoS information (e.g., DSCP trusted, CoS trusted, untrusted, etc.) is displayed.
- If no interface is specified, QoS information about all interfaces is displayed.

Examples

The following example displays QoS information about Ethernet port 1/e11.

```
console# show qos interface
Ethernet e1
Default CoS: 0:
Trust mode: enable

Ethernet e2
Default CoS: 0:
Trust mode: enable


console# show qos interface queuing

Ethernet e1
wrr bandwidth weights and EF priority:
qid       weights          Ef          Priority
1         N/A              ena         1
2         N/A              ena         2
3         N/A              ena         3
4         N/A              ena         4

Cos-queue map:
cos       qid
0         2
1         1
2         1
3         2
4         3
5         3
6         4
7         4
```

```
Ethernet e2
wrr bandwidth weights and EF priority:
qid       weights          Ef          Priority
1         N/A              ena         1
2         N/A              ena         2
3         N/A              ena         3
4         N/A              ena         4
Cos-queue map:
0         2
1         1
2         1
3         2
4         3
5         3
6         4
7         4
```

qos map dscp-queue

The **qos map dscp-queue** Global Configuration mode command modifies the DSCP to queue map. Use the **no** form of this command to return to the default map.

Syntax

- **qos map dscp-queue** *dscp-list to queue-id*
- **no qos map dscp-queue [***dscp-list* **]**
  - *dscp-list* — Specify up to 8 DSCP values, separate each DSCP with a space. (Range: 0 - 63)
  - *queue-id* — Enter the queue number to which the DSCP value corresponds.

Default Configuration

The following table describes the default map.

DSCP value	0-15	16-31	32-47	48-63
Queue-ID	1	2	3	4

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example maps DSCP values 33, 40 and 41 to queue 1.

```
Console(config)# qos map dscp-queue 33 40 41 to 1
```

qos trust (Global)

The **qos trust** Global Configuration mode command configures the system to the basic mode and trust state. Use the **no** form of this command to return to the untrusted state.

Syntax

- **qos trust** {**cos** | **dscp**}
- **no qos trust**
  - **cos** — Indicates that ingress packets are classified with packet CoS values. Untagged packets are classified with the default port CoS value.
  - **dscp** — Indicates that ingress packets are classified with packet DSCP values.

Default Configuration

CoS is the default trust mode.

Command Mode

Global Configuration mode.

User Guidelines

- Packets entering a quality of service (QoS) domain are classified at the edge of the QoS domain. When packets are classified at the edge, the switch port within the QoS domain can be configured to one of the trusted states because there is no need to classify the packets at every device in the domain.
- Use this command to specify whether the port is trusted and which fields of the packet to use to classify traffic.
- When the system is configured as trust DSCP, traffic is mapped to a queue according to the DSCP-queue map.

Example

The following example configures the system to the DSCP trust state.

```
Console(config)# qos trust dscp
```

qos cos

The **qos cos** Interface Configuration (Ethernet, Port-channel) mode command defines the default CoS value of a port. Use the **no** form of this command to return to the default configuration.

Syntax

- **qos cos** *default-cos*
- **no qos cos**
  - *default-cos* — Specifies the default CoS value of the port. (Range: 0 - 7)

Default Configuration
Default CoS value of a port is 0.

Command Mode
Interface Configuration (Ethernet, Port-channel) mode.

User Guidelines

- If the port is trusted, the default CoS value of the port is used to assign a CoS value to all untagged packets entering the port.

Example

The following example configures port 1/e15 default CoS value to 3.

```
Console(config)# interface ethernet 1/e15
Console(config-if) qos cos 3
```

show qos map

The show qos map User EXEC mode command displays all QoS maps.

Syntax

- **show qos map** [**dscp-queue**]
  - **dscp-queue** — Indicates the DSCP to queue map.

Default Configuration
This command has no default configuration.

Command Mode
User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the DSCP port-queue map.

```
Console> show qos map
Dscp-queue map:
d1 : d2 0  1  2  3  4  5  6  7  8  9
-----------------------------------
0 :    01 01 01 01 01 01 01 01 01 01
1 :    01 01 01 01 01 01 02 02 02 02
2 :    02 02 02 02 02 02 02 02 02 02
3 :    02 02 03 03 03 03 03 03 03 03
4 :    03 03 03 03 03 03 03 03 04 04
5 :    04 04 04 04 04 04 04 04 04 04
6 :    04 04 04 04
```

The following table describes the significant fields shown above.

Column	Description
d1	Decimal Bit 1 of DSCP
d2	Decimal Bit 2 of DSCP
01 - 04	Queue numbers

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RADIUS Commands

radius-server host

The **radius-server host** Global Configuration mode command specifies a RADIUS server host. Use the **no** form of this command to delete the specified RADIUS host.

Syntax

- **radius-server host** {*ip-address* | *hostname*} [**auth-port** *auth-port-number*] [**timeout** *timeout*] [**retransmit** *retries*] [**deadtime** *deadtime*] [**key** *key-string*] [**source** *source*] [**priority** *priority*] [**usage** *type*]
- **no radius-server host** {*ip-address* | *hostname*}
  - *ip-address* — IP address of the RADIUS server host.
  - *hostname* — Hostname of the RADIUS server host. (Range: 1 - 158 characters)
  - *auth-port-number* — Port number for authentication requests. The host is not used for authentication if the port number is set to 0. (Range: 0 - 65535)
  - *timeout* — Specifies the timeout value in seconds. (Range: 1 - 30)
  - *retries* — Specifies the retransmit value. (Range: 1 - 10)
  - *deadtime* — Length of time in minutes during which a RADIUS server is skipped over by transaction requests. (Range: 0 - 2000)
  - *key-string* — Specifies the authentication and encryption key for all RADIUS communications between the device and the RADIUS server. This key must match the encryption key used on the RADIUS daemon. To specify an empty string, enter "". (Range: 0 - 128 characters)
  - *source* — Specifies the source IP address to use for communication. 0.0.0.0 is interpreted as request to use the IP address of the outgoing IP interface.
  - *priority* — Determines the order in which servers are used, where 0 has the highest priority. (Range: 0 - 65535)
  - *type* — Specifies the usage type of the server. Possible values: **login**, **dot.1x** or **all**.

Default Configuration

No RADIUS server host is specified.

The port number for authentication requests is 1812.

The usage type is **all**.

Command Mode

Global Configuration mode.

User Guidelines

- To specify multiple hosts, multiple **radius-server host** commands can be used.
- If no host-specific timeout, retries, deadtime or key-string values are specified, global values apply to each RADIUS server host.
- The address type of the source parameter must be the same as the **ip-address** parameter.

Example

The following example specifies a RADIUS server host with IP address 192.168.10.1, authentication request port number 20 and a 20-second timeout period.

```
Console(config)# radius-server host 192.168.10.1 auth-port 20
timeout 20
```

radius-server key

The **radius-server key** Global Configuration mode command sets the authentication and encryption key for all RADIUS communications between the device and the RADIUS daemon. Use the **no** form of this command to return to the default configuration.

Syntax

- **radius-server key** [*key-string*]
- **no radius-server key**
  - *key-string* — Specifies the authentication and encryption key for all RADIUS communications between the device and the RADIUS server. This key must match the encryption key used on the RADIUS daemon. (Range: 0 - 128 characters)

Default Configuration

The key-string is an empty string.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example defines the authentication and encryption key for all RADIUS communications between the device and the RADIUS daemon.

```
Console(config)# radius-server key dell-server
```

radius-server retransmit

The **radius-server retransmit** Global Configuration mode command specifies the number of times the software searches the list of RADIUS server hosts. Use the **no** form of this command to reset the default configuration.

Syntax

- **radius-server retransmit** *retries*
- **no radius-server retransmit**
  - *retries* — Specifies the retransmit value. (Range: 1 - 10)

Default Configuration

The software searches the list of RADIUS server hosts 3 times.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the number of times the software searches the list of RADIUS server hosts to 5 times.

```
console(config)# radius-server retransmit 5
```

radius-server source-ip

The **radius-server source-ip** Global Configuration mode command specifies the source IP address used for communication with RADIUS servers. Use the **no** form of this command to return to the default configuration.

Syntax

- **radius-server source-ip** *source*
- **no radius-source-ip** *source*
  - *source* — Specifies a valid source IP address.

Default Configuration

The source IP address is the IP address of the outgoing IP interface.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the source IP address used for communication with RADIUS servers to 10.1.1.1.

```
console(config)# radius-server source-ip 10.1.1.1
```

radius-server source-ipv6

The **radius-server source-ipv6** Global Configuration mode command specifies the source IPv6 address used for the IPv6 communication with RADIUS servers. Use the **no** form of this command to return to the default.

Syntax

- **radius-server source-ipv6** *source*
- **no radius-server source-ipv6** *source*
  - *source* — Specifies the source IPv6 address.

Default Configuration

The default IP address is the outgoing IP interface.

Command Mode

Global Configuration mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example configures the source IPv6 address used for communication with RADIUS servers.

```
Console (config)# radius-server source-ipv6 3156::98
```

radius-server timeout

The **radius-server timeout** Global Configuration mode command sets the interval during which the device waits for a server host to reply. Use the **no** form of this command to return to the default configuration.

Syntax

- **radius-server timeout** *timeout*
- **no radius-server timeout**
  - *timeout* — Specifies the timeout value in seconds. (Range: 1 - 30)

Default Configuration

The timeout value is 3 seconds.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the timeout interval to 5 seconds.

```
Console(config)# radius-server timeout 5
```

radius-server deadtime

The **radius-server deadtime** Global Configuration mode command improves RADIUS response time when servers are unavailable. The command is used to cause the unavailable servers to be skipped. Use the **no** form of this command to return to the default configuration.

Syntax

- **radius-server deadtime** *deadtime*
- **no radius-server deadtime**

- *deadtime* — Length of time in minutes during which a RADIUS server is skipped over by transaction requests. (Range: 0 - 2000)

Default Configuration

The deadtime setting is 0.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example sets the deadtime to 10 minutes.

```
Console(config)# radius-server deadtime 10
```

show radius-servers

The **show radius-servers** Privileged EXEC mode command displays the RADIUS server settings.

Syntax

- **show radius-servers**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays RADIUS server settings.

```
Console# show radius-servers

IP address    Port Auth   TimeOut   Retransmit  DeadTime  Source IP    Priority  Usage
---------  ----   -------   ----------  ------    --------  --------  -----
172.16.1.1  1645   Global    Global      Global    -         1         All
172.16.1.2  1645   11        8           Global    Global    2         All

Global values
-------------
TimeOut: 3
Retransmit: 3
Deadtime: 0
Source IP: 172.16.8.1
```

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RMON Commands

show rmon statistics

The **show rmon statistics** User EXEC mode command displays RMON Ethernet statistics.

Syntax

- **show rmon statistics** {**ethernet** *interface number* | **port-channel** *port-channel-number*}
  - *interface number* — Valid Ethernet port.
  - *port-channel-number* — Valid port-channel number.

Default Configuration
This command has no default configuration.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays RMON Ethernet statistics for Ethernet port 1/e1.

```
Console> show rmon statistics ethernet 1/e1
Port: 1/e1
Octets: 0                   Packets: 0
Broadcast: 0                Multicast: 0
CRC Align Errors: 0         Collisions: 0
Undersize Pkts: 0           Oversize Pkts: 0
Fragments: 0                Jabbers: 0
64 Octets: 0                65 to 127 Octets: 0
128 to 255 Octets: 0        256 to 511 Octets: 0
512 to 1023 Octets: 0       1024 to max Octets: 0
```

The following table describes significant fields shown above:

Field	Description
Octets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).
Packets	The total number of packets (including bad packets, Broadcast packets, and Multicast packets) received.
Broadcast	The total number of good packets received and directed to the Broadcast address. This does not include Multicast packets.
Multicast	The total number of good packets received and directed to a Multicast address. This number does not include packets directed to the Broadcast address.
CRC Align Errors	The total number of packets received with a length (excluding framing bits, but including FCS octets) of between 64 and 1632 octets, inclusive, but with 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).
Collisions	The best estimate of the total number of collisions on this Ethernet segment.
Undersize Pkts	The total number of packets received less than 64 octets long (excluding framing bits, but including FCS octets) and otherwise well formed.
Oversize Pkts	The total number of packets received longer than 1632 octets (excluding framing bits, but including FCS octets) and otherwise well formed.
Fragments	The total number of packets received less than 64 octets in length (excluding framing bits but including FCS octets) and 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).
Jabbers	The total number of packets received longer than 1632 octets (excluding framing bits, but including FCS octets), and 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).
64 Octets	The total number of packets (including bad packets) received that are 64 octets in length (excluding framing bits but including FCS octets).
65 to 127 Octets	The total number of packets (including bad packets) received that are between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
128 to 255 Octets	The total number of packets (including bad packets) received that are between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
256 to 511 Octets	The total number of packets (including bad packets) received that are between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).

512 to 1023 Octets	The total number of packets (including bad packets) received that are between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).
1024 to 1632 Octets	The total number of packets (including bad packets) received that are between 1024 and 1632 octets in length inclusive (excluding framing bits but including FCS octets).

rmon collection history

The **rmon collection history** Interface Configuration (Ethernet, port-channel) mode command enables a Remote Monitoring (RMON) MIB history statistics group on an interface. Use the **no** form of this command to remove a specified RMON history statistics group.

Syntax

- **rmon collection history** *index* [**owner** *ownername*] [**buckets** *bucket-number*] [**interval** *seconds*]
- **no rmon collection history** *index*
  - *index* — Specifies the statistics group index. (Range: 1 - 65535)
  - *ownername* — Specifies the RMON statistics group owner name.
  - *bucket-number* — Number of buckets specified for the RMON collection history group of statistics. If unspecified, defaults to 50. (Range: 1 - 50)
  - *seconds* — Number of seconds in each polling cycle. (Range: 1 - 3600)

Default Configuration

RMON statistics group owner name is an empty string.

Number of buckets specified for the RMON collection history statistics group is 50.

Number of seconds in each polling cycle is 1800.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- Cannot be configured for a range of interfaces (range context).

Example

The following example enables a Remote Monitoring (RMON) MIB history statistics group on Ethernet port 1/e1 with index number 1 and a polling interval period of 2400 seconds.

```
Console(config)# interface ethernet 1/e1
Console(config-if)# rmon collection history 1 interval 2400
```

show rmon collection history

The **show rmon collection history** User EXEC mode command displays the requested RMON history group statistics.

Syntax

- **show rmon collection history** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)
  - *port-channel-number* — Valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays all RMON history group statistics.

```
Console> show rmon collection history

Index   Interface   Interval  Requested   Granted     Owner
                              Samples     Samples
------  ----------  --------  ---------   ----------  ----
1       1/e1        30        50          50          CLI
2       1/e1        1800      50          50          Manager
```

The following table describes significant fields shown above:

Field	Description
Index	An index that uniquely identifies the entry.
Interface	The sampled Ethernet interface
Interval	The interval in seconds between samples.
Requested Samples	The requested number of samples to be saved.
Granted Samples	The granted number of samples to be saved.
Owner	The entity that configured this entry.

show rmon history

The **show rmon history** User EXEC mode command displays RMON Ethernet history statistics.

Syntax

- **show rmon history** *index* {**throughput** | **errors** | **other**} [**period** *seconds*]
  - *index* — Specifies the requested set of samples. (Range: 1 - 65535)
  - **throughput** — Indicates throughput counters.
  - **errors** — Indicates error counters.
  - **other** — Indicates drop and collision counters.
  - *seconds* — Specifies the period of time in seconds. (Range: 1 - 4294967295)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following examples displays RMON Ethernet history statistics for index 1.

```
Console> show rmon history 1 throughput
Sample Set: 1           Owner: CLI
Interface: 1/e1         Interval: 1800
Requested samples: 50   Granted samples: 50

Maximum table size: 500

Time         Octets     Packets    Broadcast   Multicast   Util
----------   ---------  -------    ----------  ---------   -----
Jan 18 2002  303595962  357568     3289        7287        19%
21:57:00
Jan 18 2002  287696304  275686     2789        5878        20%
21:57:30

Console> show rmon history 1 errors
Sample Set: 1           Owner: Me
Interface: 1/e1         Interval: 1800
Requested samples: 50   Granted samples: 50

Maximum table size: 500 (800 after reset)

Time         CRC Align  Undersize  Oversize    Fragments   Jabbers
----------   ---------  ---------  --------    ---------   -------
Jan 18 2002  1          1          0           49          0
21:57:00
Jan 18 2002  1          1          0           27          0
21:57:30
```

```
Console> show rmon history 1 other
Sample Set: 1           Owner: Me
Interface: 1/e1         Interval: 1800
Requested samples: 50   Granted samples: 50

Maximum table size: 500

Time                    Dropped    Collisions
--------------------    --------   ----------
Jan 18 2002 21:57:00    3          0
Jan 18 2002 21:57:30    3          0
```

The following table describes significant fields shown above:

Field	Description
Time	Date and Time the entry is recorded.
Octets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).
Packets	The number of packets (including bad packets) received during this sampling interval.
Broadcast	The number of good packets received during this sampling interval that were directed to the Broadcast address.
Multicast	The number of good packets received during this sampling interval that were directed to a Multicast address. This number does not include packets addressed to the Broadcast address.
Util	The best estimate of the mean physical layer network utilization on this interface during this sampling interval, in hundredths of a percent.
CRC Align	The number of packets received during this sampling interval that had a length (excluding framing bits but including FCS octets) between 64 and 1632 octets, inclusive, but 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).
Undersize	The number of packets received during this sampling interval less than 64 octets long (excluding framing bits but including FCS octets) and were otherwise well formed.
Oversize	The number of packets received during this sampling interval longer than 1632 octets (excluding framing bits but including FCS octets) but were otherwise well formed.

Fragments	The total number of packets received during this sampling interval that were less than 64 octets in length (excluding framing bits but including FCS octets) 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 (AlignmentError). It is normal for etherHistoryFragments to increment because it counts both runts (which are normal occurrences due to collisions) and noise hits.
Jabbers	The number of packets received during this sampling interval that were longer than 1632 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).
Dropped	The total number of events in which packets were dropped by the probe due to lack of resources during this sampling interval. This number is not necessarily the number of packets dropped, it is just the number of times this condition has been detected.
Collisions	The best estimate of the total number of collisions on this Ethernet segment during this sampling interval.

rmon alarm

The **rmon alarm** Global Configuration mode command configures alarm conditions. Use the **no** form of this command to remove an alarm.

Syntax

- **rmon alarm** *index variable interval rthreshold fthreshold revent fevent* [**type** *type*] [**startup** *direction*] [**owner** *name*]
- **no rmon alarm** *index*
  - *index* — Specifies the alarm index. (Range: 1 - 65535)
  - *variable* — Specifies the object identifier of the particular variable to be sampled.
  - *interval* — Specifies the interval in seconds during which the data is sampled and compared with rising and falling thresholds. (Range: 1 - 4294967295)
  - *rthreshold* — Specifies the rising threshold. (Range: 0 - 4294967295)
  - *fthreshold* — Specifies the falling threshold. (Range: 0 - 4294967295)
  - *revent* — Specifies the event index used when a rising threshold is crossed. (Range: 1 - 65535)
  - *fevent* — Specifies the event index used when a falling threshold is crossed. (Range: 1 - 65535)

- *type* — Specifies the method used for sampling the selected variable and calculating the value to be compared against the thresholds. Possible values are **absolute** and **delta**.

  If the method is **absolute**, the value of the selected variable is compared directly with the thresholds at the end of the sampling interval. If the method is **delta**, the selected variable value of the last sample is subtracted from the current value, and the difference is compared with the thresholds.

- *direction* — Specifies the alarm that may be sent when this entry is first set to valid. Possible values are **rising**, **rising-falling** and **falling**.

  If the first sample (after this entry becomes valid) is greater than or equal to *rthreshold* and *direction* is equal to **rising** or **rising-falling**, a single rising alarm is generated. If the first sample (after this entry becomes valid) is less than or equal to *fthreshold* and *direction* is equal to **falling** or **rising-falling**, a single falling alarm is generated.

- *name* — Specifies the name of the person who configured this alarm. If unspecified, the name is an empty string.

Default Configuration

The type is **absolute**.

The startup direction is **rising-falling**.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the following alarm conditions:

- Alarm index — 1000
- Variable identifier — dell
- Sample interval — 360000 seconds
- Rising threshold — 1000000
- Falling threshold — 1000000
- Rising threshold event index — 10
- Falling threshold event index — 20

```
Console(config)# rmon alarm 1000 dell 360000 1000000 1000000 10 20
```

show rmon alarm-table

The **show rmon alarm-table** User EXEC mode command displays the alarms table.

Syntax

- **show rmon alarm-table**

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the alarms table.

```
Console> show rmon alarm-table

Index     OID                         Owner
-----     ----------------------      --------------
1         1.3.6.1.2.1.2.2.1.10.1      CLI
2         1.3.6.1.2.1.2.2.1.10.1      Manager
3         1.3.6.1.2.1.2.2.1.10.9      CLI
```

The following table describes significant fields shown above:

Field	Description
Index	An index that uniquely identifies the entry.
OID	Monitored variable OID.
Owner	The entity that configured this entry.

show rmon alarm

The **show rmon alarm** User EXEC mode command displays alarm configuration.

Syntax

- **show rmon alarm** *number*

- *number* — Specifies the alarm index. (Range: 1 - 65535)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays RMON 1 alarms.

```
Console> show rmon alarm 1
Alarm 1
-------
OID: 1.3.6.1.2.1.2.2.1.10.1
Last sample Value: 878128
Interval: 30
Sample Type: delta
Startup Alarm: rising
Rising Threshold: 8700000
Falling Threshold: 78
Rising Event: 1
Falling Event: 1
Owner: CLI
```

The following table describes the significant fields shown in the display:

Field	Description
Alarm	Alarm index.
OID	Monitored variable OID.
Last Sample Value	The statistic value during the last sampling period. For example, if the sample type is **delta**, this value is the difference between the samples at the beginning and end of the period. If the sample type is **absolute**, this value is the sampled value at the end of the period.

Interval	The interval in seconds over which the data is sampled and compared with the rising and falling thresholds.
Sample Type	The method of sampling the variable and calculating the value compared against the thresholds. If the value is **absolute**, the value of the variable is compared directly with the thresholds at the end of the sampling interval. If the value is **delta**, the value of the variable at the last sample is subtracted from the current value, and the difference compared with the thresholds.
Startup Alarm	The alarm that may be sent when this entry is first set. If the first sample is greater than or equal to the rising threshold, and startup alarm is equal to rising or rising and falling, then a single rising alarm is generated. If the first sample is less than or equal to the falling threshold, and startup alarm is equal falling or rising and falling, then a single falling alarm is generated.
Rising Threshold	A sampled statistic threshold. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval is less than this threshold, a single event is generated.
Falling Threshold	A sampled statistic threshold. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval is greater than this threshold, a single event is generated.
Rising Event	The event index used when a rising threshold is crossed.
Falling Event	The event index used when a falling threshold is crossed.
Owner	The entity that configured this entry.

rmon event

The **rmon event** Global Configuration mode command configures an event. Use the **no** form of this command to remove an event.

Syntax

- **rmon event** *index type* [**community** *text*] [**description** *text*] [**owner** *name*]
- **no rmon event** *index*
  - *index* — Specifies the event index. (Range: 1 - 65535)
  - *type* — Specifies the type of notification generated by the device about this event. Possible values: **none**, **log**, **trap**, **log-trap**.
  - **community** *text* — If the specified notification type is **trap**, an SNMP trap is sent to the SNMP community specified by this octet string. (Range: 0 - 127 characters)
  - **description** *text* — Specifies a comment describing this event. (Range: 0 - 127 characters)
  - *name* — Specifies the name of the person who configured this event. If unspecified, the name is an empty string.

Default Configuration
This command has no default configuration.

Command Mode
Global Configuration mode.

User Guidelines

- If **log** is specified as the notification type, an entry is made in the log table for each event. If **trap** is specified, an SNMP trap is sent to one or more management stations.

Example

The following example configures an event identified as index 10 and for which the device generates a notification in the log table.

```
Console(config)# rmon event 10 log
```

show rmon events

The **show rmon events** User EXEC mode command displays the RMON event table.

Syntax

- **show rmon events**

Default Configuration
This command has no default configuration.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays the RMON event table.

```
Console> show rmon events

Index  Description  Type      Community  Owner    Last time sent
-----  -----------  --------  ---------  -------  --------------
                                                  ------
1      Errors       Log                  CLI      Jan 18 2002
                                                  23:58:17
2      High         Log-Trap  device     Manager  Jan 18 2002
       Broadcast                                  23:59:48
```

The following table describes significant fields shown above:

Field	Description
Index	An index that uniquely identifies the event.
Description	A comment describing this event.
Type	The type of notification that the device generates about this event. Can have the following values: **none**, **log**, **trap**, **log-trap**. In the case of log, an entry is made in the log table for each event. In the case of trap, an SNMP trap is sent to one or more management stations.
Community	If an SNMP trap is to be sent, it is sent to the SNMP community specified by this octet string.
Owner	The entity that configured this event.
Last time sent	The time this entry last generated an event. If this entry has not generated any events, this value is zero.

show rmon log

The **show rmon log** User EXEC mode command displays the RMON log table.

Syntax

- **show rmon log** [*event*]
  - *event* — Specifies the event index. (Range: 0 - 65535)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the RMON log table.

```
Console> show rmon log
Maximum table size: 500
Event     Description       Time
-------   --------------    ---------
1         Errors            Jan 18 2002 23:48:19
1         Errors            Jan 18 2002 23:58:17
2         High Broadcast    Jan 18 2002 23:59:48

Console> show rmon log
Maximum table size: 500 (800 after reset)
Event     Description       Time
-------   --------------    ---------
1         Errors            Jan 18 2002 23:48:19
1         Errors            Jan 18 2002 23:58:17
2         High Broadcast    Jan 18 2002 23:59:48
```

The following table describes the significant fields shown in the display:

Field	Description
Event	An index that uniquely identifies the event.
Description	A comment describing this event.
Time	The time this entry was created.

rmon table-size

The **rmon table-size** Global Configuration mode command configures the maximum size of RMON tables. Use the **no** form of this command to return to the default configuration.

Syntax

- **rmon table-size** {**history** *entries* | **log** *entries*}
- **no rmon table-size** {**history** | **log**}
  - **history** *entries* — Maximum number of history table entries. (Range: 20 - 270)
  - **log** *entries* — Maximum number of log table entries. (Range: 20 - 100)

Default Configuration

History table size is 270.

Log table size is 200.

Command Mode

Global Configuration mode.

User Guidelines

- The configured table size takes effect after the device is rebooted.

Example

The following example configures the maximum RMON history table sizes to 100 entries.

```
Console(config)# rmon table-size history 100
```

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SNMP Commands

snmp-server community

The **snmp-server community** Global Configuration mode command configures the community access string to permit access to the SNMP protocol. Use the **no** form of this command to remove the specified community string.

Syntax

- **snmp-server community** *community* [**ro** | **rw** | **su**] [*ipv4-address* | *ipv6-address*] [**view** *view-name*]
- **snmp-server community-group** *community group-name* [*ipv4-address* | *ipv6-address*]
- **no snmp-server community** *community* [*ipv4-address* | *ipv6-address*]
  - *community* — Community string that acts like a password and permits access to the SNMP protocol. (Range: 1 - 20 characters)
  - **ro** — Indicates read-only access (default).
  - **rw** — Indicates read-write access.
  - **su** — Indicates SNMP administrator access.
  - **view** *view-name* — Name of a previously defined view. The view defines the objects available to the community. It's not relevant for **su**, which has an access to the whole MIB. If unspecified, all the objects except of the community-table and SNMPv3 user and access tables are available. (Range: 1 - 30 characters)
  - *ipv4-address* — Management station IPv4 address. Default is all IP addresses.
  - *ipv6-address* — Management station IPv6 address. Default is all IP addresses.
  - *group-name* — Specifies the name of a previously defined group. A group defines the objects available to the community. (Range: 1 - 30 characters)

Default Configuration

No communities are defined.

Command Mode

Global Configuration mode.

User Guidelines

- The **view-name** parameter cannot be specified for **su**, which has access to the whole MIB.
- The **view-name** parameter can be used to restrict the access rights of a community string. When it is specified:
  - An internal security name is generated.
  - The internal security name for SNMPv1 and SNMPv2 security models is mapped to an internal group name.
  - The internal group name for SNMPv1 and SNMPv2 security models is mapped to a view-name (read-view and notify-view always, and for **rw** for write-view also)
- The **group-name** parameter can also be used to restrict the access rights of a community string. When it is specified:
  - An internal security name is generated.
  - The internal security name for SNMPv1 and SNMPv2 security models is mapped to the group name.
- The **no snmp-server community** command is used to remove a community or a community group.

Examples

The following example defines community access string **public** to permit administrative access to SNMP protocol at an administrative station with IP address 192.168.1.20.

```
Console(config)# snmp-server community public su 192.168.1.20
```

snmp-server view

The **snmp-server view** Global Configuration mode command creates or updates a Simple Network Management Protocol (SNMP) server view entry. Use the **no** form of this command to remove a specified SNMP server view entry.

Syntax

- **snmp-server view** *view-name oid-tree* **{included | excluded}**
- **no snmp-server view** *view-name* [*oid-tree*]
  - *view-name* — Specifies the label for the view record that is being created or updated. The name is used to reference the record. (Range: 1 - 30 characters)
  - *oid-tree* — Specifies the object identifier of the ASN.1 subtree to be included or excluded from the view. To identify the subtree, specify a text string consisting of numbers, such as 1.3.6.2.4, or a word, such as system. Replace a single subidentifier with the asterisk (*) wildcard to specify a subtree family; for example 1.3.*.4. You may also identify the subtree by specifying its logical name; for example, "IfEntry.*.1".

- **included** — Indicates that the view type is included.
- **excluded** — Indicates that the view type is excluded.

Default Configuration

No view entry exists.

Command Mode

Global Configuration mode.

User Guidelines

- This command can be entered multiple times for the same view record.
- The number of views is limited to 64 including pre-configured views.
- No check is made to determine that a MIB node corresponds to the "starting portion" of the OID until the first wildcard.
- Following is a list of unsupported counters in the Iftable MIB:
  - ifInDiscards
  - ifOutErrors
  - ifOutQLen
  - ifHCInOctets
  - ifHCInUcastPkts
  - ifHCInMulticastPkts
  - ifHCInBroadcastPkts
  - ifHCOutOctets
  - ifHCOutUcastPkts
  - ifHCOutMulticastPkts
  - ifHCOutBroadcastPkts
- The following counters are also not supported
  - Alignment errors
  - Multiple Collision Frames
  - SQE Test Errors
  - Ryan Sense Errors
  - Symbol Errors

Examples

The following example creates a view that includes all objects in the MIB-II system group except for sysServices (System 7) and all objects for interface 1 in the MIB-II interface group.

```
Console(config)# snmp-server view user-view system included
Console(config)# snmp-server view user-view system.7 excluded
Console(config)# snmp-server view user-view ifEntry.*.1 included
```

snmp-server group

The **snmp-server group** Global Configuration mode command configures a new Simple Management Protocol (SNMP) group or a table that maps SNMP users to SNMP views. Use the **no** form of this command to remove a specified SNMP group.

Syntax

- **snmp-server group** groupname {**v1** | **v2** | **v3** {**noauth** | **auth** | **priv**} [**notify** notifyview] } [**read** readview] [**write** writeview]
- **no snmp-server group** groupname [**v1** | **v2** | **v3** [**noauth** | **auth** | **priv**]] [**context** name]
  - *groupname* — The name of the group. (Range: Up to 30 characters)
  - **v1** — SNMP Version 1 security model.
  - **v2** — SNMP Version 2 security model.
  - **v3** — SNMP Version 3 security model.
  - **noauth** — Specifies no authentication of a packet. Applicable only to SNMP Version 3 security model.
  - **auth**— Specifies authentication of a packet without encrypting it. Applicable only to SNMP Version 3 security model.
  - **priv** —Specifies authentication of a packet with encryption. Applicable only to SNMP Version 3 security model.
  - **read** *readview* — A string that is the name of the view that enables you only to view the contents of the agent. If unspecified, all the objects except of the community-table and SNMPv3 user and access tables are available. (Range: Up to 30 characters)
  - **write** *writeview* — A string that is the name of the view that enables you to enter data and configure the contents of the agent. If unspecified, nothing is defined for the write view. (Range: Up to 30 characters)
  - **notify** *notifyview* — A string that is the name of the view that enables you to specify an inform or a trap. If unspecified, nothing is defined for the notify view. (Range: Up to 30 characters.)

Default Configuration

No group entry exists.

Command Mode

Global Configuration mode.

User Guidelines

The index of the group name table is comprised of Group Name, Security Model, and Security Level. Different views for the same group can be defined with different security levels. For example, after having created the appropriate views, a group can be created for which "no authentication" is required, while allowing only notification view for "interfaces". A group of the same name can be created for which "priv" authentication is required. Read views can, for example, be configured for this group for mib2, and write views for interfaces. In this case, users in this group who send "priv" packets can modify all "interfaces" MIBs and view all mib2.

Examples

The following example attaches a group called user-group to SNMPv3 and assigns to the group the privacy security level and read access rights to a view called user-view.

```
Console(config)# snmp-server group user-group v3 priv read
user-view
```

snmp-server user

The **snmp-server user** Global Configuration mode command configures a new SNMP Version 3 user. Use the **no** form of this command to remove a user.

Syntax

- **snmp-server user** *username groupname* **[remote** *engineid-string***] [auth-md5** *password* **| auth-sha** *password* **| auth-md5-key** *md5-des-keys* **| auth-sha-key** *sha-des-keys* **]**
- **no snmp-server user** *username* **[remote** *engineid-string***]**
  - *username* — Specifies the name of the user on the host that connects to the agent. (Range: 1 - 30 characters)
  - *groupname* — Specifies the name of the group to which the user belongs. (Range: 1 - 30 characters)
  - *engineid-string* — Specifies the engine ID of the remote SNMP entity to which the user belongs. The engine ID is a concatenated hexadecimal string. Each byte in the hexadecimal character string is two hexadecimal digits. Each byte can be separated by a period or colon. (Range: 5 - 32 characters)

- **auth-md5** *password* — Indicates the HMAC-MD5-96 authentication level. The user should enter a password for authentication and generation of a DES key for privacy. (Range: 1 - 32 characters)
- **auth-sha** *password* — Indicates the HMAC-SHA-96 authentication level. The user should enter a password for authentication and generation of a DES key for privacy. (Range: 1 - 32 characters)
- **auth-md5-key** *md5-des-keys* — Indicates the HMAC-MD5-96 authentication level. The user should enter a concatenated hexadecimal string of the MD5 key (MSB) and the privacy key (LSB). If authentication is only required, 16 bytes should be entered; if authentication and privacy are required, 32 bytes should be entered. Each byte in the hexadecimal character string is two hexadecimal digits. Each byte can be separated by a period or colon. (16 or 32 bytes)
- **auth-sha-key** *sha-des-keys* — Indicates the HMAC-SHA-96 authentication level. The user should enter a concatenated hexadecimal string of the SHA key (MSB) and the privacy key (LSB). If authentication is only required, 20 bytes should be entered; if authentication and privacy are required, 36 bytes should be entered. Each byte in the hexadecimal character string is two hexadecimal digits. Each byte can be separated by a period or colon. (20 or 36 bytes)

Default Configuration

No group entry exists.

Command Mode

Global Configuration mode.

User Guidelines

- If auth-md5 or auth-sha is specified, both authentication and privacy are enabled for the user.
- When a **show running-config** Privileged EXEC mode command is entered, a line for this user will not be displayed. To see if this user has been added to the configuration, type the **show snmp users** Privileged EXEC mode command.
- An SNMP EngineID has to be defined to add SNMP users to the device. Changing or removing the SNMP EngineID value deletes SNMPv3 users from the device's database.
- The remote engineid designates the remote management station and should be defined to enable the device to receive informs.

Examples

The following example configures an SNMPv3 user **John** in group **user-group**.

```
Console(config)# snmp-server user John user-group
```

snmp-server engineID local

The **snmp-server engineID local** Global Configuration mode command specifies the Simple Network Management Protocol (SNMP) engineID on the local device. Use the **no** form of this command to remove the configured engine ID.

Syntax

- **snmp-server engineID local** {*engineid-string* | **default**}
- **no snmp-server engineID local**
  - *engineid-string* — Specifies a character string that identifies the engine ID. (Range: 9 - 64 hexa characters)
  - **default** — The engine ID is created automatically based on the device MAC address.

Default Configuration

The engine ID is not configured.

If SNMPv3 is enabled using this command, and the default is specified, the default engine ID is defined per standard as:

- First 4 octets — first bit = 1, the rest is IANA Enterprise number = 674.
- Fifth octet — set to 3 to indicate the MAC address that follows.
- Last 6 octets — MAC address of the device.

Command Mode

Global Configuration mode.

User Guidelines

- To use SNMPv3, you have to specify an engine ID for the device. You can specify your own ID or use a default string that is generated using the MAC address of the device.
- If the SNMPv3 engine ID is deleted or the configuration file is erased, SNMPv3 cannot be used. By default, SNMPv1/v2 are enabled on the device. SNMPv3 is enabled only by defining the Local Engine ID.
- If you want to specify your own ID, you do not have to specify the entire 32-character engine ID if it contains trailing zeros. Specify only the portion of the engine ID up to the point where just zeros remain in the value. For example, to configure an engine ID of 12340000000000000000000, you can specify snmp-server engineID local 1234.
- Since the engine ID should be unique within an administrative domain, the following is recommended:
  - For a standalone device, use the default keyword to configure the engine ID.
  - For a stackable system, configure the engine ID to be used for the entire stack, and verify that the stack engine ID is unique throughout the entire management network.

- Changing the value of the engine ID has the following important side-effect. A user's password (entered on the command line) is converted to an MD5 or SHA security digest. This digest is based on both the password and the local engine ID. The user's command line password is then destroyed, as required by RFC 2274. As a result, the security digests of SNMPv3 users become invalid if the local value of the engine ID change, and the users will have to be reconfigured.
- You cannot specify an engine ID that consists of all 0x0, all 0xF or 0x000000001.
- The **show running-config** Privileged EXEC mode command does not display the SNMP engine ID configuration. To see the SNMP engine ID configuration, enter the **snmp-server engineID local** Global Configuration mode command.

Examples

The following example enables SNMPv3 on the device and sets the local engine ID of the device to the default value.

```
Console(config) # snmp-server engineID local default
```

snmp-server enable traps

The **snmp-server enable traps** Global Configuration mode command enables the device to send SNMP traps. To disable SNMP traps, use the **no** form of the command.

Syntax

- **snmp-server enable traps**
- **no snmp-server enable traps**

Default Configuration

SNMP traps are enabled.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example enables SNMP traps.

```
Console(config)# snmp-server enable traps
```

snmp-server filter

The **snmp-server filter** Global Configuration mode command creates or updates a Simple Network Management Protocol (SNMP) server filter entry. Use the **no** form of this command to remove the specified SNMP server filter entry.

Syntax

- **snmp-server filter** *filter-name oid-tree* {**included | excluded**}
- **no snmp-server filter** *filter-name* [*oid-tree*]
  - *filter-name* — Specifies the label for the filter record that is being updated or created. The name is used to reference the record. (Range: 1 - 30 characters)
  - *oid-tree* — Specifies the object identifier of the ASN.1 subtree to be included or excluded from the view. To identify the subtree, specify a text string consisting of numbers, such as 1.3.6.2.4, or a word, such as system. Replace a single sub identifier with the asterisk (*) wildcard to specify a subtree family; for example, 1.3.*.4. You may also identify the subtree by specifying its logical name; for example, "IfEntry.*.1".
  - **included** — Indicates that the filter type is included.
  - **excluded** — Indicates that the filter type is excluded.

Default Configuration

No filter entry exists.

Command Mode

Global Configuration mode.

User Guidelines

This command can be entered multiple times for the same filter record. Later lines take precedence when an object identifier is included in two or more lines.

Examples

The following example creates a filter that includes all objects in the MIB-II system group except for sysServices (System 7) and all objects for interface 1 in the MIB-II interfaces group.

```
Console(config)# snmp-server filter filter-name system included
Console(config)# snmp-server filter filter-name system.7 excluded
Console(config)# snmp-server filter filter-name ifEntry.*.1
included
```

snmp-server host

The **snmp-server host** Global Configuration mode command specifies the recipient of Simple Network Management Protocol Version 1 or Version 2 notifications. Use the **no** form of this command to remove the specified host.

Syntax

- **snmp-server host** {*ip4-address* | *ip6-address* | *hostname*} *community-string* [**traps** | **informs**] [**1** | **2**] [**udp-port** *port*] [**filter** *filtername*] [**timeout** *seconds*] [**retries** *retries*]
- **no snmp-server host** {*ip4-address* | *ip6-address* | *hostname*} [**traps** | **informs**]
  - *ip4-address* — The host IPv4 address (the targeted recipient).
  - *ip6-address* — The host IPv6 address (the targeted recipient). When the IPv6 address is a Link Local address (IPv6Z address), the outgoing interface name must be specified. Refer to the usage guidelines for the interface name syntax.
  - *hostname* — Specifies the name of the host. (Range:1 - 158 characters)
  - *community-string* — Specifies a password-like community string sent with the notification operation. (Range: 1 - 20)
  - **traps** — Indicates that SNMP traps are sent to this host. If unspecified, SNMPv2 traps are sent to the host.
  - **informs** — Indicates that SNMP informs are sent to this host. Not applicable to SNMPv1.
  - **1** — Indicates that SNMPv1 traps will be used.
  - **2** — Indicates that SNMPv2 traps will be used. If
  - *port* — Specifies the UDP port of the host to use. If unspecified, the default UDP port number is 162. (Range: 1 - 65535)
  - *filtername* — Specifies a string that defines the filter for this host. If unspecified, nothing is filtered. (Range: 1 - 30 characters)
  - *seconds* — Specifies the number of seconds to wait for an acknowledgment before resending informs. If unspecified, the default timeout period is 15 seconds. (Range: 1 - 300)
  - retries — Specifies the maximum number of times to resend an inform request. If unspecified, the default maximum number of retries is 3. (Range: 0 - 255)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

- When configuring an SNMPv1 or SNMPv2 notification recipient, a notification view for that recipient is automatically generated for all the MIB.
- When configuring an SNMPv1 notification recipient, the **Inform** option cannot be selected.
- If a trap and inform are defined on the same target, and an inform was sent, the trap is not sent.
- The IPv6Z address format: <*ipv6-link-local-address*>%<*interface-name*>
  - *interface-name* — **vlan**<*integer*> | **ch**<*integer*> | **isatap**<*integer*> | <*physical-port-name*> | 0
  - *integer* — <*decimal-number*> | <*integer*><*decimal-number*>
  - *decimal-number* — 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
  - *physical-port-name* — Designated port number, for example 1/e16.

  If the egress interface is not specified, the default interface is selected. Specifying interface zone=0 is the same as not defining an egress interface.

Example

The following example enables SNMP traps for host 10.1.1.1 with community string "management" using SNMPv2.

```
Console(config)# snmp-server host 10.1.1.1 management 2
```

snmp-server v3-host

The **snmp-server v3-host** Global Configuration mode command specifies the recipient of Simple Network Management Protocol Version 3 notifications. Use the **no** form of this command to remove the specified host.

Syntax

- **snmp-server v3-host** {*ip4-address* | *ip6-address* | *hostname*} | *hostname***}** *username* **[traps | informs] {noauth | auth | priv} [udp-port** *port***] [filter** *filtername***] [timeout** *seconds***] [retries** *retries***]**
- **no snmp-server v3-host {***ip4-address* | *ip6-address* | *hostname***}** *username* **[traps | informs]**
  - *ip4-address* — The host IPv4 address (the targeted recipient).
  - *ip6-address* — The host IPv6 address (the targeted recipient). When the IPv6 address is a Link Local address (IPv6Z address), the outgoing interface name must be specified. Refer to the usage guidelines for the interface name syntax.
  - *hostname* — Specifies the name of the host. (Range: 1 - 158 characters)
  - *username* — Specifies the name of the user to use to generate the notification. (Range: 1 - 25)

- **traps** — Indicates that SNMP traps are sent to this host.
- **informs** — Indicates that SNMP informs are sent to this host.
- **noauth** — Indicates no authentication of a packet.
- **auth** — Indicates authentication of a packet without encrypting it.
- **priv** — Indicates authentication of a packet with encryption.
- *port* — Specifies the UDP port of the host to use. If unspecified, the default UDP port number is 162. (Range: 1 - 65535)
- *filtername* — Specifies a string that defines the filter for this host. If unspecified, nothing is filtered. (Range: 1 - 30 characters)
- *seconds* — Specifies the number of seconds to wait for an acknowledgment before resending informs. If unspecified, the default timeout period is 15 seconds. (Range: 1 - 300)
- *retries* — Specifies the maximum number of times to resend an inform request, when a response is not received for a generated message. If unspecified, the default maximum number of retries is 3. (Range: 0 - 255)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

- A user and notification view are not automatically created. Use the **snmp-server user**, **snmp-server group** and **snmp-server view** Global Configuration mode commands to generate a user, group and notify group, respectively.
- The IPv6Z address format: <*ipv6-link-local-address*>%<*interface-name*>
  - *interface-name* — **vlan**<*integer*> | **ch**<*integer*> | **isatap**<*integer*> | <*physical-port-name*> | 0
  - *integer* — <*decimal-number*> | <*integer*><*decimal-number*>
  - *decimal-number* — 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
  - *physical-port-name* — Designated port number, for example 1/e16.

  If the egress interface is not specified, the default interface is selected. Specifying interface zone=0 is the same as not defining an egress interface.

Example

The following example configures an SNMPv3 host.

```
console(config)# snmp-server v3-host 192.168.0.20 john noauth
```

snmp-server trap authentication

The **snmp-server trap authentication** Global Configuration mode command enables the device to send SNMP traps when authentication fails. Use the **no** form of this command to disable SNMP failed authentication traps.

Syntax

- **snmp-server trap authentication**
- **no snmp-server trap authentication**

Default Configuration

SNMP failed authentication traps are enabled.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example enables SNMP failed authentication traps.

```
Console(config)# snmp-server trap authentication
```

snmp-server contact

The **snmp-server contact** Global Configuration mode command configures the system contact (sysContact) string. To remove system contact information, use the **no** form of the command.

Syntax

- **snmp-server contact** *text*
- **no snmp-server contact**
  - *text* — Specifies the string that describes system contact information. (Range: 0 - 160 characters)

Default Configuration
This command has no default configuration.

Command Mode
Global Configuration mode.

User Guidelines

- Do not include spaces in the text string or place text that includes spaces inside quotation marks.

Example

The following example configures the system contact point called **Dell_Technical_Support**.

```
console(config)# snmp-server contact Dell_Technical_Support
```

snmp-server location

The **snmp-server location** Global Configuration mode command configures the system location string. To remove the location string.

Syntax

- **snmp-server location** *text*
- **no snmp-server location**
  - *text* — Specifies a string that describes system location information. (Range: 0 - 160 characters)

Default Configuration
This command has no default configuration.

Command Mode
Global Configuration mode.

User Guidelines
Do not include spaces in the text string or place text that includes spaces inside quotation marks.

Example

The following example defines the device location as **New_York**.

```
Console(config)# snmp-server location New_York
```

snmp-server set

The **snmp-server set** Global Configuration mode command defines the SNMP MIB value.

Syntax

- **snmp-server set** *variable-name name1 value1* [*name2 value2* …]
  - *variable-name* — MIB variable name.
  - *name value* — List of name and value pairs. In the case of scalar MIBs, only a single pair of name values. In the case of an entry in a table, at least one pair of name and value followed by one or more fields.

Default Configuration
This command has no default configuration.

Command Mode
Global Configuration mode.

User Guidelines

- Although the CLI can set any required configuration, there might be a situation where a SNMP user sets a MIB variable that does not have an equivalent command. In order to generate configuration files that support those situations, the **snmp-server set** command is used.
- This command is case-sensitive.

Examples

The following example configures the scalar MIB sysName with the value **dell**.

```
Console(config)# snmp-server set sysName sysname dell
```

show snmp

The **show snmp** Privileged EXEC mode command displays the SNMP status.

Syntax

- **show snmp**

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays the SNMP communications status.

```
Console# show snmp

Community-  Community-   View name     IP
String      Access                    address
----------  ----------   ---------     -------
                                       -
public      read only    user-view     All
private     read write   Default       172.16.1.1
private     su           DefaultSuper  172.17.1.1
```

```
Community-string         Group name    IP address
----------------         ----------    ----------
public                   user-group    all

Traps are enabled.
Authentication trap is enabled.

Version 1,2 notifications
Target Address    Type   Community     Version  UDP    Filter  TO   Retries
                                                Port   Name    Sec
--------------    -----  ---------     -------  ----   ------  ---  -------
192.122.173.42    Trap   public        2        162            15   3
192.122.173.42    Inform public        2        162            15   3

Version 3 notifications
Target Address    Type   Username      Security UDP    Filter  TO   Retries
                                       Level    Port   Name    Sec
--------------    -----  ---------     -------  ----   ------  ---  -------
192.122.173.42    Inform Bob           Priv     162            15   3

System Contact: Robert
System Location: Marketing
```

The following table describes significant fields shown above.

Field	Description
Community-string	Community access string to permit access to the SNMP protocol.
Community-access	Type of access - read-only, read-write, super access
IP Address	Management station IP Address.
Trap-Rec-Address	Targeted Recipient
Trap-Rec-Community	Statistics sent with the notification operation.
Version	SNMP version for the sent trap 1 or 2.

show snmp engineid

The **show snmp engineID** Privileged EXEC mode command displays the ID of the local Simple Network Management Protocol (SNMP) engine.

Syntax

- **show snmp engineID**

Default Configuration

This command has no default configuration.

Command Mode

- Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the SNMP engine ID.

```
Console# show snmp engineID

Local SNMP engineID: 08009009020C0B099C075878
```

show snmp views

The **show snmp views** Privileged EXEC mode command displays the configuration of views.

Syntax

- **show snmp views [***viewname***]**
  - *viewname* — Specifies the name of the view. (Range: 1 - 30)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the configuration of views.

```
Console# show snmp views

Name                 OID Tree          Type
-----------  ----------------------  ---------
user-view    1.3.6.1.2.1.1           Included
user-view    1.3.6.1.2.1.1.7         Excluded
user-view    1.3.6.1.2.1.2.2.1.*.1   Included
```

show snmp groups

The **show snmp groups** Privileged EXEC mode command displays the configuration of groups.

Syntax

- **show snmp groups [***groupname***]**
  - *groupname* — Specifies the name of the group. (Range: 1 - 30)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the configuration of views.

```
Console# show snmp groups

Name                  Security                    Views
                    Model   Level       Read      Write     Notify
--------------    -----   -----       -------   -------   -------
user-group          V3     priv        Default   ""        ""
managers-group      V3     priv        Default   Default   ""
managers-group      V3     priv        Default   ""        ""
```

The following table describes significant fields shown above.

Field		Description
Name		Name of the group.
Security Model		SNMP model in use (v1, v2 or v3).
Security Level		Authentication of a packet with encryption. Applicable only to the SNMP v3 security model.
Views	Read	Name of the view that enables only viewing the contents of the agent. If unspecified, all objects except the community-table and SNMPv3 user and access tables are available.
	Write	Name of the view that enables entering data and managing the contents of the agent.
	Notify	Name of the view that enables specifying an inform or a trap.

show snmp filters

The **show snmp filters** Privileged EXEC mode command displays the configuration of filters.

Syntax

- **show snmp filters [***filtername***]**
  - *filtername* — Specifies the name of the filter. (Range: 1 - 30)

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays the configuration of filters.

```
Console# show snmp filters


Name                        OID Tree           Type
-----------     ------------------------     ---------
user-filter     1.3.6.1.2.1.1                Included
user-filter     1.3.6.1.2.1.1.7              Excluded
user-filter     1.3.6.1.2.1.2.2.1.*.1        Included
```

show snmp users

The **show snmp users** Privileged EXEC mode command displays the configuration of users.

Syntax

- **show snmp users [***username***]**
  - *username* — Specifies the name of the user. (Range: 1 - 30)

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays the configuration of users.

```
Console# show snmp users

Name      Group name    Auth Method    Remote
------    ------------ ---------      -------------------------
John      user-group    md5
John      user-group    md5            08009009020C0B099C075879
```

28

Spanning-Tree Commands

spanning-tree

The **spanning-tree** Global Configuration mode command enables spanning-tree functionality. Use the **no** form of this command to disable spanning-tree functionality.

Syntax

- **spanning-tree**
- **no spanning-tree**

Default Configuration
Spanning-tree is enabled.

Command Mode
Global Configuration mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example enables spanning-tree functionality.

```
Console(config)# spanning-tree
```

spanning-tree mode

The **spanning-tree mode** Global Configuration mode command configures the spanning-tree protocol. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree mode** {**stp** | **rstp**| **mstp**}
- **no spanning-tree mode**
  - **stp** — STP is the Spanning Tree operative mode.
  - **rstp** — RSTP is the Spanning Tree operative mode.
  - **mstp** — MSTP is enabled.

Default Configuration
STP is enabled.

Command Mode
Global Configuration mode.

User Guidelines

- In RSTP mode, the device uses STP when the neighbor device uses STP.
- In MSTP mode, the device uses RSTP when the neighbor device uses RSTP and uses STP when the neighbor device uses STP.

Example

The following example configures the spanning-tree protocol to RSTP.

```
console(config)# spanning-tree mode rstp
```

spanning-tree forward-time

The **spanning-tree forward-time** Global Configuration mode command configures the spanning-tree bridge forward time, which is the amount of time a port remains in the listening and learning states before entering the forwarding state. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree forward-time** *seconds*
- **no spanning-tree forward-time**
  - *seconds* — Time in seconds. (Range: 4 - 30)

Default Configuration
The default forwarding time for the IEEE Spanning Tree Protocol (STP) is 5 seconds.

Command Mode
Global Configuration mode.

User Guidelines

- When configuring the forwarding time, the following relationship should be kept:
  – 2*(Forward-Time - 1) >= Max-Age

Example

The following example configures the Spanning Tree bridge forwarding time to 25 seconds.

```
Console(config)# spanning-tree forward-time 25
```

spanning-tree hello-time

The **spanning-tree hello-time** Global Configuration mode command configures the Spanning Tree bridge hello time, which is how often the device Broadcasts Spanning Tree BPDUs to other devices. Use the **no** form of this command to return to the default configuration.

Syntax

- s**panning-tree hello-time** *seconds*
- **no spanning-tree hello-time**
  - *seconds* — Time in seconds. (Range: 1 - 10)

Default Configuration

The default hello time for IEEE Spanning Tree Protocol (STP) is 2 seconds.

Command Mode

Global Configuration mode.

User Guidelines

- When configuring the hello time, the following relationship should be kept:
  – Max-Age >= 2*(Hello-Time + 1)

Example

The following example configures Spanning Tree bridge hello time to 5 seconds.

```
Console(config)# spanning-tree hello-time 5
```

spanning-tree max-age

The **spanning-tree max-age** Global Configuration mode command configures the Spanning Tree bridge maximum age. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree max-age** *seconds*
- **no spanning-tree max-age**
  - *seconds* — Time in seconds. (Range: 6 - 40)

Default Configuration

The default maximum age for IEEE Spanning Tree Protocol (STP) is 20 seconds.

Command Mode

Global Configuration mode.

User Guidelines

- When configuring the maximum age, the following relationships should be kept:
  - 2*(Forward-Time - 1) >= Max-Age
  - Max-Age >= 2*(Hello-Time + 1)

Example

The following example configures the Spanning Tree bridge maximum-age to 10 seconds.

```
Console(config)# spanning-tree max-age 10
```

spanning-tree priority

The **spanning-tree priority** Global Configuration mode command configures the Spanning Tree priority of the device. The priority value is used to determine which bridge is elected as the root bridge. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree priority** *priority*
- **no spanning-tree priority**
  - *priority* — Priority of the bridge. (Range: 0 - 61440 in steps of 4096)

Default Configuration

The default bridge priority for IEEE Spanning Tree Protocol (STP) is 32768.

Command Mode

Global Configuration mode.

User Guidelines

- The bridge with the lowest priority is elected as the root bridge.

Example

The following example configures Spanning Tree priority to 12288.

```
Console(config)# spanning-tree priority 12288
```

spanning-tree disable

The **spanning-tree disable** Interface Configuration mode command disables Spanning Tree on a specific port. Use the **no** form of this command to enable Spanning Tree on a port.

Syntax

- **spanning-tree disable**
- **no spanning-tree disable**

Default Configuration
Spanning tree is enabled on all ports.

Command Mode
Interface Configuration (Ethernet, port-channel) mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example disables spanning-tree on Ethernet port 1/e5.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# spanning-tree disable
```

spanning-tree cost

The **spanning-tree cost** Interface Configuration mode command configures the Spanning Tree path cost for a port. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree cost** *cost*
- **no spanning-tree cost**
  - *cost* — Path cost of the port (Range: 1 - 200,000,000)

Default Configuration

Default path cost is determined by port speed and path cost method (long or short) as shown below:

Interface	Long	Short
Port-channel	20,000	4
Gigabit Ethernet (1000 Mbps)	20,000	4
Fast Ethernet (100 Mbps)	200,000	19
Ethernet (10 Mbps)	2,000,000	100

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- The path cost method is configured using the **spanning-tree pathcost method** Global Configuration mode command.

Example

The following example configures the spanning-tree cost on Ethernet port 1/e15 to 35000.

```
Console(config)# interface ethernet 1/e15
Console(config-if)# spanning-tree cost 35000
```

spanning-tree port-priority

The **spanning-tree port-priority** Interface Configuration mode command configures port priority. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree port-priority** *priority*
- **no spanning-tree port-priority**
  - *priority* — The priority of the port. (Range: 0 - 240 in multiples of 16)

Default Configuration

The default port priority for IEEE Spanning TreeProtocol (STP) is 128.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the spanning priority on Ethernet port 1/e15 to 96.

```
Console(config)# interface ethernet 1/e15
Console(config-if)# spanning-tree port-priority 96
```

spanning-tree portfast

The **spanning-tree portfast** Interface Configuration mode command enables PortFast mode. In PortFast mode, the interface is immediately put into the forwarding state upon linkup without waiting for the standard forward time delay. Use the **no** form of this command to disable PortFast mode.

Syntax

- **spanning-tree portfast [auto]**
- **no spanning-tree portfast**
  - auto — Specifies that the software waits for 3 seconds (With no BPDUs received on the interface) before putting the interface into the PortFast mode.

Default Configuration

PortFast mode is disabled.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- This feature should be used only with interfaces connected to end stations. Otherwise, an accidental topology loop could cause a data packet loop and disrupt device and network operations.

Example

The following example enables PortFast on Ethernet port 1/e15.

```
Console(config)# interface ethernet 1/e15
Console(config-if)# spanning-tree portfast
```

spanning-tree link-type

The **spanning-tree link-type** Interface Configuration mode command overrides the default link-type setting determined by the duplex mode of the port and enables Rapid Spanning Tree Protocol (RSTP) transitions to the forwarding state. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree link-type** {**point-to-point** | **shared**}
- **no spanning-tree link-type**
  - **point-to-point** — Indicates that the port link type is point-to-point.
  - **shared** — Indicates that the port link type is shared.

Default Configuration

The device derives the port link type from the duplex mode. A full-duplex port is considered a point-to-point link and a half-duplex port is considered a shared link.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example enables shared spanning-tree on Ethernet port 1/e5.

```
Console(config)# interface ethernet 1/e15
Console(config-if)# spanning-tree link-type shared
```

spanning-tree pathcost method

The **spanning-tree pathcost method** Global Configuration mode command sets the default path cost method. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree pathcost method** {**long** | **short**}
- **no spanning-tree pathcost method**
  - *long* — Specifies port path costs with a range of 1-200,000,000 .
  - *short* — Specifies port path costs with a range of 0-65,535.

Default Configuration
Short path cost method.

Command Mode
Global Configuration mode.

User Guidelines

- This command applies to all Spanning Tree instances on the device.
- The cost is set using the **spanning-tree cost** command.

Example

The following example sets the default path cost method to **long**.

```
Console(config)# spanning-tree pathcost method long
```

spanning-tree bpdu

The **spanning-tree bpdu** Global Configuration mode command defines BPDU handling when the Spanning Tree is disabled globally or on a single interface. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree bpdu** {**filtering** | **flooding**}
- **no spanning-tree bpdu**
  - **filtering** — Filter BPDU packets when the Spanning Tree is disabled on an interface.
  - **flooding** — Flood BPDU packets when the Spanning Tree is disabled on an interface.

Default Configuration
The default setting is flooding.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example defines BPDU packet flooding when the spanning-tree is disabled on an interface**.**

```
Console(config)# spanning-tree bpdu flooding
```

clear spanning-tree detected-protocols

The **clear spanning-tree detected-protocols** Privileged EXEC mode command enables the user to set the switches back to RSTP mode without rebooting the device.

Syntax

- **clear spanning-tree detected-protocols** [**ethernet** *interface* | **port-channel** *port-channel-number*]
  - *interface* — A valid Ethernet port.
  - *port-channel-number* — A valid port-channel number.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- This feature should be used only when working in RSTP or MSTP mode.

Example

The following example restarts the protocol migration process on Ethernet port 1/e11.

```
Console# clear spanning-tree detected-protocols ethernet 1/e11
```

spanning-tree mst priority

The **spanning-tree mst priority** Global Configuration mode command configures the device priority for the specified spanning-tree instance. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree mst** *instance-id* **priority** *priority*
- **no spanning-tree mst** *instance-id* **priority**
  - *instance-id* — ID of the spanning -tree instance. (Range: 0 - 15)
  - *priority* — Device priority for the specified spanning-tree instance. (Range: 0 - 61440 in multiples of 4096)

Default Configuration

The default bridge priority for IEEE Spanning Tree Protocol (STP) is 32768.

Command Mode
Global Configuration mode.

User Guidelines

- The device with the lowest priority is selected as the root of the Spanning Tree.

Example

The following example configures the Spanning Tree priority of instance 1 to 4096.

```
Console(config)# spanning-tree mst 1 priority 4096
```

spanning-tree mst max-hops

The **spanning-tree mst max-hops** Global Configuration mode command configures the number of hops in an MST region before the BDPU is discarded and the port information is aged out. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree mst max-hops** *hop-count*
- **no spanning-tree mst max-hops**
  - *hop-count* — Number of hops in an MST region before the BDPU is discarded . (Range: 1 - 40)

Default Configuration
The default number of hops is 20.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example configures the maximum number of hops that a packet travels in an MST region before it is discarded to 10.

```
Console (config) # spanning-tree mst max-hops 10
```

spanning-tree mst port-priority

The **spanning-tree mst port-priority** Interface Configuration mode command configures port priority for the specified MST instance. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree mst** *instance-id* **port-priority** *priority*
- **no spanning-tree mst** *instance-id* **port-priority**
  - *instance-ID* — ID of the Spanning Tree instance. (Range: 1 - 15)
  - *priority* — The port priority. (Range: 0 - 240 in multiples of 16)

Default Configuration

The default port priority for IEEE Multiple Spanning Tree Protocol (MSTP) is 128.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the port priority of port 1/e1 for instance 1 to 142.

```
Console(config)# interface ethernet 1/e1
Console(config-if)# spanning-tree mst 1 port-priority 142
```

spanning-tree mst cost

The **spanning-tree mst cost** Interface Configuration mode command configures the path cost for multiple Spanning Tree (MST) calculations. If a loop occurs, the Spanning Tree considers path cost when selecting an interface to put in the forwarding state. Use the **no** form of this command to return to the default configuration.

Syntax

- **spanning-tree mst** *instance-id* **cost** *cost*
- **no spanning-tree mst** *instance-id* **cost**
  - *instance-ID* — ID of the spanning -tree instance. (Range: 1 - 15)
  - *cost* — The port path cost. (Range: 1 - 200,000,000)

Default Configuration

Default path cost is determined by port speed and path cost method (long or short) as shown below:

Interface	Long	Short
Port-channel	20,000	4
Gigabit Ethernet (1000 Mbps)	20,000	4
Fast Ethernet (100 Mbps)	200,000	19
Ethernet (10 Mbps)	2,000,000	100

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example configures the MSTP instance 1 path cost for Ethernet port 1/e9 to 4.

```
Console(config) # interface ethernet 1/e9
Console(config-if) # spanning-tree mst 1 cost 4
```

spanning-tree mst configuration

The **spanning-tree mst configuration** Global Configuration mode command enables configuring an MST region by entering the Multiple Spanning Tree (MST) mode.

Syntax

- **spanning-tree mst configuration**

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

All devices in an MST region must have the same VLAN mapping, configuration revision number and name.

Example

The following example configures an MST region.

```
Console(config)# spanning-tree mst configuration
Console(config-mst) # instance 1 add vlan 10-20
Console(config-mst) # name region1
Console(config-mst) # revision 1
```

instance (mst)

The **instance** MST Configuration mode command maps VLANS to an MST instance.

Syntax

- **instance** *instance-id* **{add | remove} vlan** *vlan-range*
  - *instance-ID* — ID of the MST instance. (Range: 1 - 15)
  - *vlan-range* — VLANs to be added to or removed from the specified MST instance. To specify a range of VLANs, use a hyphen. To specify a series of VLANs, use a comma. (Range: 1 - 4094)

Default Configuration

VLANs are mapped to the common and internal Spanning Tree (CIST) instance (instance 0).

Command Mode

MST Configuration mode.

User Guidelines

All VLANs that are not explicitly mapped to an MST instance are mapped to the common and internal Spanning Tree (CIST) instance (instance 0) and cannot be unmapped from the CIST.

For two or more devices to be in the same MST region, they must have the same VLAN mapping, the same configuration revision number, and the same name.

Example

The following example maps VLANs 10-20 to MST instance 1.

```
Console(config)# spanning-tree mst configuration
Console(config-mst)# instance 1 add vlan 10-20
```

name (mst)

The **name** MST Configuration mode command defines the MST region name. Use the **no** form of this command to return to the default setting.

Syntax

- **name** *string*
- **no name**
  - *string* — MST configuration name. Case-sensitive. (Range: 1 - 32 characters)

Default Configuration

The default name is a bridge ID.

Command Mode

MST Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example defines the configuration name as region1.

```
Console(config)# spanning-tree mst configuration
Console(config-mst)# name region 1
```

revision (mst)

The **revision** MST configuration command defines the MST region revision number. Use the **no** form of this command to return to the default configuration.

Syntax

- **revision** *value*
- **no revision**
  - *value* — Configuration revision number. (Range: 0 - 65535)

Default Configuration

The default configuration revision number is 0.

Command Mode

MST Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example sets the configuration revision to 1.

```
Console(config)# spanning-tree mst configuration
Console(config-mst)# revision 1
```

show (mst)

The **show** MST Configuration mode command displays the current or pending MST region configuration.

Syntax

- **show {current | pending}**
  - **current** — Indicates the current region configuration.
  - **pending** — Indicates the pending region configuration.

Default Configuration

This command has no default configuration.

Command Mode

MST Configuration mode.

User Guidelines

The pending MST region configuration takes effect only after exiting the MST configuration mode.

Example

The following example displays a pending MST region configuration.

```
Console(config-mst)# show pending
Pending MST configuration
Name: Region1
Revision: 1
Instance     Vlans Mapped     State
--------     ------------     -----
0            1-9,21-4094      Enabled
1            10-20            Enabled
```

exit (mst)

The **exit** MST Configuration mode command exits the MST configuration mode and applies all configuration changes.

Syntax

- **exit**

Default Configuration

This command has no default configuration.

Command Mode

MST Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example exits the MST configuration mode and saves changes.

```
Console(config)# spanning-tree mst configuration
Console(config-mst)# exit
```

abort (mst)

The **abort** MST Configuration mode command exits the MST configuration mode without applying the configuration changes.

Syntax

- **abort**

Default Configuration
This command has no default configuration.

Command Mode
MST Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example exits the MST configuration mode without saving changes.

```
Console(config)# spanning-tree mst configuration
Console(config-mst)# abort
```

show spanning-tree

The **show spanning-tree** Privileged EXEC mode command displays spanning-tree configuration.

Syntax

- **show spanning-tree [ethernet** *interface -number*| **port-channel** *port-channel-number*] [**instance** instance-id]
- **show spanning-tree** [**detail**] [**active** | **blockedports**] [**instance** instance-id]
- **show spanning-tree mst-configuration**
  - *interface -number* — A valid Ethernet port.
  - *port-channel-number* — A valid port channel number.
  - **detail** — Indicates detailed information.
  - **active** — Indicates active ports only.
  - **blockedports** — Indicates blocked ports only.
  - **mst-configuration** — Indicates the MST configuration identifier.
  - *instance-id* — Specifies ID of the Spanning Tree instance.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays spanning-tree information.

```
Console# show spanning-tree


Spanning tree enabled mode RSTP

Default port cost method: long


Root ID  Priority          32768

         Address           00:01:42:97:e0:00

         Path              20000
         Cost

         Root              1 (1/e1)
         Port

         Hello Time 2 sec  Max Age 20 sec   Forward Delay 15 sec


Bridge   Priority          36864
ID

         Address           00:02:4b:29:7a:00

         Hello Time 2 sec  Max Age 20 sec   Forward Delay 15 sec


Interfaces

Name     State    Prio.Nbr Cost     Sts     Role    PortFast Type

----     -------  -------- -----    ---     ----    -------- ----------

1/e1     Enabled  128.1    20000    FWD     Root    No       P2p (RSTP)
```

```
1/e2     Enabled  128.2    20000    FWD     Desg    No       Shared
                                                             (STP)
1/e3     Disabled 128.3    20000    -       -       -        -
1/e4     Enabled  128.4    20000    BLK     ALTN    No       Shared
                                                             (STP)
1/e5     Enabled  128.5    20000    DIS     -       -        -

Console# show spanning-tree

Spanning tree enabled mode RSTP
Default port cost method: long

Root ID  Priority          36864
         Address           00:02:4b:29:7a:00
         This switch is the root.
         Hello Time 2 sec  Max Age 20 sec   Forward Delay 15 sec

Interfaces
Name     State    Prio.Nbr Cost     Sts     Role    PortFast Type
----     -------  -------- -----    ---     ----    -------- ----------
1/e1     Enabled  128.1    20000    FWD     Desg    No       P2p (RSTP)
1/e2     Enabled  128.2    20000    FWD     Desg    No       Shared
                                                             (STP)
1/e3     Disabled 128.3    20000    -       -       -        -
1/e4     Enabled  128.4    20000    FWD     Desg    No       Shared
                                                             (STP)
1/e5     Enabled  128.5    20000    DIS     -       -        -
```

```
Console# show spanning-tree


Spanning tree disabled (BPDU filtering) mode RSTP

Default port cost method: long


Root ID  Priority          N/A

         Address           N/A

         Path              N/A
         Cost

         Root              N/A
         Port

         Hello Time N/A    Max Age N/A      Forward Delay N/A


Bridge   Priority          36864
ID

         Address           00:02:4b:29:7a:00

         Hello Time 2 sec  Max Age 20 sec   Forward Delay 15 sec


Interfaces

Name     State    Prio.Nbr Cost     Sts     Role    PortFast Type

----     -------  -------- -----    ---     ----    -------- ----

1/e1     Enabled  128.1    20000    -       -       -        -

1/e2     Enabled  128.2    20000    -       -       -        -

1/e3     Disabled 128.3    20000    -       -       -        -

1/e4     Enabled  128.4    20000    -       -       -        -

1/e5     Enabled  128.5    20000    -       -       -        -
```

```
Console# show spanning-tree active


Spanning tree enabled mode RSTP

Default port cost method: long


Root ID  Priority          32768

         Address           00:01:42:97:e0:00

         Path              20000
         Cost

         Root              1 (1/e1)
         Port

         Hello Time 2 sec  Max Age 20 sec   Forward Delay 15 sec


Bridge   Priority          36864
ID

         Address           00:02:4b:29:7a:00

         Hello Time 2 sec  Max Age 20 sec   Forward Delay 15 sec


Interfaces

Name     State    Prio.Nbr Cost     Sts     Role    PortFast Type

----     -------  -------- -----    ---     ----    -------- ----------

1/e1     Enabled  128.1    20000    FWD     Root    No       P2p (RSTP)

1/e2     Enabled  128.2    20000    FWD     Desg    No       Shared
                                                             (STP)

1/e4     Enabled  128.4    20000    BLK     ALTN    No       Shared
                                                             (STP)
```

```
Console# show spanning-tree blockedports


Spanning tree enabled mode RSTP

Default port cost method: long


Root ID  Priority          32768

         Address           00:01:42:97:e0:00

         Path              20000
         Cost

         Root              1 (1/1)
         Port

         Hello Time 2 sec  Max Age 20 sec   Forward Delay 15 sec


Bridge   Priority          36864
ID

         Address           00:02:4b:29:7a:00

         Hello Time 2 sec  Max Age 20 sec   Forward Delay 15 sec


Interfaces

Name     State    Prio.Nbr Cost     Sts     Role    PortFast Type

----     -------  -------- -----    ---     ----    -------- ----------

1/e4     Enabled  128.4    20000    BLK     ALTN    No       Shared
                                                              (STP)
```

```
Console# show spanning-tree detail


Spanning tree enabled mode RSTP

Default port cost method: long


Root ID  Priority          32768

         Address           00:01:42:97:e0:00

         Path              20000
         Cost

         Root              1 (1/e1)
         Port

         Hello Time 2 sec  Max Age 20 sec   Forward Delay 15 sec


Bridge   Priority 36864
ID

         Address           00:02:4b:29:7a:00

         Hello Time 2 sec  Max Age 20 sec   Forward Delay 15 sec


Number of topology changes 2 last change occurred 2d18h ago

Times:   hold 1, topology change 35, notification 2

         hello 2, max age 20, forward delay 15


Port 1 (1/e1) enabled

State: Forwarding                    Role: Root

Port id: 128.1                       Port cost: 20000

Type: P2p (configured: auto) RSTP    Port Fast: No (configured:no)

Designated bridge Priority: 32768    Address: 00:01:42:97:e0:00

Designated port id: 128.25           Designated path cost: 0

Number of transitions to forwarding state: 1

BPDU: sent 2, received 120638
```

```
Port 2 (1/e2) enabled
State: Forwarding                     Role: Designated
Port id: 128.2                        Port cost: 20000
Type: Shared (configured: auto) STP   Port Fast: No (configured:no)
Designated bridge Priority: 32768     Address: 00:02:4b:29:7a:00
Designated port id: 128.2             Designated path cost: 20000
Number of transitions to forwarding state: 1
BPDU: sent 2, received 170638

Port 3 (1/e3) disabled
State: N/A                            Role: N/A
Port id: 128.3                        Port cost: 20000
Type: N/A (configured: auto)          Port Fast: N/A (configured:no)
Designated bridge Priority: N/A       Address: N/A
Designated port id: N/A               Designated path cost: N/A
Number of transitions to forwarding state: N/A
BPDU: sent N/A, received N/A

Port 4 (1/e4) enabled
State: Blocking                       Role: Alternate
Port id: 128.4                        Port cost: 20000
Type: Shared (configured:auto) STP    Port Fast: No (configured:no)
Designated bridge Priority: 28672     Address: 00:30:94:41:62:c8
Designated port id: 128.25            Designated path cost: 20000
Number of transitions to forwarding state: 1
BPDU: sent 2, received 120638

Port 5 (1/e5) enabled
```

```
State: Disabled                      Role: N/A
Port id: 128.5                       Port cost: 20000
Type: N/A (configured: auto)         Port Fast: N/A (configured:no)
Designated bridge Priority: N/A      Address: N/A
Designated port id: N/A              Designated path cost: N/A
Number of transitions to forwarding state: N/A
BPDU: sent N/A, received N/A

Console# show spanning-tree ethernet 1/e1
Port 1 (1/e1) enabled
State: Forwarding                    Role: Root
Port id: 128.1                       Port cost: 20000
Type: P2p (configured: auto) RSTP    Port Fast: No (configured:no)
Designated bridge Priority: 32768    Address: 00:01:42:97:e0:00
Designated port id: 128.25           Designated path cost: 0
Number of transitions to forwarding state: 1
BPDU: sent 2, received 120638

Console# show spanning-tree mst-configuration

Name: Region1
Revision: 1
Instance          Vlans mapped      State
--------          ------------      -------
0                 1-9, 21-4094      Enabled
1                 10-20             Enabled
```

```
Console# show spanning-tree

Spanning tree enabled mode MSTP
Default port cost method: long

###### MST 0 Vlans Mapped: 1-9, 21-4094
CST Root ID       Priority 32768
                  Address  00:01:42:97:e0:00
                  Path     20000
                  Cost
                  Root     1 (1/e1)
                  Port
                  Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

IST Master ID     Priority 32768
                  Address  00:02:4b:29:7a:0
                           0
                  This switch is the IST master.
                  Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
                  Max hops  20

Interfaces
Name     State    Prio.Nbr Cost     Sts     Role    PortFast Type
----     -------  -------- -----    ---     ----    -------- ----------
1/e1     Enabled  128.1    20000    FWD     Root    No       P2p Bound
                                                     (RSTP)
1/e2     Enabled  128.2    20000    FWD     Desg    No       Shared
                                                     Bound (STP)
1/e3     Enabled  128.3    20000    FWD     Desg    No       P2p
1/e4     Enabled  128.4    20000    FWD     Desg    No       P2p
```

```
###### MST 1 Vlans Mapped: 10-20
CST Root ID       Priority 24576
                  Address  00:02:4b:29:89:76
                  Path     20000
                  Cost
                  Root     4 (1/e4)
                  Port
                  Rem hops 19

Bridge ID         Priority 32768
                  Address  00:02:4b:29:7a:0
                           0

Interfaces
Name     State    Prio.Nbr Cost     Sts     Role    PortFast Type
----     -------  -------- -----    ---     ----    -------- ----------
1/e1     Enabled  128.1    20000    FWD     Boun    No       P2p Bound
                                                    (RSTP)
1/e2     Enabled  128.2    20000    FWD     Boun    No       Shared
                                                    Bound (STP)
1/e3     Enabled  128.3    20000    BLK     Altn    No       P2p
1/e4     Enabled  128.4    20000    FWD     Desg    No       P2p

Console# show spanning-tree detail

Spanning tree enabled mode MSTP
Default port cost method: long

###### MST 0 Vlans Mapped: 1-9, 21-4094
```

```
CST Root ID       Priority 32768

                  Address  00:01:42:97:e0:00

                  Path     20000
                  Cost

                  Root     1 (1/e1)
                  Port

                  Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec


IST Master ID     Priority 32768

                  Address  00:02:4b:29:7a:0
                           0

                  This switch is the IST master.

                  Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

                  Max hops  20

                  Number of topology changes 2 last change occurred 2d18h
                  ago

                  Times:  hold 1, topology change 35, notification 2
                  hello 2, max age 20, forward delay 15


Port 1 (1/e1) enabled

State: Forwarding                              Role: Root

Port id: 128.1                                 Port cost: 20000

Type: P2p (configured: auto) Boundary RSTP     Port Fast: No
                                               (configured:no)

Designated bridge Priority: 32768              Address: 00:01:42:97:e0:00

Designated port id: 128.25                     Designated path cost: 0

Number of transitions to forwarding state: 1

BPDU: sent 2, received 120638
```

```
Port 2 (1/e2) enabled
State: Forwarding                              Role: Designated
Port id: 128.2                                 Port cost: 20000
Type: Shared (configured: auto) Boundary STP   Port Fast: No
                                               (configured:no)
Designated bridge Priority: 32768              Address: 00:02:4b:29:7a:00
Designated port id: 128.2                      Designated path cost: 20000
Number of transitions to forwarding state: 1
BPDU: sent 2, received 170638

Port 3 (1/e3) enabled
State: Forwarding                              Role: Designated
Port id: 128.3                                 Port cost: 20000
Type: Shared (configured: auto) Internal       Port Fast: No
                                               (configured:no)
Designated bridge Priority: 32768              Address: 00:02:4b:29:7a:00
Designated port id: 128.3                      Designated path cost: 20000
Number of transitions to forwarding state: 1
BPDU: sent 2, received 170638

Port 4 (1/e4) enabled
State: Forwarding                              Role: Designated
Port id: 128.4                                 Port cost: 20000
Type: Shared (configured: auto) Internal       Port Fast: No
                                               (configured:no)
Designated bridge Priority: 32768              Address: 00:02:4b:29:7a:00
Designated port id: 128.2                      Designated path cost: 20000
Number of transitions to forwarding state: 1
BPDU: sent 2, received 170638
```

```
###### MST 1 Vlans Mapped: 10-20

Root ID            Priority 24576

                   Address  00:02:4b:29:89:76

                   Path     20000
                   Cost

                   Port     4 (1/e4)
                   Cost

                   Rem hops 19


Bridge ID          Priority 32768

                   Address  00:02:4b:29:7a:00

                   Number of topology changes 2 last change occurred 1d9h
                   ago

                   Times:  hold 1, topology change 2, notification 2

                   hello 2, max age 20, forward delay 15


Port 1 (1/e1) enabled

State: Forwarding                              Role: Boundary

Port id: 128.1                                 Port cost: 20000

Type: P2p (configured: auto) Boundary RSTP     Port Fast: No
                                               (configured:no)

Designated bridge Priority: 32768              Address: 00:02:4b:29:7a:00

Designated port id: 128.1                      Designated path cost: 20000

Number of transitions to forwarding state: 1

BPDU: sent 2, received 120638


Port 2 (1/e2) enabled

State: Forwarding                              Role: Designated

Port id: 128.2                                 Port cost: 20000

Type: Shared (configured: auto) Boundary STP   Port Fast: No
                                               (configured:no)
```

```
Designated bridge Priority: 32768           Address: 00:02:4b:29:7a:00
Designated port id: 128.2                   Designated path cost: 20000
Number of transitions to forwarding state: 1
BPDU: sent 2, received 170638

Port 3 (1/e3) disabled
State: Blocking                             Role: Alternate
Port id: 128.3                              Port cost: 20000
Type: Shared (configured: auto) Internal    Port Fast: No
                                            (configured:no)
Designated bridge Priority: 32768           Address: 00:02:4b:29:1a:19
Designated port id: 128.78                  Designated path cost: 20000
Number of transitions to forwarding state: 1
BPDU: sent 2, received 170638

Port 4 (1/e4) enabled
State: Forwarding                           Role: Designated
Port id: 128.4                              Port cost: 20000
Type: Shared (configured: auto) Internal    Port Fast: No
                                            (configured:no)
Designated bridge Priority: 32768           Address: 00:02:4b:29:7a:00
Designated port id: 128.2                   Designated path cost: 20000
Number of transitions to forwarding state: 1
BPDU: sent 2, received 170638

Console# show spanning-tree

Spanning tree enabled mode MSTP
Default port cost method: long
```

```
###### MST 0 Vlans Mapped: 1-9, 21-4094
CST Root ID       Priority 32768
                  Address  00:01:42:97:e0:00
                  Path     20000
                  Cost
                  Root     1 (1/e1)
                  Port
                  Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

IST Master ID     Priority 32768
                  Address  00:02:4b:19:7a:0
                           0
                  Path     10000
                  Cost
                  Rem hops 19

Bridge            Priority 32768
ID
                  Address  00:02:4b:29:7a:0
                           0
                  Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
                  Max hops 20

Console# show spanning-tree

Spanning tree enabled mode MSTP
Default port cost method: long

###### MST 0 Vlans Mapped: 1-9, 21-4094
CST Root ID       Priority 32768
```

```
                Address  00:01:42:97:e0:00

                This switch is root for CST and IST master.

                Root     1 (1/e1)
                Port

                Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

                Max hops 20
```

spanning-tree guard root

Use the **spanning-tree guard root** interface configuration command to enable root guard on all the Spanning Tree instances on that interface. Root guard restricts the interface to be the root port for the switch. Use the **no** form of this command to disable root guard on the interface.

Syntax

- **spanning-tree guard root**
- **no spanning-tree guard root**

Default Configuration

Root guard is disabled.

Command Mode

Interface configuration (Ethernet, port-channel).

User Guidelines

Root guard can be enabled when the switch works in STP, RSTP and MSTP.

When root guard is enabled, if spanning-tree calculations cause a port to be selected as the root port, the port transitions to the alternate state.

Example

The following example enable root guard on port e8.

```
Console(config)# interface ethernet 1/e8
Console(config-if)# spanning-tree guard root
```

29

SSH Commands

ip ssh port

The **ip ssh port** Global Configuration mode command specifies the port to be used by the SSH server. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip ssh port** *port-number*
- **no ip ssh port**
  - *port-number* — Port number for use by the SSH server. (Range: 1 - 65535)

Default Configuration
The default port number is 22.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example specifies the port to be used by the SSH server as 8080.

```
Console(config)# ip ssh port 8080
```

ip ssh server

The **ip ssh server** Global Configuration mode command enables the device to be configured from a SSH server. Use the **no** form of this command to disable this function.

Syntax

- **ip ssh server**
- **no ip ssh server**

Default Configuration
Device configuration from a SSH server is enabled.

Command Mode
Global Configuration mode.

User Guidelines

- If encryption keys are not generated, the SSH server is in standby until the keys are generated. To generate SSH server keys, use the **crypto key generate dsa**, and **crypto key generate rsa** Global Configuration mode commands.

Example

The following example enables configuring the device from a SSH server.

```
Console(config)# ip ssh server
```

crypto key generate dsa

The **crypto key generate dsa** Global Configuration mode command generates DSA key pairs.

Syntax

- **crypto key generate dsa**

Default Configuration
DSA key pairs do not exist.

Command Mode
Global Configuration mode.

User Guidelines

- DSA keys are generated in pairs: one public DSA key and one private DSA key. If the device already has DSA keys, a warning and prompt to replace the existing keys with new keys are displayed.
- This command is not saved in the device configuration; however, the keys generated by this command are saved in the private configuration, which is never displayed to the user or backed up on another device.
- DSA keys are saved to the backup master.
- This command may take a considerable period of time to execute.

Example

The following example generates DSA key pairs.

```
Console(config)# crypto key generate dsa
```

crypto key generate rsa

The **crypto key generate rsa** Global Configuration mode command generates RSA key pairs.

Syntax

- **crypto key generate rsa**

Default Configuration

RSA key pairs do not exist.

Command Mode

Global Configuration mode.

User Guidelines

- RSA keys are generated in pairs: one public RSA key and one private RSA key. If the device already has RSA keys, a warning and prompt to replace the existing keys with new keys are displayed.
- This command is not saved in the device configuration; however, the keys generated by this command are saved in the private configuration which is never displayed to the user or backed up on another device.
- RSA keys are saved to the backup master.
- This command may take a considerable period of time to execute.

Example

The following example generates RSA key pairs.

```
Console(config)# crypto key generate rsa
```

ip ssh pubkey-auth

The **ip ssh pubkey-auth** Global Configuration mode command enables public key authentication for incoming SSH sessions. Use the **no** form of this command to disable this function.

Syntax

- **ip ssh pubkey-auth**
- **no ip ssh pubkey-auth**

Default Configuration
Public Key authentication for incoming SSH sessions is disabled.

Command Mode
Global Configuration mode.

User Guidelines
AAA authentication is independent

Example

The following example enables public key authentication for incoming SSH sessions.

```
Console(config)# ip ssh pubkey-auth
```

crypto key pubkey-chain ssh

The **crypto key pubkey-chain ssh** Global Configuration mode command enters the SSH Public Key-chain Configuration mode. The mode is used to manually specify other device public keys such as SSH client public keys.

Syntax

- **crypto key pubkey-chain ssh**

Default Configuration
No keys are specified.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example enters the SSH Public Key-chain Configuration mode and manually configures the RSA key pair for SSH public key-chain **bob**.

```
Console(config)# crypto key pubkey-chain ssh
Console(config-pubkey-chain)# user-key bob
Console(config-pubkey-key)# key-string rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQCvTnRwPWl
Al4kpqIw9GBRonZQZxjHKcqKL6rMlQ+
ZNXfZSkvHG+QusIZ/76ILmFT34v7u7ChFAE+
Vu4GRfpSwoQUvV35LqJJk67IOU/zfwOl1g
kTwml75QR9gHujS6KwGN2QWXgh3ub8gDjTSq
muSn/Wd05iDX2IExQWu08licglk02LYciz
+Z4TrEU/9FJxwPiVQOjc+KBXuR0juNg5nFYsY
0ZCk0N/W9a/tnkm1shRE7Di71+w3fNiOA
6w9o44t6+AINEICBCCA4YcF6zMzaT1wefWwX6f+
Rmt5nhhqdAtN/4oJfce166DqVX1gWmN
zNR4DYDvSzg0lDnwCAC8Qh

Fingerprint: a4:16:46:23:5a:8d:1d:b5:37:59:eb:44:13:b9:33:e9
```

user-key

The **user-key** SSH Public Key-string Configuration mode command specifies which SSH public key is manually configured. Use the **no** form of this command to remove an SSH public key.

Syntax

- **user-key** *username* {**rsa** | **dsa**}
- **no user-key** *username*
  - *username* — Specifies the username of the remote SSH client. (Range: 1-48 characters)
  - **rsa** — Indicates the RSA key pair.
  - **dsa** — Indicates the DSA key pair.

Default Configuration
No SSH public keys exist.

Command Mode
SSH Public Key-string Configuration mode.

User Guidelines
Follow this command with the **key-string** SSH Public Key-String Configuration mode command to specify the key.

Example

The following example enables manually configuring an SSH public key for SSH public key-chain **bob**.

```
Console(config)# crypto key pubkey-chain ssh
Console(config-pubkey-chain)# user-key bob rsa
Console(config-pubkey-key)# key-string row
AAAAB3NzaC1yc2EAAAADAQABAAABAQCvTnRwPWl
```

key-string

The **key-string** SSH Public Key-string Configuration mode command manually specifies an SSH public key.

Syntax

- **key-string**
- **key-string row** *key-string*
  - **row —** Indicates the SSH public key row by row.
  - *key-string* **—** Specifies the key in UU-encoded DER format; UU-encoded DER format is the same format in the authorized_keys file used by OpenSSH.

Default Configuration
No keys exist.

Command Mode
SSH Public Key-string Configuration mode.

User Guidelines

- Use the **key-string** SSH Public Key-string Configuration mode command to specify which SSH public key is to be interactively configured next. To complete the command, you must enter a row with no characters.
- Use the **key-string row** SSH Public Key-string Configuration mode command to specify the SSH public key row by row. Each row must begin with a **key-string row** command. This command is useful for configuration files.

Example

The following example enters public key strings for SSH public key client **bob**.

```
Console(config)# crypto key pubkey-chain ssh
Console(config-pubkey-chain)# user-key bob rsa
Console(config-pubkey-key)# key-string
AAAAB3NzaC1yc2EAAAADAQABAAABAQCvTnRwPWl
Al4kpqIw9GBRonZQZxjHKcqKL6rMlQ+
ZNXfZSkvHG+QusIZ/76ILmFT34v7u7ChFAE+
Vu4GRfpSwoQUvV35LqJJk67IOU/zfwOl1g
kTwml75QR9gHujS6KwGN2QWXgh3ub8gDjTSq
muSn/Wd05iDX2IExQWu08licglk02LYciz
+Z4TrEU/9FJxwPiVQOjc+KBXuR0juNg5nFYsY
0ZCk0N/W9a/tnkm1shRE7Di71+w3fNiOA
6w9o44t6+AINEICBCCA4YcF6zMzaT1wefWwX6f+
Rmt5nhhqdAtN/4oJfce166DqVX1gWmN
zNR4DYDvSzg0lDnwCAC8Qh

Fingerprint: a4:16:46:23:5a:8d:1d:b5:37:59:eb:44:13:b9:33:e9

Console(config)# crypto key pubkey-chain ssh
Console(config-pubkey-chain)# user-key bob rsa
Console(config-pubkey-key)# key-string row AAAAB3Nza
Console(config-pubkey-key)# key-string row C1yc2
```

show ip ssh

The **show ip ssh** Privileged EXEC mode command displays the SSH server configuration.

Syntax

- **show ip ssh**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the SSH server configuration.

```
Console# show ip ssh
SSH server enabled. Port: 22
RSA key was generated.
DSA (DSS) key was generated.
SSH Public Key Authentication is enabled.
Active incoming sessions:
IP address  SSH         Version     Cipher        Auth Code
            username
----------  ----------  ---------   -------       ----------
172.16.0.1  John Brown  2.0 3       DES           HMAC-SHA1
```

The following table describes significant fields shown above:

Field	Description
IP address	Client address
SSH username	User name
Version	SSH version number
Cipher	Encryption type (3DES, Blowfish, RC4)
Auth Code	Authentication Code (HMAC-MD5, HMAC-SHA1)

show crypto key mypubkey

The **show crypto key mypubkey** Privileged EXEC mode command displays the SSH public keys on the device.

Syntax

- **show crypto key mypubkey** [**rsa** | **dsa**]
  - **rsa** — Indicates the RSA key.
  - **dsa** — Indicates the DSA key.

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays the SSH public RSA keys on the device.

```
Console# show crypto key mypubkey rsa

RSA key data:

005C300D 06092A86 4886F70D 01010105 00034B00 30480241 00C5E23B
55D6AB22

04AEF1BA A54028A6 9ACC01C5 129D99E4 64CAB820 847EDAD9 DF0B4E4C
73A05DD2

BD62A8A9 FA603DD2 E2A8A6F8 98F76E28 D58AD221 B583D7A4 71020301
87685768

Fingerprint(Hex): 77:C7:19:85:98:19:27:96:C9:CC:83:C5:78:89:F8:86

Fingerprint(Bubble Babble): yteriuwt jgkljhglk yewiury hdskjfryt
gfhkjglk
```

show crypto key pubkey-chain ssh

The **show crypto key pubkey-chain ssh** Privileged EXEC mode command displays SSH public keys stored on the device.

Syntax

- **show crypto key pubkey-chain ssh** [**username** *username*] [**fingerprint** {**bubble-babble** | **hex**}]
  - *username* — Specifies the remote SSH client username.
  - **bubble-babble** — Fingerprint in Bubble Babble format.
  - **hex** — Fingerprint in Hex format.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays SSH public keys stored on the device.

```
Console# show crypto key pubkey-chain ssh
Username   Fingerprint
--------   -----------------------------------------------
bob        9A:CC:01:C5:78:39:27:86:79:CC:23:C5:98:59:F1:86
john       98:F7:6E:28:F2:79:87:C8:18:F8:88:CC:F8:89:87:C8

Console# show crypto key pubkey-chain ssh username bob
Username: bob
Key: 005C300D 06092A86 4886F70D 01010105 00034B00 30480241
00C5E23B 55D6AB22 04AEF1BA A54028A6 9ACC01C5 129D99E4
Fingerprint: 9A:CC:01:C5:78:39:27:86:79:CC:23:C5:98:59:F1:86
```

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Syslog Commands

logging on

The **logging on** Global Configuration mode command controls error message logging. This command sends debug or error messages to a logging process, which logs messages to designated locations asynchronously to the process that generated the messages. Use the **no** form of this command to disable the logging process.

Syntax

- **logging on**
- **no logging on**

Default Configuration
Logging is enabled.

Command Mode
Global Configuration mode.

User Guidelines

- The logging process controls the distribution of logging messages at various destinations, such as the logging buffer, logging file or syslog server. Logging on and off at these destinations can be individually configured using the **logging buffered**, **logging file**, and **logging** Global Configuration mode commands. However, if the **logging on** command is disabled, no messages are sent to these destinations. Only the console receives messages.

Example

The following example enables logging error messages.

```
Console(config)# logging on
```

logging

The **logging** Global Configuration mode command logs messages to a syslog server.. Use the **no** form of this command to delete the syslog server with the specified address from the list of syslogs.

Syntax

- **logging** *{ip4-address | ip6-address |hostname}* [**port** *port*] [**severity** *level*] [**facility** *facility*] [**description** *text*]
- **no logging** *{ip4-address | ip6-address | hostname}*
  - *ip4-address* — Host IPv4 address to be used as a syslog server.
  - *ip6-address* — Host IPv6 address to be used as a syslog server. When the IPv6 address is a Link Local address (IPv6Z address), the outgoing interface name must be specified. Refer to the usage guidelines for the interface name syntax.
  - *hostname* — Specifies the host name of the syslog server. (Range: 1 - 158 characters)
  - *port* — Specifies the port number for syslog messages. (Range: 1 - 65535)
  - *level* — Specifies the severity level of logged messages sent to the syslog servers. Possible values: **emergencies, alerts**, **critical**, **errors, warnings**, **notifications, informational** and **debugging**.
  - *facility* — Specifies the facility that is indicated in the message. Possible values: **local0, local1, local2, local3, local4, local5, local 6, local7**.
  - *text* — Syslog server description. (Range: 1-64 characters)

Default Configuration

The default port number is 514.

The default logging message level is **informational**.

The default facility is local7.

Command Mode

Global Configuration mode.

User Guidelines

- Up to 8 syslog servers can be used.
- If no specific severity level is specified, the global values apply to each server.
- The IPv6Z address format: <*ipv6-link-local-address*>%<*interface-name*>
  - *interface-name* — **vlan**<*integer*> | **ch**<*integer*> | **isatap**<*integer*> | <*physical-port-name*> | 0
  - *integer* — <*decimal-number*> | <*integer*><*decimal-number*>
  - *decimal-number* — 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
  - *physical-port-name* — Designated port number, for example 1/e16.

  If the egress interface is not specified, the default interface is selected. Specifying interface zone=0 is the same as not defining an egress interface.

Example

The following example limits logged messages sent to the syslog server with IP address 10.1.1.1 to severity level **critical**.

```
Console(config)# logging 10.1.1.1 severity critical
```

logging console

The **logging console** Global Configuration mode command limits messages logged to the console based on severity. Use the **no** form of this command to disable logging to the console.

Syntax

- **logging console** *level*
- **no logging console**
  - *level* — Specifies the severity level of logged messages displayed on the console. Possible values: **emergencies, alerts**, **critical**, **errors, warnings**, **notifications, informational, debugging.**

Default Configuration

The default severity level is **informational**.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example limits logging messages displayed on the console to severity level **errors**.

```
Console(config)# logging console errors
```

logging buffered

The **logging buffered** Global Configuration mode command limits syslog messages displayed from an internal buffer based on severity. Use the **no** form of this command to cancel using the buffer.

Syntax

- **logging buffered** *level*
- **no logging buffered**
  - *level* — Specifies the severity level of messages logged in the buffer. Possible values: **emergencies, alerts**, **critical**, **errors, warnings**, **notifications, informational, debugging.**

Default Configuration

The default severity level is **informational**.

Command Mode

Global Configuration mode.

User Guidelines

- All the syslog messages are logged to the internal buffer. This command limits the messages displayed to the user.

Example

The following example limits syslog messages displayed from an internal buffer based on severity level **debugging**.

```
Console(config)# logging buffered debugging
```

logging buffered size

The **logging buffered size** Global Configuration mode command changes the number of syslog messages stored in the internal buffer. Use the **no** form of this command to return to the default configuration.

Syntax

- **logging buffered size** *number*
- **no logging buffered size**
  - *number* — Specifies the maximum number of messages stored in the history table. (Range: 20 - 400)

Default Configuration

The default number of messages is 200.

Command Mode

Global Configuration mode.

User Guidelines

This command takes effect only after Reset.

Example

The following example changes the number of syslog messages stored in the internal buffer to 300.

```
Console(config)# logging buffered size 300
```

clear logging

The **clear logging** Privileged EXEC mode command clears messages from the internal logging buffer.

Syntax

- **clear logging**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example clears messages from the internal logging buffer.

```
Console# clear logging
Clear logging buffer [yes/no]?
```

logging file

The **logging file** Global Configuration mode command limits syslog messages sent to the logging file based on severity. Use the **no** form of this command to cancel using the buffer..

Syntax

- **logging file** *level*
- **no logging file**
  - *level* — Specifies the severity level of syslog messages sent to the logging file. Possible values: **emergencies, alerts**, **critical**, **errors, warnings**, **notifications, informational** and **debugging.**

Default Configuration

The default severity level is **errors**.

Command Mode

Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example limits syslog messages sent to the logging file based on severity level **alerts**.

```
Console(config)# logging file alerts
```

clear logging file

The **clear logging file** Privileged EXEC mode command clears messages from the logging file.

Syntax

- **clear logging file**

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example clears messages from the logging file.

```
Console# clear logging file
Clear Logging File [yes/no]?
```

aaa logging

The **aaa logging** Global Configuration mode command enables logging AAA login events in the syslog. Use the **no** form of this command to disable logging AAA login events.

Syntax

- **aaa logging login**
- **no aaa logging login**
    - **login** — Indicates logging messages related to successful login events, unsuccessful login events and other login-related events**.**

Default Configuration
Logging AAA login events is enabled.

Command Mode
Global Configuration mode.

User Guidelines
Other types of AAA events are not subject to this command.

Example

The following example enables logging messages related to AAA login events.

```
Console(config)# aaa logging login
```

file-system logging

The **file-system logging** Global Configuration mode command enables logging file system events in the syslog. Use the **no** form of this command to disable logging file system events.

Syntax

- **file-system logging copy**
- **no file-system logging copy**
- **file-system logging delete-rename**
- **no file-system logging delete-rename**
  - **copy** — Indicates logging messages related to file copy operations.
  - **delete-rename** — Indicates logging messages related to file deletion and renaming operations.

Default Configuration
Logging file system events is enabled.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example enables logging messages related to file copy operations.

```
Console(config)# file-system logging copy
```

management logging

The **management logging** global configuration command enables logging management access list (ACL) events in the syslog. Use the **no** form of this command to disable logging management access list events.

Syntax

- **management logging deny**
- **no management logging deny**
  - **deny** — Indicates logging messages related to deny actions of management ACLs.

Default Configuration
Logging management ACL events is enabled.

Command Mode
Global Configuration mode.

User Guidelines
Other types of management ACL events are not subject to this command.

Example

The following example enables logging messages related to deny actions of management ACLs.

```
Console(config)# management logging deny
```

show logging

The **show logging** Privileged EXEC mode command displays the state of logging and the syslog messages stored in the internal buffer.

Syntax

- **show logging**

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays the state of logging and the syslog messages stored in the internal buffer.

```
Console# show logging

Logging is enabled.

Console logging: level debugging. Console Messages: 0 Dropped
(severity).

Buffer logging: level debugging. Buffer Messages: 11 Logged, 200
Max.

File logging: level notifications. File Messages: 0 Dropped
(severity).

Syslog server 192.180.2.27 logging: errors. Messages: 6 Dropped
(severity).

Syslog server 192.180.2.28 logging: errors. Messages: 6 Dropped
(severity).

2 messages were not logged (resources)

Application filtering control

   Application          Event                Status

AAA                  Login                Enabled

File system          Copy                 Enabled

File system          Delete-Rename        Enabled

Management ACL       Deny                 Enabled
```

```
Buffer log:

11-Aug-2002 15:41:43: %LINK-3-UPDOWN: Interface FastEthernet0/0,
changed state to up

11-Aug-2002 15:41:43: %LINK-3-UPDOWN: Interface Ethernet1/0,
changed state to up

11-Aug-2002 15:41:43: %LINK-3-UPDOWN: Interface Ethernet1/1,
changed state to up

11-Aug-2002 15:41:43: %LINK-3-UPDOWN: Interface Ethernet1/2,
changed state to up

11-Aug-2002 15:41:43: %LINK-3-UPDOWN: Interface Ethernet1/3,
changed state to up

11-Aug-2002 15:41:43: %SYS-5-CONFIG_I: Configured from memory by
console

11-Aug-2002 15:41:39: %LINEPROTO-5-UPDOWN: Line protocol on
Interface FastEthernet0/e0, changed state to up

11-Aug-2002 15:41:39: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Ethernet1/e0, changed state to down

11-Aug-2002 15:41:39: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Ethernet1/e1, changed state to down

11-Aug-2002 15:41:39: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Ethernet1/e2, changed state to down

11-Aug-2002 15:41:39: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Ethernet1/e3, changed state to down
```

show logging file

The **show logging file** Privileged EXEC mode command displays the state of logging and the syslog messages stored in the logging file.

Syntax

- **show logging file**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the logging state and the syslog messages stored in the logging file.

```
Console# show logging file

Logging is enabled.

Console logging: level debugging. Console Messages: 0 Dropped
(severity).

Buffer logging: level debugging. Buffer Messages: 11 Logged, 200
Max.

File logging: level notifications. File Messages: 0 Dropped
(severity).

Syslog server 192.180.2.27 logging: errors. Messages: 6 Dropped
(severity).

Syslog server 192.180.2.28 logging: errors. Messages: 6 Dropped
(severity).

2 messages were not logged (resources)

Application filtering control

   Application          Event               Status

AAA                  Login               Enabled

File system          Copy                Enabled

File system          Delete-Rename       Enabled

Management ACL       Deny                Enabled
```

```
File log:

11-Aug-2002 15:41:43: %LINK-3-UPDOWN: Interface FastEthernet0/0,
changed state to up

11-Aug-2002 15:41:43: %LINK-3-UPDOWN: Interface Ethernet1/0,
changed state to up

11-Aug-2002 15:41:43: %LINK-3-UPDOWN: Interface Ethernet1/1,
changed state to up

11-Aug-2002 15:41:43: %LINK-3-UPDOWN: Interface Ethernet1/2,
changed state to up

11-Aug-2002 15:41:43: %LINK-3-UPDOWN: Interface Ethernet1/3,
changed state to up

11-Aug-2002 15:41:43: %SYS-5-CONFIG_I: Configured from memory by
console

11-Aug-2002 15:41:39: %LINEPROTO-5-UPDOWN: Line protocol on
Interface FastEthernet0/e0, changed state to up

11-Aug-2002 15:41:39: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Ethernet1/e0, changed state to down

11-Aug-2002 15:41:39: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Ethernet1/e1, changed state to down

11-Aug-2002 15:41:39: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Ethernet1/e2, changed state to down

11-Aug-2002 15:41:39: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Ethernet1/e3, changed state to down
```

show syslog-servers

The **show syslog-servers** Privileged EXEC mode command displays the settings of the syslog servers.

Syntax

- **show syslog-servers**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the settings of the syslog servers.

```
Console# show syslog-servers

Device Configuration
IP address      Port   Severity         Facility  Description
------------    ----   -------------    --------  -----------
192.180.2.275   14     Informational    local7    7
192.180.2.285   14     Warning          local7    7
```

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System Management

ping

The **ping** User EXEC mode command sends ICMP echo request packets to another node on the network.

Syntax

- **ping** *ip-address* | *hostname* [**size** *packet_size*] [**count** *packet_count*] [**timeout** *time_out*]
- **ping ipv6** {*ipv6-address* | *hostname*} [**size** *packet_size*] [**count** *packet_count*] [**timeout** *time_out*]*ip-address* — IP address to ping.
  - **ipv6** — IPv6 checks the network connectivity.
  - *ip4-address* — Destination host IPv4 address.
  - *ipv6-address* — Unicast or multicast IPv6 address to ping. When the IPv6 address is a Link Local address (IPv6Z address), the outgoing interface name must be specified. Refer to the usage guidelines for the interface name syntax.*hostname* — Host name to ping. (Range: 1 - 158 characters)
  - *packet_size* — Number of bytes in a packet. The actual packet size is eight bytes larger than the specified size specified because the device adds header information.
    (Range: 56 - 1472 bytes)
  - *packet_count* — Number of packets to send. If 0 is entered, it pings until stopped. (Range: 0 - 65535 packets)
  - *time_out* — Timeout in milliseconds to wait for each reply. (Range: 50 - 65535 milliseconds)

Default Configuration

Default packet size is 56 bytes.

Default number of packets to send is 4.

Default timeout value is 2000 milliseconds.

Command Mode

User EXEC mode.

User Guidelines

Press **Esc** to stop pinging. Following are sample results of the **ping** command:

- **Destination (host/network) unreachable** — The gateway for this destination indicates an unreachable destination.
- **Destination does not respond** — If the host does not respond, a “no answer from host” appears in ten seconds.

The IPv6Z address format: <*ipv6-link-local-address*>%<*interface-name*>

– *interface-name* — **vlan**<*integer*> | **ch**<*integer*> | **isatap**<*integer*> | <*physical-port-name*> | 0

– *integer* — <*decimal-number*> | <*integer*><*decimal-number*>

– *decimal-number* — 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

– *physical-port-name* — Designated port number, for example `1/e16`.

When using the ping ipv6 command to check network connectivity of a directly attached host using its link local address, the egress interface may be specified in the IPv6Z format. If the egress interface is not specified, the default interface is selected. Specifying interface zone=0 is the same as not defining an egress interface.

When using the ping ipv6 command with a multicast address, the information displayed is taken from all received echo responses.

Examples

The following example displays pinging results:

```
Console> ping 10.1.1.1
Pinging 10.1.1.1 with 64 bytes of data:

64 bytes from 10.1.1.1: icmp_seq=0. time=11 ms
64 bytes from 10.1.1.1: icmp_seq=1. time=8 ms
64 bytes from 10.1.1.1: icmp_seq=2. time=8 ms
64 bytes from 10.1.1.1: icmp_seq=3. time=7 ms

----10.1.1.1 PING Statistics----
4 packets transmitted, 4 packets received, 0% packet loss
round-trip (ms) min/avg/max = 7/8/11
```

```
Console> ping yahoo.com
Pinging yahoo.com (66.218.71.198) with 64 bytes of data:

64 bytes from 10.1.1.1: icmp_seq=0. time=11 ms
64 bytes from 10.1.1.1: icmp_seq=1. time=8 ms
64 bytes from 10.1.1.1: icmp_seq=2. time=8 ms
64 bytes from 10.1.1.1: icmp_seq=3. time=7 ms

----10.1.1.1 PING Statistics----
4 packets transmitted, 4 packets received, 0% packet loss
round-trip (ms) min/avg/max = 7/8/11
```

traceroute

The **traceroute** User EXEC mode command discovers routes that packets actually take when traveling to their destination.

Syntax

- **traceroute** *ip-address* |*hostname* [**size** *packet_size*] [**ttl** *max-ttl*] [**count** *packet_count*] [**timeout** *time_out*] [**source** *ip-address*] [**tos** *tos*]
- **traceroute ipv6** {*ipv6-address* | *hostname*} [**size** *packet_size*] [**ttl** *max-ttl*] [**count** *packet_count*] [**timeout** *time_out*] [**source** *ip-address*] [**tos** *tos*]
  - **ipv6** — IPv6 checks the network connectivity.
  - *ip4-address* — Destination host IPv4 address. (Range: Valid IP Address)
  - *ip6-address* — Unicast or multicast IPv6 address to ping. When the IPv6 address is a Link Local address (IPv6Z address), the outgoing interface name must be specified. Refer to the usage guidelines for the interface name syntax.
  - *hostname* — Host name of the destination host. (Range: 1 - 158 characters)
  - *packet_size* — Number of bytes in a packet. (Range: 40 - 1500)
  - *max-ttl* — The largest TTL value that can be used. The **traceroute** command terminates when the destination is reached or when this value is reached. (Range: 1 - 255)
  - *packet_count* — The number of probes to be sent at each TTL level. (Range: 1 - 10)
  - *time_out* — The number of seconds to wait for a response to a probe packet. (Range: 1 - 60)

- *ip-address* — One of the device's interface addresses to use as a source address for the probes. The device normally selects what it feels is the best source address to use.
- *tos* — The Type-Of-Service byte in the IP Header of the packet. (Range: 0 - 255)

Default Configuration

The default number of bytes in a packet is 40.

The default maximum TTL value is 30.

The default number of probes to be sent at each TTL level is 3.

The default timeout interval in seconds is 3.

Command Mode

User EXEC mode.

User Guidelines

- The **traceroute** command takes advantage of the error messages generated by the routers when a datagram exceeds its time-to-live (TTL) value.
- The **traceroute** command starts by sending probe datagrams with a TTL value of one. This causes the first router to discard the probe datagram and send back an error message. The **traceroute** command sends several probes at each TTL level and displays the round-trip time for each.
- The **traceroute** command sends out one probe at a time. Each outgoing packet may result in one or two error messages. A "time exceeded" error message indicates that an intermediate router has seen and discarded the probe. A "destination unreachable" error message indicates that the destination node has received the probe and discarded it because it could not deliver the packet. If the timer goes off before a response comes in, the **traceroute** command prints an asterisk (*).
- The **traceroute** command terminates when the destination responds, when the maximum TTL is exceeded or when the user interrupts the trace by pressing **Esc**.

Examples

The following example discovers the routes that packets will actually take when traveling to their destination.

```
Console> traceroute umaxp1.physics.lsa.umich.edu

Type Esc to abort.

Tracing the route to umaxp1.physics.lsa.umich.edu
(141.211.101.64)

1 i2-gateway.stanford.edu (192.68.191.83)  0 msec 0 msec 0 msec

2 STAN.POS.calren2.NET (171.64.1.213) 0 msec 0 msec 0 msec

3 SUNV--STAN.POS.calren2.net (198.32.249.73) 1 msec 1 msec 1 msec

4 Abilene--QSV.POS.calren2.net (198.32.249.162)  1 msec 1 msec
1 msec

5 kscyng-snvang.abilene.ucaid.edu (198.32.8.103)  33 msec 35 msec
35 msec

6 iplsng-kscyng.abilene.ucaid.edu (198.32.8.80)   47 msec 45 msec
45 msec

7 so-0-2-0x1.aa1.mich.net (192.122.183.9)  56 msec  53 msec 54
msec

8 atm1-0x24.michnet8.mich.net (198.108.23.82)  56 msec 56 msec
57 msec

9 * * *

10 A-ARB3-LSA-NG.c-SEB.umnet.umich.edu (141.211.5.22) 58 msec
58 msec 58 msec

11 umaxp1.physics.lsa.umich.edu (141.211.101.64)  62 msec 63 msec
63 msec
```

The following table describes significant fields shown above.

Field	Description
1	Indicates the sequence number of the device in the path to the host.
i2-gateway.stanford.edu	Host name of this device.
192.68.191.83	IP address of this device.
1 msec 1 msec 1 msec	Round-trip time for each probe sent.

The following table describes characters that may appear in the **traceroute** command output.

Field	Description
*	The probe timed out.
?	Unknown packet type.
A	Administratively unreachable. Usually, this output indicates that an access list is blocking traffic.
F	Fragmentation is required and DF is set.
H	Host unreachable.
N	Network unreachable.
P	Protocol unreachable.
Q	Source quench.
R	Fragment reassembly time exceeded.
S	Source route failed.
U	Port unreachable.

telnet

The **telnet** User EXEC mode command enables logging on to a host that supports Telnet.

Syntax

- **telnet** {*ip-address* | *hostname*} [*port*] [*keyword1*.....]
  - *ip-address* — IP address of the destination host.
  - *hostname* — Host name of the destination host. (Range: 1 - 158 characters)
  - *port* — A decimal TCP port number, or one of the keywords listed in the Ports table in the User Guidelines.
  - *keyword* — One or more keywords listed in the Keywords table in the User Guidelines.

Default Configuration

The default port is the Telnet port (decimal23) on the host.

Command Mode

User EXEC mode.

User Guidelines

- Telnet software supports special Telnet commands in the form of Telnet sequences that map generic terminal control functions to operating system-specific functions. To enter a Telnet sequence, press the escape sequence keys (Ctrl-shift-6) followed by a Telnet command character.

Special Telnet Sequences

Telnet Sequence	Purpose
Ctrl-shift-6-b	Break
Ctrl-shift-6-c	Interrupt Process (IP)
Ctrl-shift-6-h	Erase Character (EC)
Ctrl-shift-6-o	Abort Output (AO)
Ctrl-shift-6-t	Are You There? (AYT)
Ctrl-shift-6-u	Erase Line (EL)

At any time during an active Telnet session, Telnet commands can be listed by pressing the Ctrl-shift-6-? keys at the system prompt.

A sample of this list follows. Note that the Ctrl-shift-6 sequence appears as ^^ on the screen.

```
Console> ‘Ctrl-shift-6’ ?
[Special telnet escape help]
^^ B sends telnet BREAK
^^ C sends telnet IP
^^ H sends telnet EC
^^ O sends telnet AO
^^ T sends telnet AYT
^^ U sends telnet EL
```

Several concurrent Telnet sessions can be opened and switched. To open a subsequent session, the current connection has to be suspended by pressing the escape sequence keys (Ctrl-shift-6) and x to return to the system command prompt. Then open a new connection with the **telnet** User EXEC mode command.

Keywords Table

Options	Description
/echo	Enables local echo.
/quiet	Prevents onscreen display of all messages from the software.
/source-interface	Specifies the source interface.

/stream	Turns on stream processing, which enables a raw TCP stream with no Telnet control sequences. A stream connection does not process Telnet options and can be appropriate for connections to ports running UNIX-to-UNIX Copy Program (UUCP) and other non-Telnet protocols.

Ports Table

Keyword	Description	Port Number
BGP	Border Gateway Protocol	179
chargen	Character generator	19
cmd	Remote commands	514
daytime	Daytime	13
discard	Discard	9
domain	Domain Name Service	53
echo	Echo	7
exec	Exec	512
finger	Finger	79
ftp	File Transfer Protocol	21
ftp-data	FTP data connections	20
gopher	Gopher	70
hostname	NIC hostname server	101
ident	Ident Protocol	113
irc	Internet Relay Chat	194
klogin	Kerberos login	543
kshell	Kerberos shell	544
login	Login	513
lpd	Printer service	515
nntp	Network News Transport Protocol	119
pim-auto-rp	PIM Auto-RP	496
pop2	Post Office Protocol v2	109
pop3	Post Office Protocol v3	110
smtp	Simple Mail Transport Protocol	25
sunrpc	Sun Remote Procedure Call	111
syslog	Syslog	514

tacacs	TAC Access Control System	49
talk	Talk	517
telnet	Telnet	23
time	Time	37
uucp	Unix-to-Unix Copy Program	540
whois	Nickname	43
www	World Wide Web	80

- This command lists concurrent telnet connections to remote hosts that were opened by the current telnet session to the local device. It does not list telnet connections to remote hosts that were opened by other telnet sessions.

Example

The following example displays connecting to 176.213.10.50 via Telnet.

```
Console> telnet 176.213.10.50
Esc U sends telnet EL
```

resume

The **resume** User EXEC mode command enables switching to another open Telnet session.

Syntax

- **resume** [*connection*]
  - *connection* — The connection number. (Range: 1 - 4 connections)

Default Configuration

The default connection number is that of the most recent connection.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following command switches to open Telnet session number 1.

```
Console> resume 1
```

reload

The **reload** Privileged EXEC mode command reloads the operating system.

Syntax

- **reload**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example reloads the operating system.

```
Console# reload

This command will reset the whole system and disconnect your
current session. You haven't saved your changes. Are you sure you
want to continue ? (Y/N)[N] N
```

hostname

The **hostname** Global Configuration mode command specifies or modifies the device host name. To remove the existing host name, use the **no** form of the command.

Syntax

- **hostname** *name*
- **no hostname**
  - *name* — The host name of the device. (Range: 1 - 158 characters)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example specifies the device host name.

```
Console(config)# hostname Dell
Dell(config)#
```

service cpu-utilization

The **service cpu-utilization** global configuration mode command allows the software to measure CPU utilization. Use the **no** form of this command to disable measuring.

Syntax

- **service cpu-utilization**
- **no service cpu-utilization**

Default Configuration

The service cpu-utilization function is enabled.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example.

The following example allows the software to measure CPU utilization.

```
console(config)# service cpu-utilization
```

stack master

The **stack master** Global Configuration mode command enables forcing the selection of a stack master. Use the **no** form of this command to return to the default configuration.

Syntax

- **stack master unit** *unit*
- **no stack master**
  - *unit* — Unit number of the new master (Range: 1 - 2)

Default Configuration

Disables forcing the selection of a stack master.

Command Mode

Global Configuration mode.

User Guidelines

- The following algorithm is used to select a unit as the master:
  - If only one master-enabled unit is in the stack (1 or 2), it becomes the master.
  - If a unit configured as a forced master, it becomes the master.

  If a forced master unit is removed from a stack and placed in a different stack with another forced master unit, both are considered to be forced, and the election criteria continue as follows:
  - The unit with the longer up-time is elected master. Units are considered to have the same up-time if they were powered up within ten minutes of each other.
  - If both forced master units have the same up-time, Unit 1 is elected.

Example

The following example selects Unit 2 as the stack master.

```
Console(config)# stack master unit 2
```

stack reload

The **stack reload** Privileged EXEC mode command reloads stack members.

Syntax

- **stack reload** [*unit*]
  - *unit* — Number of the unit to be reloaded (Range: 1 - 8)

Default Configuration
All units are reloaded.

Command Mode
Privileged EXEC mode.

User Guidelines
If no unit is specified, all units are reloaded.

Example

The following example reloads Unit 2 of the stack.

```
Console(config)# stack reload unit 2
```

show stack

The **show stack** User EXEC mode command displays information about the status of a stack.

Syntax

- **show stack** [**unit** *unit*]
  - *unit* — Specifies the number of the unit. (Range: 1 - 6)

Default Configuration
This command has no default configuration.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays stack status.

```
Console> show stack
Unit   MAC Address       Software  Master   Uplink  Downlink  Status
----   --------------    --------  -------  ------  --------  ------
1      00:33:97:02:16:00 1.0.0.7   Forced   8       2         Master
2      00:33:97:02:21:00 1.0.0.7   Enabled  1       3         backup
3      00:33:97:02:12:00 1.0.0.7   Disabled 2       4         Slave
```

```
4     00:33:97:02:18:00 1.0.0.6   Disabled 3      5         Slave
5     00:33:97:02:14:00 1.0.0.7   Disabled 4      6         Slave
6     00:33:97:02:22:00 1.0.0.7   Disabled 5      7         Slave
7     00:33:97:02:11:00 1.0.0.7   Disabled 8      6         Slave
8     00:33:97:02:19:00 1.0.0.7   Disabled 7      1         Slave
Topology is Ring


Unit  Unit Id After
      Reset
----  ---------------
1     1
2     2
3     3
4     4
5     5
6     6
7     7
8     8


console#
```

show users

The **show users** User EXEC mode command displays information about the active users.

Syntax

- **show users**

Default Configuration

This command has no default configuration.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays information about the active users.

```
Console> show users

Username        Protocol     Location
----------      -----------  ------------
Bob             Serial
John            SSH          172.16.0.1
Robert          HTTP         172.16.0.8
Betty           Telnet       172.16.1.7
```

show sessions

The **show sessions** User EXEC mode command lists open Telnet sessions.

Syntax

- **show sessions**

Default Configuration
There is no default configuration for this command.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following example lists open Telnet sessions.

```
Console> show sessions

Connection     Host              Address        Port     Byte
----------     -------------     ----------     -----    ----
1              Remote device     172.16.1.1     23       89
2              172.16.1.2        172.16.1.2     23       8
```

The following table describes significant fields shown above.

Field	Description
Connection	Connection number.
Host	Remote host to which the device is connected through a Telnet session.
Address	IP address of the remote host.
Port	Telnet TCP port number
Byte	Number of unread bytes for the user to see on the connection.

show system

The **show system** User EXEC mode command displays system information.

Syntax

- **show system** [**unit** *unit*]
  - *unit* — Specifies the number of the unit. (Range: 1 - 8)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the system information.

```
Console> show system

Unit       Type
----       ---------
1          PowerConnect 3524
2          PowerConnect 3524
3          PowerConnect 3524
4          PowerConnect 3524
5          PowerConnect 3524
6          PowerConnect 3524
7          PowerConnect 3524
8          PowerConnect 3524

Unit       Main Power Supply               Redundant Power Supply
1          ok
2          ok
3          ok
4          ok
5          ok
6          ok
7          ok
8          ok
```

show version

The **show version** User EXEC mode command displays system version information.

Syntax

- **show version** [**unit** *unit*]
  - *unit* — Specifies the number of the unit. (Range: 1 - 6)

  Default Configuration

  This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays system version information (only for demonstration purposes).

```
Console> show version
SW version 1.0.0.0           (date 23-Jul-2004 time 17:34:19)
Boot version 1.0.0.0         (date 11-Jan-2004 time 11:48:21)
HW version 1.0.0

Unit           SW version    Boot version       HW version
----           ----------    ------------       ----------
1              1.0.0.0       2.178              1.0.0
2              1.0.0.0       2.178              1.0.0
```

asset-tag

The **asset-tag** Global Configuration mode command specifies the asset tag of the device. To return to the default configuration, use the **no** form of the command.

Syntax

- **asset-tag** [**unit** *unit*] *tag*
- **no asset-tag** [**unit** *unit*]
  - *unit* — Specifies the number of the unit. (Range: 1 - 8)
  - *tag* — Specifies the asset tag of the device. (Range: 1 - 16 characters)

Default Configuration

No asset tag is defined.

The default unit number is that of the master unit

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example specifies the asset tag of the master unit as "1qwepot".

```
Console(config)# asset-tag 1qwepot
```

show system id

The **show system id** User EXEC mode command displays system ID information.

Syntax

- **show system id** [**unit** *unit*]
  - *unit* — Specifies the number of the unit. (Range: 1 - 6)

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays system service and asset tag information.

```
Console> show system id

Service Tag: 89788978

Serial number: 8936589782

Asset tag: 7843678957


Unit          Service tag   Serial number      Asset tag

----          -----------   ------------       ---------

1             89788978      893659782          7843678957

2             34254675      3216523877         5621987728
```

show cpu utilization

The **show cpu utilization** Privileged EXEC mode command displays display information about CPU utilization.

Syntax

- **show cpu utilization**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- Use the **service cpu-utilization** Global Configuration mode command to enable measuring CPU utilization.

Example

The following example displays CPU utilization..

```
Console# show cpu utilization
CPU utilization service is on.
CPU utilization
-------------------------
five seconds: 5%; one minute: 3%; five minutes: 3%
```

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TACACS+ Commands

tacacs-server host

The **tacacs-server host** Global Configuration mode command specifies a TACACS+ host. Use the **no** form of this command to delete the specified name or address.

Syntax

- **tacacs-server host {***ip-address* | *hostname*} [**single-connection**] [**port** *port-number*] [**timeout** *timeout*] [**key** *key-string*] [**source** *source*] [**priority** *priority*]
- **no tacacs-server host {***ip-address* | *hostname*}
  - *ip-address* — IP address of the TACACS+ server.
  - *hostname* — Host name of the TACACS+ server. (Range: 1 - 158 characters)
  - **single-connection** — Indicates a single-connection. Rather than have the device open and close a TCP connection to the daemon each time it must communicate, the single-connection option maintains a single open connection between the device and the daemon.
  - *port-number* — Specifies a server port number. (Range: 0 - 65535)
  - *timeout* — Specifies the timeout value in seconds. (Range: 1 - 30)
  - *key-string* — Specifies the authentication and encryption key for all TACACS+ communications between the device and the TACACS+ server. This key must match the encryption key used on the TACACS+ daemon. To specify an empty string, enter "". (Range: 0 - 128 characters)
  - *source* — Specifies the source IP address to use for the communication. 0.0.0.0 indicates a request to use the IP address of the outgoing IP interface.
  - *priority* — Determines the order in which the TACACS+ servers are used, where 0 is the highest priority. (Range: 0 - 65535)

Default Configuration

No TACACS+ host is specified.

If no port number is specified, default port number 49 is used.

If no host-specific timeout, key-string or source value is specified, the global value is used.

If no TACACS+ server priority is specified, default priority 0 is used.

Command Mode
Global Configuration mode.

User Guidelines

- Multiple **tacacs-server host** commands can be used to specify multiple hosts.

Example
The following example specifies a TACACS+ host.

```
Console(config)# tacacs-server host 172.16.1.1
```

tacacs-server key

The **tacacs-server key** Global Configuration mode command sets the authentication encryption key used for all TACACS+ communications between the device and the TACACS+ daemon. Use the **no** form of this command to disable the key.

Syntax

- **tacacs-server key** *key-string*
- **no tacacs-server key**
  - *key-string* — Specifies the authentication and encryption key for all TACACS+ communications between the device and the TACACS+ server. This key must match the encryption key used on the TACACS+ daemon. (Range: 0 - 128 characters)

Default Configuration
Empty string.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following example sets the authentication encryption key.

```
Console(config)# tacacs-server key dell-s
```

tacacs-server timeout

The **tacacs-server timeout** Global Configuration mode command sets the interval during which the device waits for a TACACS+ server to reply. Use the **no** form of this command to return to the default configuration.

Syntax

- **tacacs-server timeout** *timeout*
- **no tacacs-server timeout**
  - *timeout* — Specifies the timeout value in seconds. (Range: 1 - 30)

Default Configuration
5 seconds.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following example sets the timeout value to 30.

```
Console(config)# tacacs-server timeout 30
```

tacacs-server source-ip

The **tacacs-server source-ip** Global Configuration mode command configures the source IP address to be used for communication with TACACS+ servers. Use the **no** form of this command to return to the default configuration.

Syntax

- **tacacs-server source-ip** *source*
- **no tacacs-server source-ip** *source*
  - *source* — Specifies the source IP address.

Default Configuration
The source IP address is the address of the outgoing IP interface.

Command Mode
Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example specifies the source IP address.

```
Console(config)# tacacs-server source-ip 172.16.8.1
```

show tacacs

The **show tacacs** Privileged EXEC mode command displays configuration and statistical information about a TACACS+ server.

Syntax

- **show tacacs** [*ip-address*]
  - *ip-address*—Host name or IP address of the host.

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays configuration and statistical information about a TACACS+ server.

```
Console# show tacacs

Device Configuration
--------------------

IP address  Status     Port  Single      TimeOut  Source  Priority
                           Connection            IP
----------  --------   ----  ---------   -------  ------  --------
172.16.1.1  Connected  49    No          Global   Global  1

Global values
-------------
TimeOut: 3
Device Configuration
---------------------
Source IP: 172.16.8.1
```

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TIC Commands

passwords min-length

The **passwords min-length** Global Configuration mode command sets the minimum length required for passwords in the local database. Use the **no** form of this command to remove the minimum password length requirement.

Syntax

- **passwords min-length** *length*
- **no passwords min-length**
  - *length* — The minimum length required for passwords. (Range: 8 - 64 characters)

Default Configuration

No minimum password length.

Command Mode

Global Configuration mode.

User Guidelines

- Relevant to local user passwords, line passwords, and enable passwords.
- The software checks the password length when an unencrypted password is defined or a user enters an unencrypted password when logging in.

NOTE: The length of encrypted passwords is only checked when the user logs in. Similarly, the length of passwords that were defined before the minimum password length requirement was configured are checked only when the user logs in.

Example

The following example configures a minimum length of 8 characters required for passwords in the local database.

```
Console(config)# passwords min-length 8
```

password-aging

The **password-aging** Line Configuration mode command configures the aging time of line passwords. Use the **no** form of this command to disable password expiration time.

Syntax

- **password-aging** *days*
- **no password-aging**
  - *days* — The number of days before a password change is forced. (Range: 1 - 365)

Default Configuration

Password aging is disabled.

Command Mode

Line Configuration mode.

User Guidelines

- The aging time is calculated from the day the password is defined (not from the day the aging is defined).
- After a password expires a user can login for another 3 times.
- 10 days before expiration a syslog message is generated.

Example

The following example configures 5 days as the aging time of line passwords.

```
Console (config-line)# password-aging 5
```

passwords aging

The **passwords aging** Global Configuration mode command configures the aging time of username passwords and enables passwords. Use the **no** form of this command to disable password expiration time.

Syntax

- **passwords aging username** *name days*
- **no passwords aging username** *name*

- **passwords aging enable-password** *level days*
- **no passwords aging enable-password** *level*
  - *name* — The name of the user. (Range: 1 - 20 characteres)
  - *level* — The level for which the password applies. (Range: 1 - 15)
  - *days* — The number of days before a password change is forced. (Range: 1 - 365)

Default Configuration

Password aging is disabled.

Command Mode

Global Configuration mode.

User Guidelines

- The aging time is calculated from the day the password was defined, and not from the day the aging was defined.
- After a password expires a user can login for another 3 times.
- 10 days before expiration a syslog message is generated.

Example

The following example configures configures 40 days as the aging time of global passwords.

```
Console (config)# passwords aging username 40
```

passwords history

The **passwords history** Global Configuration mode command sets the number of required password changes before a password in the local database can be reused. Use the **no** form of this command to remove this requirement,.

Syntax

- **passwords history** *number*
- **no passwords history**
  - *number* — Indicates the required number of password changes before a password can be reused. (Range: 1 - 10)

Default Configuration

No required number of password changes before reusing a password.

Command Mode
Global Configuration mode.

User Guidelines

- Relevant to local user passwords, line passwords, and enable passwords.
- Password history is not checked during the configuration download.
- Password history is saved even if the feature is disabled.
- A user's password history is saved as long as the user is defined.
- If the user enters a password that is identical to the previously used one, the password is not included in the password history count. This is required to enable the user to modify privilege level or aging, without having to change passwords.

Example

The following example configures the required number of password changes before a password can be reused to 3.

```
Console(config)# passwords history 3
```

passwords history hold-time

The **passwords history hold-time** Global Configuration mode command configures the number of days a password is relevant for tracking its password history. Use the **no** form of this command to return to the default configuration.

Syntax

- **passwords history hold-time** *days*
- **no passwords hold-time**
  - *days* — Number of days a password is relevant for tracking its password history. (Range: 1 - 365)

Default Configuration
Disabled.

Command Mode
Global Configuration mode.

User Guidelines
Relevant to local user passwords, line passwords, and enable passwords.

For tracking purposes, passwords are not deleted from the history database after becoming 'irrelevant'. A period of time that the password cannot be changed (according to the history table) must be configured. By increasing a password 's relevance for tracking purposes by a number of days, it may cause the irrelevant password to be relevant again.

Example

The following example configures the number of days that a password is relevant for tracking its password history to 120.

```
Console(config)# passwords history hold-time 120
```

passwords lockout

The **passwords lockout** Global Configuration mode command sets the number of failed login attempts before a user account is locked. Use the **no** form of this command to remove this condition.

Syntax

- **passwords lockout** *number*
- **no passwords lockout**
  - *number* — Number of failed login attempts before the user account is locked. (Range: 1 - 5)

Default Configuration

No locked user account due to failed login attempts.

Command Mode

Global Configuration mode.

User Guidelines

- Relevant to local user passwords, line passwords, and enable passwords.
- The user account can still access the local console.
- A different administrator, with privilege level 15, can release a locked account by using the **set username active** command.

Example

The following example configures the number of failed login attempts before a user account is locked to 3.

```
Console(config)# passwords lockout 3
```

aaa login-history file

The **aaa login-history file** Global Configuration mode command enables writing to the login history file. Use the **no** form of this command to disable writing to the file.

Syntax

- **aaa login-history file**
- **no aaa login-history file**

Default Configuration

Writing to the login history file is enabled.

Command Mode

Global Configuration mode.

User Guidelines

The login history is also saved in the internal buffer of the device.

Example

The following example enables writing to the login history file.

```
Console(config)# aaa login-history file
```

set username active

The **set username active** Privileged EXEC mode command reactivates a locked user account.

Syntax

- **set username** *name* **active**
  - *name* — Name of the user. (Range: 1 - 20 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

- A locked user account can be reactivated from the local console.
- A different user, with privilege level 15, can reactivate a locked user account from any remote or local connection.

Example

The following example reactivates a suspended user with username **bob**.

```
Console# set username bob active
```

set line active

The **set line active** Privileged EXEC mode command reactivates a locked line.

Syntax

- **set line {console | telnet | ssh} active**
  - **console** — Console terminal line.
  - **telnet** — Virtual terminal for remote console access (Telnet).
  - **ssh** — Virtual terminal for secured remote console access (SSH).

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example reactivates the line for a virtual terminal for remote console access.

```
Console# set line telnet active
```

set enable-password active

The **set enable-password active** Privileged EXEC mode command reactivates a locked enable password.

Syntax

- **set enable-password** *level* **active**
  - *level* — The user level. (Range: 1 - 15)

Default Configuration

This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example reactivates a locked level 15 enable password.

```
Console# set enable-password 15 active
```

show passwords configuration

The **show passwords configuration** Privileged EXEC mode command displays information about password management.

Syntax

- **show passwords configuration**

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays information about password management in the local database.

```
Console# show passwords configuration
Minimal length: 8
History: 10
History hold time: 365 days
Lock-out: Disabled
```

```
Enable Passwords
Level            Aging            Expiry date      Lockout
-----            -----            -----------      -------
1                90               Jan 18 2005      1
15               90               Jan 18 2005      0

Line Passwords
Level            Aging            Expiry date      Lockout
-----            -----            -----------      -------
Console          -                -                -
Telnet           90               Jan 18 2005      LOCKOUT
SSH              90               Jan 21 2005      0
```

The following table describes significant fields shown above.

Field	Description
Minimal length	Minimum length required for passwords in the local database.
History	Number of required passwords changes before a password in the local database can be reused.
History hold time	Period of time that a password is relevant for tracking password history.
Lockout control	Control locking a user account after a series of authentication failures.
Enable passwords	Describes the configuration and status of a local password with a specific level.
Aging	Password expiration time in days.
Expiry date	Expiration date of a password.
Lockout	If lockout control is enabled, specifies the number of failed authentication attempts since the user last logged in successfully. If the user account is locked, specifies LOCKOUT.
Line Passwords	Describes the configuration and status of a specific line password.

show users login-history

The **show users login-history** Privileged EXEC mode command displays information about the login history of users.

Syntax

- **show users login-history [username** *name***]**
  - *name* — Name of the user. (Range: 1 - 20 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the login history of users.

```
Console# show users login-history

Login Time              Username     Protocol    Location
--------------          --------     --------    --------
Jan 18 2004 23:58:17    Robert       HTTP        172.16.1.8
Jan 19 2004 07:59:23    Robert       HTTP        172.16.0.8
Jan 19 2004 08:23:48    Bob          Serial
Jan 19 2004 08:29:29    Robert       HTTP        172.16.0.8
Jan 19 2004 08:42:31    John         SSH         172.16.0.1
Jan 19 2004 08:49:52    Betty        Telnet      172.16.1.7
```

show users accounts

The **show users accounts** Privileged EXEC mode command displays information about the local user database.

Syntax

- **show users accounts**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the local users configured with access to the system.

```
Console# show users accounts


Username  Privilege  Password   Password        Lockout
                     Aging      Expiry date
--------  ---------  --------   -----------     -------
Bob       1          120        Jan 21 2005     -
Admin     15         120        Jan 21 2005     -
```

The following table describes significant fields shown above.

Field	Description
Username	Name of the user.
Privilege	User’s privilege level.
Password Aging	User’s password expiration time in days.
Password Expiry Date	Expiration date of the user’s password.
Lockout	If lockout control is enabled, specifies the number of failed authentication attempts since the user last logged in successfully. If the user account is locked, specifies LOCKOUT.

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Tunnel

interface tunnel

The **interface tunnel** Global Configuration mode command enters tunnel interface configuration mode.

Syntax

- **interface tunnel** *number*
  - *number* — Tunnel index. (Range: 1)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example enters tunnel interface configuration mode to configure tunnel 1.

```
Console (config)# interface tunnel 1
Console (config-tunnel)#
```

tunnel mode ipv6ip

The **tunnel mode ipv6ip** Interface Tunnel Configuration mode command configures an IPv6 transition mechanism global support mode. Use the **no** form of this command to remove the IPv6 transition mechanism.

Syntax

- **tunnel mode ipv6ip** {**isatap**}
- **no tunnel mode ipv6ip**
  - **isatap** — Automatic IPv6 over IPv4 ISATAP tunnel is enabled.

Default Configuration

Disabled.

Command Mode

Interface Tunnel Configuration mode.

User Guidelines

- The system can be enabled to an ISATAP tunnel. When enabled, an automatic tunnel interface is created on each interface that is assigned with IPv4 address.

NOTE: Note: on a specific interface (that is port/ VLAN), both native IPV6 and transition mechanisms can coexist. The host implementation selects the egress interface according to the scope of the destination IP address (for example ISATAP/ Native IPv6).

Example

The following example configures an IPv6 transition mechanism global support mode.

```
Console (config)# interface tunnel 1
Console (config-tunnel)# tunnel mode ipv6ip
```

tunnel isatap router

The **tunnel isatap router** Interface Tunnel Configuration mode command configures a global string that represents a specific automatic tunnel router domain name. Use the **no** form of this command to remove the string associated with the router domain name and return to the default.

Syntax

- **tunnel isatap router** *router_name*
- no **tunnel isatap router**
  - *router_name* — A string representing the router's domain name.

Default Configuration

By default, 'ISATAP' string represents the corresponding automatic tunnel router's domain name.

Command Mode

Interface Tunnel Configuration mode.

User Guidelines

- The **ipv6 tunnel routers-dns** command determines the string that the host uses for automatic tunnel router lookup in IPv4 DNS procedure. By default, the string 'ISATAP' is used for the corresponding automatic tunnel types.
- Per tunnel only one string can represent the automatic tunnel router name. Using this command overwrites the existing entry.

Example

The following example configures a global string "Dell_Tunnel_Router" to represent a specific automatic tunnel router domain name..

```
Console (config)# interface tunnel 1
Console (config-tunnel)# tunnel isatap router Dell_Tunnel_Router
```

tunnel source

The **tunnel source** Interface Tunnel Configuration mode command sets the local (source) tunnel interface IPv4 address. Use the **no** form to delete the tunnel local address.

Syntax

- **tunnel source** { **auto** | **ip-address** *ipv4-address* | *interface* }
- **no tunnel source**
  - **auto** — The system minimum IPv4 address is used as the source address for packets sent on the tunnel interface. If the IPv4 address is changed then the local address of the tunnel interface is also changed.
  - *ip4-address* — Pv4 address to use as the source address for packets sent on the tunnel interface. The tunnel interface local address is not changed when the IPv4 address is moved to another interface.
  - *interface* — Interface which the minimum IPv4 address is used as the source address for packets sent on the tunnel interface. If the minimum IPv4 address is removed from the interface or moved to another interface then the next minimum IPv4 address is chosen as the local IPv4 address. The parameter has the following format: **ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *number.*

Default Configuration

No source address is defined.

Command Mode

Interface Tunnel Configuration mode.

User Guidelines

- The configured source IPv4 address is used for forming the tunnel interface identifier. The interface identifier is set to the 8 least significant bytes of the SIP field of the encapsulated IPv6 tunneled packets.

Example

The following example sets the local (source) tunnel interface IPv4 address.

```
Console (config)# interface tunnel 1
Console (config-tunnel)# tunnel source auto
```

tunnel isatap query-interval

The **tunnel isatap query-interval** Global Configuration mode command configures the interval between DNS Queries (before the IP address of the ISATAP router is known) for the automatic tunnel router domain name. Use the **no** form of this command to return to default.

Syntax

- **tunnel isatap query-interval** *seconds*
- **no tunnel isatap query-interval**
  - *seconds* — Specify the number of seconds between DNS Queries. (Range: 10 – 3600)

Default Configuration

10 seconds.

Command Mode

Global Configuration mode.

User Guidelines

- This command determines the interval of DNS queries before the IP address of the ISATAP router is known. When the IP address is known the robustness level that is set by the **tunnel isatap robustness** global configuration command determines the refresh rate.

Example

The following example configures the interval between DNS Queries for the automatic tunnel router domain to 60 seconds.

```
Console (config)# tunnel isatap query-interval 60
```

tunnel isatap solicitation-interval

The **tunnel isatap solicitation-interval** Global Configuration mode command configures the interval between ISATAP router solicitations messages (when there is no active ISATAP router). Use the **no** form of this command to return to default.

Syntax

- **tunnel isatap solicitation-interval** *seconds*
- **no tunnel isatap solicitation-interval**
  - *seconds* — Specify the number of seconds between ISATAP router solicitations messages. (Range: 10 – 3600)

Default Configuration
10 seconds.

Command Mode
Global Configuration mode.

User Guidelines

- This command determines the interval of Router Solicitation messages when there is no active ISATAP router. When there is an active ISATAP router, the robustness level that is set by the **tunnel isatap robustness** global configuration command determines the refresh rate.

Example

The following example configures the interval between ISATAP router solicitations messages to 60 seconds.

```
Console (config)# tunnel isatap solicitation-interval 60
```

tunnel isatap robustness

The **tunnel isatap robustness** Global Configuration mode command configures the number of DNS Query/Router Solicitation refresh messages that the device sends. Use the **no** form of this command to return to default.

Syntax

- **tunnel isatap robustness** *number*
- **no tunnel isatap robustness**
  - *number* — Specify the number of refresh messages. (Range: 1 – 20)

Default Configuration
3 times.

Command Mode
Global Configuration mode.

User Guidelines

- The DNS query interval (after the IP address of the ISATAP router is known) is the TTL that is received from the DNS divided by (Robustness + 1).
- The router solicitation interval (when there is an active ISATAP router) is the minimum-router-lifetime that is received from the ISATAP router divided by (Robustness + 1).

Example

The following example configures the number of DNS Query/Router Solicitation refresh messages that the device sends to 6 times.

```
Console (config)# tunnel isatap robustness 6
```

show ipv6 tunnel

The **show ipv6 tunnel** Privileged EXEC mode command displays information on the ISATAP tunnel.

Syntax

- **show ipv6 tunnel**

Default Configuration

This command has no default setting.

Command Mode

Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example displays information on the ISATAP tunnel.

```
Console> show ipv6 tunnel


Router DNS name: ISATAP
Router IPv4 address: 172.16.1.1
DNS Query interval: 10 seconds
Min DNS Query interval: 0 seconds
Router Solicitation interval: 10 seconds
Min Router Solicitation interval: 0 seconds
Robustness: 3
```

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User Interface

enable

The **enable** User EXEC mode command enters the Privileged EXEC mode.

Syntax

- **enable** [*privilege-level*]
  - *privilege-level* — Privilege level to enter the system. (Range: 1 - 15)

Default Configuration
The default privilege level is 15.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example enters Privileged EXEC mode.

```
Console> enable
enter password:
Console#
```

disable

The **disable** Privileged EXEC mode command returns to the User EXEC mode.

Syntax

- **disable** [*privilege-level*]
  - *privilege-level* — Privilege level to enter the system. (Range: 1 - 15)

Default Configuration
The default privilege level is 1.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example returns to Users EXEC mode.

```
Console# disable
Console>
```

login

The **login** User EXEC mode command changes a login username.

Syntax

- **login**

Default Configuration
This command has no default configuration.

Command Mode
User EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example enters Privileged EXEC mode and logs in with username **admin**.

```
Console> login
User Name:admin
Password:*****
Console#
```

configure

The **configure** Privileged EXEC mode command enters the Global Configuration mode.

Syntax

- **configure**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example enters Global Configuration mode.

```
Console# configure
Console(config)#
```

exit (Configuration)

The **exit** command exits any configuration mode to the next highest mode in the CLI mode hierarchy.

Syntax

- **exit**

Default Configuration

This command has no default configuration.

Command Mode

All configuration modes.

User Guidelines

There are no user guidelines for this command.

Example

The following example changes the configuration mode from Interface Configuration mode to Privileged EXEC mode.

```
Console(config-if)# exit
Console(config)# exit
Console#
```

exit

The **exit** Privileged/User EXEC mode command closes an active terminal session by logging off the device.

Syntax

- **exit**

Default Configuration

This command has no default configuration.

Command Mode

Privileged and User EXEC modes.

User Guidelines

There are no user guidelines for this command.

Example

The following example closes an active terminal session.

```
Console> exit
```

end

The **end** command ends the current configuration session and returns to the Privileged EXEC mode.

Syntax

- **end**

Default Configuration
This command has no default configuration.

Command Mode
All configuration modes.

User Guidelines
There are no user guidelines for this command.

Example

The following example changes from Global Configuration mode to Privileged EXEC mode.

```
Console(config)# end
Console#
```

help

The **help** command displays a brief description of the help system.

Syntax

- **help**

Default Configuration
This command has no default configuration.

Command Mode
All command modes.

User Guidelines
There are no user guidelines for this command.

Example

The following example describes the help system.

```
Console# help

Help may be requested at any point in a command by entering a
question mark '?'. If nothing matches the currently entered
incomplete command, the help list is empty. This indicates that
for a query at this point, there is no command matching the
current input. If the request is within a command, enter backspace
and erase the entered characters to a point where the request
results in a display.

Help is provided when:

1. There is a valid command and a help request is made for
entering a parameter or argument (e.g. 'show ?'). All possible
parameters or arguments for the entered command are displayed.

2. An abbreviated argument is entered and a help request is made
for arguments matching the input (e.g. 'show pr?').
```

terminal datadump

The **terminal datadump** User EXEC mode command enables dumping all the output of a show command without prompting. Use the **no** form of this command to disable dumping.

Syntax

- **terminal datadump**
- **no terminal datadump**

Default Configuration

Dumping is disabled.

Command Mode

User EXEC mode.

User Guidelines

- By default, a **More** prompt is displayed when the output contains more lines than can be displayed on the screen. Pressing the **Enter** key displays the next line; pressing the Spacebar displays the next screen of output. The data-dump command enables dumping all output immediately after entering the show command.
- This command is relevant only for the current session.

Example

This example dumps all output immediately after entering a show command.

```
Console> terminal datadump
```

show history

The **show history** User EXEC mode command lists the commands entered in the current session.

Syntax

- **show history**

Default Configuration

This command has no default configuration.

Command Mode

User EXEC mode.

User Guidelines

- The buffer includes executed and unexecuted commands.
- Commands are listed from the first to the most recent command.
- The buffer remains unchanged when entering into and returning from configuration modes.

Example

The following example displays all the commands entered while in the current Privileged EXEC mode.

```
Console# show version
SW version 3.131 (date 23-Jul-2004 time 17:34:19)
HW version 1.0.0
Console# show clock
15:29:03 Jun 17 2004
Console# show history
show version
show clock
show history
3 commands were logged (buffer size is 10)
```

show privilege

The **show privilege** Privileged/User EXEC mode command displays the current privilege level.

Syntax

- **show privilege**

Default Configuration

This command has no default configuration.

Command Mode

Privileged and User EXEC modes.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the current privilege level for the Privileged EXEC mode.

```
Console# show privilege
Current privilege level is 15
```

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VLAN Commands

vlan database

The **vlan database** Global Configuration mode command enters the VLAN Configuration mode.

Syntax

- **vlan database**

Default Configuration
This command has no default configuration.

Command Mode
Global Configuration mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example enters the VLAN database mode.

```
Console(config)# vlan database
Console(config-vlan)#
```

vlan

The **vlan** VLAN Configuration mode command creates a VLAN. Use the **no** form of this command to delete a VLAN.

Syntax

- **vlan** *vlan-range*
- **no vlan** *vlan-range*
  - *vlan-range* — Specifies a list of VLAN IDs to be added. Separate non-consecutive VLAN IDs with a comma and no spaces; a hyphen designates a range of IDs.

Default Configuration

This command has no default configuration.

Command Mode

VLAN Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example VLAN number 1972 is created.

```
Console(config)# vlan database
Console(config-vlan)# vlan 1972
```

interface vlan

The **interface vlan** Global Configuration mode command enters the Interface Configuration (VLAN) mode.

Syntax

- **interface vlan** *vlan-id*
  - *vlan-id* — Specifies an existing VLAN ID.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example enters Interface Configuration mode for VLAN 1.

```
Console(config)# interface vlan 1
Console(config-if)#
```

interface range vlan

The **interface range vlan** Global Configuration mode command enables simultaneously configuring multiple VLANs.

Syntax

- **interface range vlan** {*vlan-range* | **all**}
  - *vlan-range* — Specifies a list of VLAN IDs to be added. Separate non-consecutive VLAN IDs with a comma and no spaces; a hyphen designates a range of IDs.
  - **all** — All existing static VLANs.

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

- Commands under the interface range context are executed independently on each interface in the range. If the command returns an error on one of the interfaces, an error message is displayed and execution of the command continues on the other interfaces.
- The following commands are not supported with the **interface range vlan** command: **switchport access vlan**, **private-vlan community**, **private-vlan isolated** and **switchport protected**.

Example

The following example groups VLANs 221, 228 and 889 to receive the same command.

```
Console(config)# interface range vlan 221-228,889
Console(config-if)#
```

name

The **name** Interface Configuration mode command adds a name to a VLAN. Use the **no** form of this command to remove the VLAN name.

Syntax

- **name** *string*
- **no name**
  - *string* — Unique name to be associated with this VLAN. (Range: 1 - 32 characters)

Default Configuration
No name is defined.

Command Mode
Interface Configuration (VLAN) mode. Cannot be configured for a range of interfaces (range context).

User Guidelines
There are no user guidelines for this command.

Example

The following example gives VLAN number 19 the name **Marketing**.

```
Console(config)# interface vlan 19
Console(config-if)# name Marketing
```

switchport access vlan

The **switchport access vlan** Interface Configuration mode command configures the VLAN ID when the interface is in access mode. Use the **no** form of this command to return to the default configuration.

Syntax

- **switchport access vlan {***vlan-id* | **dynamic**}
- **no switchport access vlan**
  - *vlan-id* — Specifies the ID of the VLAN to which the port is configured.
  - **dynamic** — Indicates that the port is assigned to a VLAN based on the source MAC address of the host connected to the port.

Default Configuration
All ports belong to VLAN 1.

Command Mode
Interface configuration (Ethernet, port-channel) mode.

User Guidelines

- The command automatically removes the port from the previous VLAN and adds it to the new VLAN.

Example

The following example configures a VLAN ID of 23 to the untagged layer 2 VLAN Ethernet port 1/e16.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# switchport access vlan 23
```

switchport trunk allowed vlan

The **switchport trunk allowed vlan** Interface Configuration mode command adds or removes VLANs to or from a trunk port.

Syntax

- **switchport trunk allowed vlan** {**add** *vlan-list* | **remove** *vlan-list* }
  - **add** *vlan-list* — List of VLAN IDs to be added. Separate non-consecutive VLAN IDs with a comma and no spaces. A hyphen designates a range of IDs.
  - **remove** *vlan-list* — List of VLAN IDs to be removed. Separate non-consecutive VLAN IDs with a comma and no spaces. A hyphen designates a range of IDs.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example adds VLANs 1, 2, 5 to 6 to the allowed list of Ethernet port 1/e16.

```
Console(config)# interface ethernet 1/e16
console(config-if)# switchport trunk allowed vlan add 1-2,5-6
```

switchport trunk native vlan

The **switchport trunk native vlan** Interface Configuration mode command defines the native VLAN when the interface is in trunk mode. Use the **no** form of this command to return to the default configuration.

Syntax

- **switchport trunk native vlan** *vlan-id*
- **no switchport trunk native vlan**
  - *vlan-id* — Specifies the ID of the native VLAN.

Default Configuration

VID=1.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- The command adds the port as a member in the VLAN. If the port is already a member in the VLAN (not as a native), it should be first removed from the VLAN.

Example

The following example configures VLAN number 123 as the native VLAN when Ethernet port 1/e16 is in trunk mode.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# switchport trunk native vlan 123
```

switchport general allowed vlan

The **switchport general allowed vlan** Interface Configuration mode command adds or removes VLANs from a general port.

Syntax

- **switchport general allowed vlan add** *vlan-list* [**tagged** | **untagged**]
- **switchport general allowed vlan remove** *vlan-list*
  - **add** *vlan-list* — Specifies the list of VLAN IDs to be added. Separate non-consecutive VLAN IDs with a comma and no spaces. A hyphen designates a range of IDs.
  - **remove** *vlan-list* — Specifies the list of VLAN IDs to be removed. Separate non-consecutive VLAN IDs with a comma and no spaces. A hyphen designates a range of IDs.

- **tagged** — Indicates that the port transmits tagged packets for the VLANs.
- **untagged** — Indicates that the port transmits untagged packets for the VLANs.

Default Configuration
: If the port is added to a VLAN without specifying tagged or untagged, the default setting is tagged.

Command Mode
: Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- This command enables changing the egress rule (e.g., from tagged to untagged) without first removing the VLAN from the list.

Example

The following example adds VLANs 2, 5, and 6 to the allowed list of Ethernet port 1/e16 .

```
Console(config)# interface ethernet 1/e16
Console(config-if)# switchport general allowed vlan add 2,5-6
tagged
```

switchport general pvid

The **switchport general pvid** Interface Configuration mode command configures the PVID when the interface is in general mode. Use the **no** form of this command to return to the default configuration.

Syntax

- **switchport general pvid** *vlan-id*
- **no switchport general pvid**
  - *vlan-id* — Specifies the PVID (Port VLAN ID).

Default Configuration
: If the default VLAN is enabled, PVID = 1. Otherwise, PVID=4095.

Command Mode
: Interface Configuration (Ethernet, port-channel) mode.

User Guidelines
: There are no user guidelines for this command.

Example

The following example configures the PVID for Ethernet port 1/e16, when the interface is in general mode.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# switchport general pvid 234
```

switchport general ingress-filtering disable

The **switchport general ingress-filtering disable** Interface Configuration mode command disables port ingress filtering. Use the **no** form of this command to return to the default configuration.

Syntax

- **switchport general ingress-filtering disable**
- **no switchport general ingress-filtering disable**

Default Configuration
Ingress filtering is enabled.

Command Mode
Interface Configuration (Ethernet, port-channel) mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example disables port ingress filtering on Ethernet port 1/e16.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# switchport general ingress-filtering disable
```

switchport general acceptable-frame-type tagged-only

The **switchport general acceptable-frame-type tagged-only** Interface Configuration mode command discards untagged frames at ingress. Use the **no** form of this command to return to the default configuration.

Syntax

- **switchport general acceptable-frame-type tagged-only**
- **no switchport general acceptable-frame-type tagged-only**

Default Configuration
All frame types are accepted at ingress.

Command Mode
Interface Configuration (Ethernet, port-channel) mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example configures Ethernet port 1/e16 to discard untagged frames at ingress.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# switchport general acceptable-frame-type
tagged-only
```

switchport forbidden vlan

The **switchport forbidden vlan** Interface Configuration mode command forbids adding specific VLANs to a port. To return to the default configuration, use the **remove** parameter for this command.

Syntax

- **switchport forbidden vlan** {**add** *vlan-list* | **remove** *vlan-list*}
  - **add** *vlan-list* — Specifies the list of VLAN IDs to be added. Separate non-consecutive VLAN IDs with a comma and no spaces. A hyphen designates a range of IDs.
  - **remove** *vlan-list* — Specifies the list of VLAN IDs to be removed. Separate non-consecutive VLAN IDs with a comma and no spaces. A hyphen designates a range of IDs.

Default Configuration
All VLANs are allowed.

Command Mode
Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- This command can be used to prevent GVRP from automatically making the specified VLANs active on the selected ports.

Example

The following example forbids adding VLAN IDs 234 to 256 to Ethernet port 1/e16.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# switchport forbidden vlan add 234-256
```

switchport mode

The **switchport mode** Interface Configuration mode command configures the VLAN membership mode of a port. Use the **no** form of this command to reset the mode to the appropriate default for the device.

Syntax

- **switchport mode** { *access* | *trunk* | *general* | *customer* }
- **no switchport mode**
  - *access* — Untagged layer 2 VLAN interface
  - *trunk* — Trunking layer 2 VLAN interface
  - *general* — Full 802.1q support VLAN interface
  - *customer* — The port is connected to customer equipment. Used when the switch is in a provider network

Default Configuration

Access mode.

Command Mode

Interface configuration (Ethernet, port-channel) mode.

User Guidelines

- There are no user Guidelines for this command.

Example

The following example configures the VLAN membership mode of a port. Use the no form of this command to reset the mode to the appropriate default for the device.

```
console# config
console(config)# interface ethernet g1 - 1/e1
console(config-if)# switchport mode customer
```

switchport customer vlan

Use the **switchport customer vlan** interface configuration command set the port's VLAN when the interface is in customer mode. Use the **no** form of this command to revert to default.

Syntax

- **switchport customer vlan** *vlan-id*
- **no switchport customer vlan**

vlan-id — VLAN ID of the customer

Default Configuration

No VLAN is configured.

Command Mode

Interface configuration (Ethernet, port-channel) mode.

User Guidelines

There are no user Guidelines for this command.

Example

The following example sets the port's VLAN when the interface is in customer mode.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# switchport customer vlan vlan-id
```

switchport protected

The **switchport protected** Interface Configuration mode command overrides the FDB (Forwarding Database)decision, and sends all the Unicast, Multicast and Broadcast traffic to an uplink port. Use the **no** form of this command to disable overriding the FDB decision.

Syntax

- **switchport protected** {**ethernet** *port* | **port-channel** *port-channel-number* }
- **no switchport protected**
  - *port* — Specifies the uplink port (Ethernet port).
  - *port-channel-number* — Specifies the uplink port (Port-channel).

Default Configuration

The default configuration is **disabled**.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

Use this command to override the FDB decision, and forward the packet to the uplink. Please note that the packet is still subject to all filtering decisions.

The following example overrides the FDB decision, and sends all the Unicast, Multicast and Broadcast traffic to specified ethernet port.

```
Console(config)# interface ethernet 1/e5
Console(config-if)# switchport protected ethernet 2/g1
```

map protocol protocols-group

The **map protocol protocols-group** VLAN Configuration mode command maps a protocol to a protocol group. Protocol groups are used for protocol-based VLAN assignment. Use the **no** form of this command to delete a protocol from a group.

Syntax

- **map protocol** *protocol* [*encapsulation*] **protocols-group** *group*
- **no map protocol** *protocol encapsulation*
  - *protocol* — The protocol is a 16 or 40 bits protocol number or one of the following names, **ip, ipx** or **arp**. The protocol number is in Hex format (Range: 0600 - FFFF).
  - *encapsulation* — One of the following values: **ethernet or protocols-group**. If no option is indicated the default is **ethernet**.
  - *group* — Protocol group number. (Range: 1 - 2147483647)

Default Configuration

This command has no default configuration.

Command Mode

VLAN Configuration mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example maps protocol ip-arp to the group named "213".

```
Console (config)# vlan database
Console (config-vlan)# map protocol ip-arp protocols-group 213
```

switchport general map protocols-group vlan

The **switchport general map protocols-group vlan** Interface Configuration mode command sets a protocol-based classification rule. Use the **no** form of this command to delete a classification.

Syntax

- **switchport general map protocols-group** *group* **vlan** *vlan-id*
- **no switchport general map protocols-group** *group*
  - *group* — Group number as defined in the **map protocol protocols-group** command. (Range: 1 - 2147483647)
  - *vlan-id* — Define the VLAN ID in the classifying rule.

Default Configuration

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example sets a protocol-based classification rule of protocol group 1 to VLAN 8.

```
Console (config)# interface ethernet g8
console(config-if)# switchport general map protocols-group 1 vlan 8
```

ip internal-usage-vlan

The **ip internal-usage-vlan** Interface Configuration mode command reserves a VLAN as the internal usage VLAN of an interface. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip internal-usage-vlan** *vlan-id*
- **no ip internal-usage-vlan**
  - *vlan-id* — Specifies the ID of the internal usage VLAN.

Default Configuration

The software reserves an unused VLAN as the internal usage VLAN of an interface.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- An internal usage VLAN is required when an IP interface is configured on an Ethernet port or port-channel.
- This command enables the user to configure the internal usage VLAN of a port. If an internal usage VLAN is not configured and the user configures an IP interface, an unused VLAN is selected by the software.
- If the software selected a VLAN for internal use and the user uses that VLAN as a static or dynamic VLAN, the user should do one of the following:
  - Remove the IP interface.
  - Create the VLAN and recreate the IP interface.
  - Use this command to explicitly configure a different VLAN as the internal usage VLAN.
- This command is not supported under the command **interface range ethernet**.

Example

The following example reserves VLAN 15 as the internal usage VLAN of ethernet port 1/e8.

```
Console# config
Console(config)# interface ethernet 1/e8
Console(config-if)# ip internal-usage-vlan 15
```

show vlan

The **show vlan** Privileged EXEC mode command displays VLAN information.

Syntax

- **show vlan** [**id** *vlan-id* | **name** *vlan-name* **]**
  - *vlan-id* — specifies a VLAN ID
  - *vlan-name* — Specifies a VLAN name string. (Range: 1 - 32 characters)

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays all VLAN information.

```
Console# show vlan

VLAN   Name         Ports               Type     Authorization
----   -------      --------            ----     -------------
1      default      1/e1-e2, 2/e1-e4    other    Required
10     VLAN0010     1/e3-e4             dynamic  Required
11     VLAN0011     1/e1-e2             static   Required
20     VLAN0020     1/e3-e4             static   Required
21     VLAN0021                         static   Required
30     VLAN0030                         static   Required
31     VLAN0031                         static   Required
91     VLAN0011     1/e1-e2             static   Not Required
3978   Guest VLAN   1/e17               guest    -
```

show vlan protocols-groups

The **show vlan protocols-groups** Privileged EXEC mode command displays protocols-groups information.

Syntax

- **show vlan protocols-groups**

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example displays protocols-groups information.

```
Console# show vlan protocols-groups

Encapsulation   Protocol        Group Id
-------------   --------        --------
ethernet        08 00           213
ethernet        08 06           213
ethernet        81 37           312
ethernet        81 38           312
rfc1042         08 00           213
rfc1042         08 06           213
```

show vlan internal usage

The **show vlan internal usage** Privileged EXEC mode command displays a list of VLANs used internally by the device.

Syntax

- **show vlan internal usage**

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays VLANs used internally by the device.

```
Console# show vlan internal usage

VLAN     Usage         IP address    Reserved
----     ---------     ----------    --------
1007     Eth 1/e21     Active        No
1008     Eth 1/e22     Inactive      Yes
1009     Eth 1/e23     Active        Yes
```

show interfaces switchport

The **show interfaces switchport** Privileged EXEC mode command displays the switchport configuration.

Syntax

- **show interfaces switchport {ethernet** *interface* | **port-channel** *port-channel-number*}
  - *interface* — A valid Ethernet port number.
  - *port-channel-number* — A valid port-channel number.

Default Configuration
This command has no default configuration.

Command Mode
Privileged EXEC mode.

User Guidelines
There are no user guidelines for this command.

Example

The following example displays the switchport configuration for Ethernet port 1/e1.

```
Console# show interface switchport ethernet 1/e1
Port 1/e1:
VLAN Membership mode: General

Operating parameters:
PVID: 1 (default)
Ingress Filtering: Enabled
Acceptable Frame Type: All
GVRP status: Enabled
Protected: Enabled, Uplink is 1/e9.

Port is member in:
Vlan        Name                Egress rule    Type
----        -------             -----------    -------
1           default             untagged       System
8           VLAN008             tagged         Dynamic
11          VLAN011             tagged         Static
19          IPv6 VLAN           untagged       Static
72          VLAN0072            untagged       Static

Static configuration:
PVID: 1 (default)
Ingress Filtering: Enabled
Acceptable Frame Type: All
```

```
Port is statically configured to:
Vlan        Name                Egress rule
----        -------             -----------
1           default             untagged
11          VLAN011             tagged
19          IPv6 VLAN           untagged
72          VLAN0072            untagged

Forbidden VLANS:
VLAN        Name
----        ----
73          out

Console# show interface switchport ethernet 1/e2
Port 1/e2:
VLAN Membership mode: General

Operating parameters:
PVID: 4095 (discard vlan)
Ingress Filtering: Enabled
Acceptable Frame Type: All

Port is member in:
Vlan        Name                Egress rule    Type
----        ------------        -----------    ------
91          IP Telephony        tagged         Static

Static configuration:
PVID: 8
Ingress Filtering: Disabled
Acceptable Frame Type: All
```

```
Port is statically configured to:
Vlan        Name                Egress rule
----        ------------        -----------
8           VLAN0072            untagged
91          IP Telephony        tagged

Forbidden VLANS:
VLAN        Name
----        ----
73          out

Port 2/e19
VLAN Membership mode: Private-VLAN Community
Primary VLAN: 2921
Community VLAN: 2922

Console# show interfaces switchport ethernet 2/e19
Port 2/e19:
VLAN Membership mode: Private-VLAN Community

Operating parameters:
PVID: 2922
Ingress Filtering: Enabled
Acceptable Frame Type: Untagged
GVRP status: Disabled
```

```
Port is member in:
Vlan        Name                Egress rule    Type
----        ------------        -----------    ------
2921        Primary A           untagged       Static
2922        Community A1        untagged       Static

Static configuration:
PVID: 2922
Ingress Filtering: Enabled
Acceptable Frame Type: Untagged
GVRP status: Disabled
```

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Voice VLAN

voice vlan id

The **voice vlan id** Global Configuration mode command enables the voice VLAN, and configures the voice VALN id. To disable the voice VALN, enter the **no** form of this command.

Syntax

- **voice vlan id** *vlan-id*
- **no voice vlan id**
  - *vlan-id* — Specify the voice VLAN ID.

Default Configuration
Voice VLAN is not defined.

Command Mode
Global Configuration mode.

User Guidelines

- The Voice VLAN feature is only active if the specified VLAN is already created. If the Voice VLAN feature is not active, all the voice VLAN parameters are kept as shadow parameters.

Example

The following example configures the voice VLAN

```
Console (config)# voice vlan id 3
```

voice vlan oui-table

The **voice vlan oui-table** Global Configuration mode command configures the voice OUI table. Use the **no** form of this command to return to default.

Syntax

- **voice vlan oui-table {***add mac-address-prefix* **[description** *text***] | remove** *mac-address-prefix***}**
- **no voice vlan oui-table**
  - mac-address-prefix — Specify the MAC address prefix to be entered to the list.
  - **description** *text* — An optional text that describes the OUI.

Default Configuration

OUI	Description
00:E0:BB	3COM
00:03:6B	Cisco
00:E0:75	Veritel
00:D0:1E	Pingtel
00:01:E3	Simens
00:60:B9	NEC/Philips
00:0F:E2	Huawei-3COM

Command Mode

Global Configuration mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example configures the voice OUI table.

```
console(config)# voice vlan
oui-table remo 00:e0:bb

console(config)# exit

console# show voice vlan


Aging timeout: 1440 minutes


OUI table


MAC Address - Prefix         Description

----------------------       ----------------------

00:01:e3                     Siemens_AG_phone________

00:03:6b                     Cisco_phone_____________

00:09:6e                     Avaya___________________

00:0f:e2                     H3C_Aolynk______________

00:60:b9                     Philips_and_NEC_AG_phone

00:d0:1e                     Pingtel_phone___________

00:e0:75                     Polycom/Veritel_phone___


console#
```

voice vlan cos

The **voice vlan cos** Global Configuration mode command sets the voice VLAN Class Of Service. Use the **no** form of this command to return to default.

Syntax

- **voice vlan cos** *cos*
- **no voice vlan cos**
  - **cos** — Specify the voice VLAN Class Of Service.

Default Configuration

CoS: 6

Command Mode

Global Configuration mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example configures voice vlan cos.

```
Console (config)# voice vlan cos 4
```

voice vlan aging-timeout

The **voice vlan aging-timeout** Global Configuration mode command sets the voice VLAN aging timeout. Use the **no** form of this command to return to default.

Syntax

- **voice vlan aging-timeout** *minutes*
- **no voice vlan aging-timeout**
  - *minutes* — Specify the aging timeout in minutes. (Range: 1 - 43200 minutes)

Default Configuration

1440.

Command Mode

Global Configuration mode.

User Guidelines

- Aging starts after bridging aging is expired.

Example

The following example configures vlan aging-timeout.

```
Console (config)# voice vlan aging-timeout 2000
```

voice vlan enable

The **voice vlan enable** Interface Configuration mode command enables automatic voice VLAN configuration for a port. Use the **no** form of this command to disable automatic voice VLAN configuration.

Syntax

- **voice vlan enable**
- **no voice vlan enable**

Default Configuration

Disabled.

Command Mode

Interface configuration (Ethernet, port-channel) mode.

User Guidelines

- The port is added to the voice VLAN if a packet with a *telephony* MAC address source MAC address (defined by the voice vlan oui-table global configuration command) is trapped on the port.

  NOTE: The VLAN ID of the packet can be the voice VLAN ID or any other VLAN. The port joins the voice VLAN as a tagged port. If the time since the last *telephony* MAC addressed MAC address ages out exceeds the timeout limit (configured by the voice vlan aging-timeout global configuration command), the port is removed from the voice VLAN.

Example

The following example enables automatic voice VLAN configuration for a port

```
console(config-if)# voice vlan enable
```

voice vlan secure

The **voice vlan secure** Interface Configuration mode command configures the secure mode for the voice VLAN. Use the **no** form of this command to disable the secure mode.

Syntax

- **voice vlan secure**
- **no voice vlan secure**

Default Configuration

Not secured.

Command Mode

Interface Configuration (Ethernet, port-channel) mode.

User Guidelines

- Use this command to specify that packets classified to the voice VLAN with a *non- telephony* MAC address source MAC address (defined by the **voice vlan oui-table** global configuration command) are discarded.
- This command is relevant only to ports added to the voice VLAN automatically.

Example

The following example configures the current port in security mode. See User Guidlines.

```
console(config-if)# voice vlan secure
```

show voice vlan

The **show voice vlan** EXEC mode command displays the voice VLAN status.s

Syntax

- **show voice vlan [ethernet** interface **| port-channel** port-channel-number **]**
  - *interface* — **Ethernet interface**
  - port-channel-number — **Port Channel interface**

Default Configuration

OUI	Description
0001e3	Siemens_AG_phone
00036b	Cisco_phone
000fe2	H3C_Aolynk
0060b9	Philips_and_NEC_AG_phone
00d01e	Pingtel_phone
00e075	Polycom/Veritel_phone
00e0bb	3Com_phone

Command Mode

EXEC mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following example displays the voice VLAN configuration.

```
Console Switch# show voice vlan
Aging timeout: 1440 minutes
OUI table
MAC Address-Prefix      Description
00:E0:BB                    3COM
00:03:6B                    Cisco
00:E0:75                    Veritel
00:D0:1E                    Pingtel
00:01:E3                    Simens
00:60:B9                    NEC/Philips
00:0F:E2                    Huawei-3COM
```

.

```
Voice VLAN VLAN ID: 8
CoS: 6
Interface       Enabled         Secure          Activated
1/e1            Yes             Yes             Yes
1/e2            Yes             Yes             No
1/e3            Yes             Yes             Yes
1/e4            Yes             Yes             Yes
1/e5            No              No
1/e6            No              No
1/e7            No              No
1/e8            No              No
1/e9            No              No
```

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Web Server

ip http server

The **ip http server** Global Configuration mode command enables configuring the device from a browser. Use the **no** form of this command to disable this function.

Syntax

- **ip http server**
- **no ip http server**

Default Configuration

HTTP server is enabled.

Command Mode

Global Configuration mode.

User Guidelines

- Only a user with access level 15 can use the Web server.

Example

The following example enables configuring the device from a browser.

```
Console(config)# ip http server
```

ip http port

The **ip http port** Global Configuration mode command specifies the TCP port to be used by the Web browser interface. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip http port** *port-number*
- **no ip http port**
  - *port-number* — Port number for use by the HTTP server. (Range: 1 - 65534)

Default Configuration
The default port number is 80.

Command Mode
Global Configuration mode.

User Guidelines

- Specifying 0 as the port number effectively disables HTTP access to the device.

Example

The following example configures the http port number to 100.

```
Console(config)# ip http port 100
```

ip http exec-timeout

The **ip http exec-timeout** global configuration command sets the interval the system waits for user input before automatically logging off. Use the **no** form of this command to return to default.

Syntax

- **ip http exec-timeout** *minutes* [*seconds*]
- **no ip http exec-timeout**

Parameters

- *minutes* — Integer that specifies the number of minutes. (Range: 0 - 65535)
- *seconds* — Additional time intervals in seconds. (Range: 0 - 59)

Default Configuration
The default configuration is 10 minutes.

Command Mode
Global Configuration mode.

User Guidelines

- This command also configures the exec-timeout for HTTPS in case the HTTPS timeout was not set. To specify no timeout, enter the command **ip https exec-timeout 0 0**.

Example

The following example the interval the system waits for user input before automatically logging off to 3 minutes 30 seconds.

```
Console (config)# ip http exec-timeout 3 30
```

ip https server

The **ip https server** Global Configuration mode command enables configuring the device from a secured browser. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip https server**
- **no ip https server**

Default Configuration
HTTPS server is disabled.

Command Mode
Global Configuration mode.

User Guidelines

- Use the **ip https exec-timeout** Global Configuration mode command to generate an HTTPS certificate.

Example

The following example enables configuring the device from a secured browser.

```
console(config)# ip https server
```

ip https port

The **ip https port** Global Configuration mode command specifies the TCP port used by the server to configure the device through the Web browser. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip https port** *port-number*
- **no ip https port**
  - *port-number* — Port number to be used by the HTTPS server. (Range: 1 - 65534)

Default Configuration
The default port number is 443.

Command Mode
Global Configuration mode.

User Guidelines

- Specifying 0 as the port number effectively disables HTTPS access to the device.

Example

The following example configures the https port number to 100.

```
Console(config)# ip https port 100
```

ip https exec-timeout

The **ip https exec-timeout** Global Configuration command sets the interval the system waits for user input before automatically logging off. Use the **no** form of this command to return to default.

Syntax

- **ip https exec-timeout** *minutes* [*seconds*]
- **no ip https exec-timeout**

Parameters

- *minutes* — Integer that specifies the number of minutes. (Range: 0 - 65535)
- *seconds* — Additional time intervals in seconds. (Range: 0 - 59)

Default Configuration

The default configuration is the exec-timeout that was set by the **ip http exec-timeout** command.

Command Mode

Global Configuration mode.

User Guidelines

- This command also configures the exec-timeout for HTTPS in case the HTTPS timeout was not set. To specify no timeout, enter the command **ip https exec-timeout 0 0**.

Example

The following example the interval the system waits for user input before automatically logging off to 3 minutes 30 seconds.

```
Console (config)# ip https exec-timeout 3 30
```

crypto certificate generate

The **crypto certificate generate** Global Configuration mode command generates a self-signed HTTPS certificate.

Syntax

- **crypto certificate [***number***] generate key-generate [***length***] [passphrase** *string***] [cn** *common-name***][ou** *organization-unit***][or** *organization***] [loc** *location***] [st** *state***] [cu** *country***] [duration** *days***]**
  - *number* — Specifies the certificate number. (Range: 1 - 2)
  - **key-generate** — Regenerate the SSL RSA key.
  - *length* — Specifies the SSL RSA key length. (Range: 512 - 2048)
  - **passphrase** *string* — Passphrase that is used for exporting the certificate in PKCS12 file format. If unspecified the certificate is not exportable. (Range: 512 - 2048)
  - **cn** *common- name* — Specifies the fully qualified URL or IP address of the device. (Range: 1 - 64)
  - **or** *organization* — Specifies the organization name. (Range: 1 - 64)
  - **ou** *organization-unit* — Specifies the organization-unit or department name. (Range: 1 - 64)
  - **loc** *location* — Specifies the location or city name. (Range: 1 - 64)
  - **st** *state* — Specifies the state or province name. (Range: 1 - 64)
  - **cu** *country* — Specifies the country name. (Range: 2)
  - **duration** *days* — Specifies number of days certification is valid. (Range: 30 - 3650)

Default Configuration

The Certificate and SSL's RSA key pairs do not exist.

If no certificate number is specified, the default certificate number is 1.

If no RSA key length is specified, the default length is 1024.

If no URL or IP address is specified, the default common name is the lowest IP address of the device at the time that the certificate is generated.

If the number of days is not specified, the default period of time that the certification is valid is 365 days.

Command Mode

Global Configuration mode.

User Guidelines

- The command is not saved in the device configuration; however, the certificate and keys generated by this command are saved in the private configuration (which is never displayed to the user or backed up to another device).
- Use this command to generate a self-signed certificate for the device.
- If the RSA keys do not exist, parameter **key-generate** must be used.
- When you export an RSA key pair to a PKCS#12 file, the RSA key pair is as secure as the passphrase. Therefore, keep the passphrase secure.

Example

The following example regenerates an HTTPS certificate.

```
Console(config)# crypto certificate 1 generate key-generate
```

crypto certificate request

The **crypto certificate request** Privileged EXEC mode command generates and displays certificate requests for HTTPS.

Syntax

- **crypto certificate** *number* **request** [**cn** *common- name*]**[ou** *organization-unit***][or** *organization***] [loc** *location***] [st** *state***] [cu** *country***]**
  - *number* — Specifies the certificate number. (Range: 1 - 2)
  - **cn** *common- name* — Specifies the fully qualified URL or IP address of the device. (Range: 1 - 64)
  - **ou** *organization-unit* — Specifies the organization-unit or department name. (Range: 1 - 64)
  - **or** *organization* — Specifies the organization name. (Range: 1 - 64)
  - **loc** *location* — Specifies the location or city name. (Range: 1 - 64)
  - **st** *state* — Specifies the state or province name. (Range: 1 - 64)
  - **cu** *country* — Specifies the country name. (Range: 1 - 2)

Default Configuration

There is no default configuration for this command.

Command Mode

Privileged EXEC mode.

User Guidelines

- Use this command to export a certificate request to a Certification Authority. The certificate request is generated in Base64-encoded X.509 format.
- Before generating a certificate request you must first generate a self-signed certificate using the **ip https exec-timeout** Global Configuration mode command. Be aware that you have to reenter the certificate fields.
- After receiving the certificate from the Certification Authority, use the **crypto certificate import** Global Configuration mode command to import the certificate into the device. This certificate replaces the self-signed certificate.

Examples

The following example generates and displays a certificate request for HTTPS.

```
Console# crypto certificate 1 request
-----BEGIN CERTIFICATE REQUEST-----
MIwTCCASoCAQAwYjELMAkGA1UEBhMCUFAxCzAJBgNVBAgTAkNDMQswCQYDVQQH
EwRDEMMAoGA1UEChMDZGxkMQwwCgYDVQQLEwNkbGQxCzAJBgNVBAMTAmxkMRAw
DgKoZIhvcNAQkBFgFsMIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQC8ecwQ
HdML0831i0fh/F0MV/Kib6Sz5p+3nUUenbfHp/igVPmFM+1nbqTDekb2ymCu6K
aKvEbVLF9F2LmM7VPjDBb9bb4jnxkvwW/wzDLvW2rsy5NPmH1QVl+8Ubx3GyCm
/oW93BSOFwxwEsP58kf+sPYPy+/8wwmoNtDwIDAQABoB8wHQYJKoZIhvcNAQkH
MRDjEyMwgICCAgICAICAgIMA0GCSqGSIb3DQEBBAUAA4GBAGb8UgIx7rB05m+2
m5ZZPhIwl8ARSPXwhVdJexFjbnmvcacqjPG8pIiRV6LkxryGF2bVU3jKEipcZa
g+uNpyTkDt3ZVU72pjz/fa8TF0n3
-----END CERTIFICATE REQUEST-----
CN= router.gm.com
0= General Motors
C= US
```

crypto certificate import

The **crypto certificate import** Global Configuration mode command imports a certificate signed by the Certification Authority for HTTPS.

Syntax

- **crypto certificate** *number* **import**
  - *number* — Specifies the certificate number. (Range: 1 - 2)

Default Configuration

This command has no default configuration.

Command Mode

Global Configuration mode.

User Guidelines

- Use this command to enter an external certificate (signed by Certification Authority) to the device. To end the session, enter an empty line.
- The imported certificate must be based on a certificate request created by the **crypto certificate request** Privileged EXEC mode command.
- If the public key found in the certificate does not match the device's SSL RSA key, the command fails.
- This command is not saved in the device configuration; however, the certificate imported by this command is saved in the private configuration (which is never displayed to the user or backed up to another device).

Examples

The following example imports a certificate signed by Certification Authority for HTTPS.

```
Console(config)# crypto certificate 1 import
-----BEGIN CERTIFICATE-----
dHmUgUm9vdCBDZXJ0aWZpZXIwXDANBgkqhkiG9w0BAQEFAANLADBIAkEAp4HS
nnH/xQSGA2ffkRBwU2XIxb7n8VPsTm1xyJ1t11a1GaqchfMqqe0kmfhcoHSWr
yf1FpD0MWOTgDAwIDAQABo4IBojCCAZ4wEwYJKwYBBAGCNxQCBAYeBABDAEEw
CwR0PBAQDAgFGMA8GA1UdEwEB/wQFMAMBAf8wHQYDVR0OBBYEFAf4MT9BRD47
ZvKBAEL9Ggp+6MIIBNgYDVR0fBIIBLTCCASkwgdKggc+ggcyGgclsZGFwOi8v
L0VByb3h5JTIwU29mdHdhcmUlMjBSb290JTIwQ2VydGlmaWVyLENOPXNlcnZl
-----END CERTIFICATE-----

Certificate imported successfully.
Issued to: router.gm.com
Issued by: www.verisign.com
Valid from: Jan 1 02:44:50 2003 GMT
Valid to: Dec 31 02:44:50 2004 GMT
Subject: CN= router.gm.com, 0= General Motors, C= US
Finger print: DC789788 DC88A988 127897BC BB789788
```

ip https certificate

The **ip https certificate** Global Configuration mode command configures the active certificate for HTTPS. Use the **no** form of this command to return to the default configuration.

Syntax

- **ip https certificate** *number*
- **no ip https certificate**
  - *number* — Specifies the certificate number. (Range: 1 - 2)

Default Configuration

Certificate number 1.

Command Mode

Global Configuration mode.

User Guidelines

- The **ip https exec-timeout** command should be used to generate HTTPS certificates.

Example

The following example configures the active certificate for HTTPS.

```
Console(config)# ip https certificate 1
```

show crypto certificate mycertificate

The **show crypto certificate mycertificate** Privileged EXEC mode command displays the SSH certificates of the device.

Syntax

- **show crypto certificate mycertificate [***number***]**
  - *number* — Specifies the certificate number. (Range: 1 - 2)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the certificate.

```
Console# show crypto certificate mycertificate 1
-----BEGIN CERTIFICATE-----
dHmUgUm9vdCBDZXJ0aWZpZXIwXDANBgkqhkiG9w0BAQEFAANLADBIAkEAp4HS
nnH/xQSGA2ffkRBwU2XIxb7n8VPsTm1xyJ1t11a1GaqchfMqqe0kmfhcoHSWr
yf1FpD0MWOTgDAwIDAQABo4IBojCCAZ4wEwYJKwYBBAGCNxQCBAYeBABDAEEw
CwR0PBAQDAgFGMA8GA1UdEwEB/wQFMAMBAf8wHQYDVR0OBBYEFAf4MT9BRD47
ZvKBAEL9Ggp+6MIIBNgYDVR0fBIIBLTCCASkwgdKggc+ggcyGgclsZGFwOi8v
L0VByb3h5JTIwU29mdHdhcmUlMjBSb290JTIwQ2VydGlmaWVyLENOPXNlcnZl
-----END CERTIFICATE-----


Issued by: www.verisign.com
Valid from: Jan 1 02:44:50 2003 GMT
Valid to: Dec 31 02:44:50 2004 GMT
Subject: CN= router.gm.com, 0= General Motors, C= US
Finger print: DC789788 DC88A988 127897BC BB789788
```

show ip http

The **show ip http** Privileged EXEC mode command displays the HTTP server configuration.

Syntax

- **show ip http**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the HTTP server configuration.

```
Console# show ip http
HTTP server enabled. Port: 80
```

show ip https

The **show ip https** Privileged EXEC mode command displays the HTTPS server configuration.

Syntax

- **show ip https**

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the HTTP server configuration.

```
Console# show ip https
HTTPS server enabled. Port: 443

Certificate 1 is active
Issued by: www.verisign.com
Valid from: Jan 1 02:44:50 2004 GMT
Valid to: Dec 31 02:44:50 2005 GMT
Subject: CN= router.gm.com, 0= General Motors, C= US
Finger print: DC789788 DC88A988 127897BC BB789788

Certificate 2 is inactive
Valid From: Jan 1 02:44:50 2004 GMT
Valid to: Dec 31 02:44:50 2005 GMT
Subject: CN= router.gm.com, 0= General Motors, C= US
Finger print: 1873B936 88DC3411 BC8932EF 782134BA
```

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802.1x Commands

aaa authentication dot1x

The **aaa authentication dot1x** Global Configuration mode command specifies one or more authentication, authorization, and accounting (AAA) methods for use on interfaces running IEEE 802.1X. Use the **no** form of this command to return to the default configuration.

Syntax

- **aaa authentication dot1x default** *method1* [*method2*...]
- **no aaa authentication dot1x default**
  - *method1* [*method2*...] — At least one from the following table:

Keyword	Description
Radius	Uses the list of all RADIUS servers for authentication
None	Uses no authentication

Default Configuration

No authentication method is defined.

Command Mode

Global Configuration mode.

User Guidelines

- Additional methods of authentication are used only if the previous method returns an error and not if the request for authentication is denied. To ensure that authentication succeeds even if all methods return an error, specify **none** as the final method in the command line.
- The RADIUS server must support MD-5 challenge and EAP type frames.
- The device accepts EAP frames with a priority tag and also accepts EAP packets with VLAN tags.

Examples

The following example uses the **aaa authentication dot1x default** command with no authentication.

```
Console(config)# aaa authentication dot1x default none
```

dot1x system-auth-control

The **dot1x system-auth-control** Global Configuration mode command enables 802.1x globally. Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x system-auth-control**
- **no dot1x system-auth-control**

Default Configuration

802.1x is disabled globally.

Command Mode

Global Configuration mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example enables 802.1x globally.

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

dot1x port-control

The **dot1x port-control** Interface Configuration mode command enables manually controlling the authorization state of the port. Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x port-control** {**auto** | **force-authorized** | **force-unauthorized**}
- **no dot1x port-control**
  - **auto —** Enables 802.1X authentication on the interface and causes the port to transition to the authorized or unauthorized state based on the 802.1X authentication exchange between the port and the client.
  - **force-authorized —** Disables 802.1X authentication on the interface and causes the port to transition to the authorized state without any authentication exchange required. The port resends and receives normal traffic without 802.1X-based authentication of the client.
  - **force-unauthorized —** Denies all access through this interface by forcing the port to transition to the unauthorized state and ignoring all attempts by the client to authenticate. The device cannot provide authentication services to the client through the interface.

Default Configuration

Port is in the force-authorized state.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- It is recommended to disable Spanning Tree or to enable spanning-tree PortFast mode on 802.1x edge ports (ports in **auto** state that are connected to end stations), in order to get immediately to the forwarding state after successful authentication.

Examples

The following example enables 802.1X authentication on Ethernet port 1/e16.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# dot1x port-control auto
```

dot1x re-authentication

The **dot1x re-authentication** Interface Configuration mode command enables periodic re-authentication of the client. Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x re-authentication**
- **no dot1x re-authentication**

Default Configuration
Periodic re-authentication is disabled.

Command Mode
Interface Configuration (Ethernet) mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following example enables periodic re-authentication of the client.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# dot1x re-authentication
```

dot1x timeout re-authperiod

The **dot1x timeout re-authperiod** Interface Configuration mode command sets the number of seconds between re-authentication attempts. Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x timeout re-authperiod** *seconds*
- **no dot1x timeout re-authperiod**
  - *seconds* — Number of seconds between re-authentication attempts. (Range: 300 - 4294967295)

Default Configuration
Re-authentication period is 3600 seconds.

Command Mode
Interface Configuration (Ethernet) mode.

User Guidelines
There are no user guidelines for this command.

Examples

The following example sets the number of seconds between re-authentication attempts, to 300.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# dot1x timeout re-authperiod 300
```

dot1x re-authenticate

The **dot1x re-authenticate** Privileged EXEC mode command manually initiates a re-authentication of all 802.1X-enabled ports or the specified 802.1X-enabled port.

Syntax

- **dot1x re-authenticate** [**ethernet** *interface*]
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following command manually initiates a re-authentication of 802.1X-enabled Ethernet port 1/e16.

```
Console# dot1x re-authenticate ethernet 1/e16
```

dot1x timeout quiet-period

The **dot1x timeout quiet-period** Interface Configuration mode command sets the number of seconds that the device remains in the quiet state following a failed authentication exchange (for example, the client provided an invalid password). Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x timeout quiet-period** *seconds*

  no dot1x timeout quiet-period

  - *seconds* — Specifies the time in seconds that the device remains in the quiet state following a failed authentication exchange with the client. (Range: 0 - 65535 seconds)

Default Configuration

Quiet period is 60 seconds.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- During the quiet period, the device does not accept or initiate authentication requests.
- The default value of this command should only be changed to adjust for unusual circumstances, such as unreliable links or specific behavioral problems with certain clients and authentication servers.
- To provide a faster response time to the user, a smaller number than the default value should be entered.

Examples

The following example sets the number of seconds that the device remains in the quiet state following a failed authentication exchange to 3600.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# dot1x timeout quiet-period 3600
```

dot1x timeout tx-period

The **dot1x timeout tx-period** Interface Configuration mode command sets the number of seconds that the device waits for a response to an Extensible Authentication Protocol (EAP)-request/identity frame from the client before resending the request. Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x timeout tx-period** *seconds*
- **no dot1x timeout tx-period**
  - *seconds* — Specifies the time in seconds that the device waits for a response to an EAP-request/identity frame from the client before resending the request. (Range: 30 - 65535 seconds)

Default Configuration

Timeout period is 30 seconds.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- The default value of this command should be changed only to adjust for unusual circumstances, such as unreliable links or specific behavioral problems with certain clients. and authentication servers

Examples

The following command sets the number of seconds that the device waits for a response to an EAP-request/identity frame, to 3600 seconds.

```
Console(config)# interface ethernet 1/e16
Console(config-if)# dot1x timeout tx-period 3600
```

dot1x max-req

The **dot1x max-req** Interface Configuration mode command sets the maximum number of times that the device sends an Extensible Authentication Protocol (EAP)-request/identity frame (assuming that no response is received) to the client, before restarting the authentication process. Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x max-req** *count*
- **no dot1x max-req**
  - *count* — Number of times that the device sends an EAP-request/identity frame before restarting the authentication process. (Range: 1 - 10)

Default Configuration

The default number of times is 2.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- The default value of this command should be changed only to adjust for unusual circumstances, such as unreliable links or specific behavioral problems with certain clients. and authentication servers

Examples

The following example sets the number of times that the device sends an EAP-request/identity frame to 6 .

```
Console(config)# interface ethernet 1/e16
Console(config-if)# dot1x max-req 6
```

dot1x timeout supp-timeout

The **dot1x timeout supp-timeout** Interface Configuration mode command sets the time for the retransmission of an Extensible Authentication Protocol (EAP)-request frame to the client. Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x timeout supp-timeout** *seconds*
- **no dot1x timeout supp-timeout**
  - *seconds* — Time in seconds that the device waits for a response to an EAP-request frame from the client before resending the request. (Range: 1- 65535 seconds)

Default Configuration

Default timeout period is 30 seconds.

Command Mode

Interface configuration (Ethernet) mode.

User Guidelines

- The default value of this command should be changed only to adjust for unusual circumstances, such as unreliable links or specific behavioral problems with certain clients. and authentication servers

Examples

The following example sets the timeout period before retransmitting an EAP-request frame to the client to 3600 seconds.

```
Console(config-if)# dot1x timeout supp-timeout 3600
```

dot1x timeout server-timeout

The **dot1x timeout server-timeout** Interface Configuration mode command sets the time that the device waits for a response from the authentication server. Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x timeout server-timeout** *seconds*
- **no dot1x timeout server-timeout**
  - *seconds* — Time in seconds that the device waits for a response from the authentication server. (Range: 1 - 65535 seconds)

Default Configuration

The timeout period is 30 seconds.

Command Mode

Interface configuration (Ethernet) mode.

User Guidelines

- The actual timeout can be determined by comparing the **dot1x timeout server-timeout** value and the result of multiplying the **radius-server retransmit** value with the **radius-server timeout** value and selecting the lower of the two values.

Example

The following example sets the time for the retransmission of packets to the authentication server to 3600 seconds.

```
Console(config-if)# dot1x timeout server-timeout 3600
```

dot1x send-async-request-id

Use the **dot1x send-async-request-id** interface configuration command to enable 802.1x switch to request asynchronously the responses from supplicants on port. This request causes the stations, which don't start 802.1x authentication automatically, to start it in response to Switch massage. In case enabled the massage would be sent according to *dot1x timeout tx-period*. Use the **no** form of this command to return to the default setting.

dot1x send-async-request-id

no dot1x send-async-request-id

Syntax Description

This command has no arguments or keywords

Parameters range

None

Default

no by default

Command Modes

Interface configuration (Ethernet)

Usage Guidelines

The command causes 802.1x switch to send Extensible Authentication Protocol (EAP)-request/identity frame from the authenticator (switch) each *tx-period* automatically. It is recommended to activate this command only in case there is at least one device with not full 802.1x functionality connected to port (for example Windows EX with Service Pack 2). In addition it is recommended to increase *dot1x timeout tx-period* to reduce the overhead during the processing of supplicant responses on switch.

Examples

```
Console(config-if)# dot1x send-async-request-id
Console(config-if)#
```

show dot1x

The **show dot1x** Privileged EXEC mode command displays the 802.1X status of the device or specified interface.

Syntax

- **show dot1x** [**ethernet** *interface*]
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays the status of 802.1X-enabled Ethernet ports.

```
Console# show dot1x

802.1x is enabled

Port   Admin Mode   Oper Mode       Reauth     Reauth    Username
                                    Control    Period
----   ----------   ---------       -------    ------    --------
1/e1   Auto         Authorized      Ena        3600      Bob
1/e2   Auto         Authorized      Ena        3600      John
1/e3   Auto         Unauthorized    Ena        3600      Clark
1/e4   Force-auth   Authorized      Dis        3600      n/a
1/e5   Force-auth   Unauthorized*   Dis        3600      n/a

* Port is down or not present.

Console# show dot1x ethernet 1/e3

802.1x is enabled.

Port   Admin Mode   Oper Mode       Reauth     Reauth    Username
                                    Control    Period
----   ----------   ---------       -------    ------    --------
1/e3   Auto         Unauthorized    Ena        3600      Clark

Quiet period: 60 Seconds
Tx period:30 Seconds
Max req: 2
Supplicant timeout: 30 Seconds
Server timeout: 30 Seconds
Session Time (HH:MM:SS): 08:19:17
MAC Address: 00:08:78:32:98:78
```

```
Authentication Method: Remote
Termination Cause: Supplicant logoff

Authenticator State Machine
State: HELD

Backend State Machine
State: IDLE
Authentication success: 9
Authentication fails: 1
```

The following table describes significant fields shown above:

Field	Description
Port	The port number.
Admin mode	The port admin mode. Possible values: Force-auth, Force-unauth, Auto.
Oper mode	The port oper mode. Possible values: Authorized, Unauthorized or Down.
Reauth Control	Reauthentication control.
Reauth Period	Reauthentication period.
Username	The username representing the identity of the Supplicant. This field shows the username in case the port control is auto. If the port is Authorized, it shows the username of the current user. If the port is unauthorized it shows the last user that was authenticated successfully.
Quiet period	The number of seconds that the device remains in the quiet state following a failed authentication exchange (for example, the client provided an invalid password).
Tx period	The number of seconds that the device waits for a response to an Extensible Authentication Protocol (EAP)-request/identity frame from the client before resending the request.
Max req	The maximum number of times that the device sends an Extensible Authentication Protocol (EAP)-request frame (assuming that no response is received) to the client before restarting the authentication process.
Supplicant timeout	Time in seconds the switch waits for a response to an EAP-request frame from the client before resending the request.
Server timeout	Time in seconds the switch waits for a response from the authentication server before resending the request.
Session Time	The amount of time the user is logged in.
MAC address	The supplicant MAC address.

Authentication Method	The authentication method used to establish the session.
Termination Cause	The reason for the session termination.
State	The current value of the Authenticator PAE state machine and of the Backend state machine.
Authentication success	The number of times the state machine received a Success message from the Authentication Server.
Authentication fails	The number of times the state machine received a Failure message from the Authentication Server.

show dot1x users

The **show dot1x users** Privileged EXEC mode command displays active 802.1X authenticated users for the device.

Syntax

- **show dot1x users** [**username** *username*]
  - *username* — Supplicant username. (Range: 1 - 160 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Example

The following example displays 802.1X users.

```
Console# show dot1x users

Port   Username    Session Time   Auth Method    MAC Address
-----  --------    ------------   -----------   --------------
1/e1   Bob         1d:03:08.58    Remote        0008:3b79:8787
1/e2   John        08:19:17       None          0008:3b89:3127
```

```
Console# show dot1x users username Bob

Username: Bob
Port   Username    Session Time   Auth Method    MAC Address
-----  --------    ------------   -----------   --------------
1/e1   Bob         1d:03:08.58    Remote        0008:3b79:8787
```

The following table describes significant fields shown above:

Field	Description
Port	The port number.
Username	The username representing the identity of the Supplicant.
Session Time	The period of time the Supplicant is connected to the system.
Authentication Method	Authentication method used by the Supplicant to open the session.
MAC Address	MAC address of the Supplicant.

show dot1x statistics

The **show dot1x statistics** Privileged EXEC mode command displays 802.1X statistics for the specified interface.

Syntax

- **show dot1x statistics ethernet** *interface*
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays 802.1X statistics for the specified interface.

```
Console# show dot1x statistics ethernet 1/e1


EapolFramesRx: 11
EapolFramesTx: 12
EapolStartFramesRx: 12
EapolLogoffFramesRx: 1
EapolRespIdFramesRx: 3
EapolRespFramesRx: 6
EapolReqIdFramesTx: 3
EapolReqFramesTx: 6
InvalidEapolFramesRx: 0
EapLengthErrorFramesRx: 0
LastEapolFrameVersion: 1
LastEapolFrameSource: 00:08:78:32:98:78
```

The following table describes the significant fields shown in the display:

Field	Description
EapolFramesRx	The number of valid EAPOL frames of any type that have been received by this Authenticator.
EapolFramesTx	The number of EAPOL frames of any type that have been transmitted by this Authenticator.
EapolStartFramesRx	The number of EAPOL Start frames that have been received by this Authenticator.
EapolLogoffFramesRx	The number of EAPOL Logoff frames that have been received by this Authenticator.
EapolRespIdFramesRx	The number of EAP Resp/Id frames that have been received by this Authenticator.
EapolRespFramesRx	The number of valid EAP Response frames (other than Resp/Id frames) that have been received by this Authenticator.
EapolReqIdFramesTx	The number of EAP Req/Id frames that have been transmitted by this Authenticator.

EapolReqFramesTx	The number of EAP Request frames (other than Rq/Id frames) that have been transmitted by this Authenticator.
InvalidEapolFramesRx	The number of EAPOL frames that have been received by this Authenticator in which the frame type is not recognized.
EapLengthErrorFramesRx	The number of EAPOL frames that have been received by this Authenticator in which the Packet Body Length field is invalid.
LastEapolFrameVersion	The protocol version number carried in the most recently received EAPOL frame.
LastEapolFrameSource	The source MAC address carried in the most recently received EAPOL frame.

ADVANCED FEATURES

dot1x auth-not-req

The **dot1x auth-not-req** VLAN Configuration mode command enables unauthorized devices access to the VLAN. Use the **no** form of this command to disable access to the VLAN.

Syntax

- **dot1x auth-not-req**
- **no dot1x auth-not-req**

Default Configuration
Access is enabled.

Command Mode
Interface Configuration (VLAN) mode.

User Guidelines

- An access port cannot be a member in an unauthenticated VLAN.
- The native VLAN of a trunk port cannot be an unauthenticated VLAN.
- For a general port, the PVID can be an unauthenticated VLAN (although only tagged packets are accepted in the unauthorized state.)

Examples

The following example enables access to the VLAN to unauthorized devices.

```
Console(config-if)# dot1x auth-not-req
```

dot1x multiple-hosts

The **dot1x multiple-hosts** Interface Configuration mode command enables multiple hosts (clients) on an 802.1X-authorized port, where the authorization state of the port is set to **auto**. Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x multiple-hosts**
- **no dot1x multiple-hosts**

Default Configuration

Multiple hosts are disabled.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- This command enables the attachment of multiple clients to a single 802.1X-enabled port. In this mode, only one of the attached hosts must be successfully authorized for all hosts to be granted network access. If the port becomes unauthorized, all attached clients are denied access to the network.
- For unauthenticated VLANs, multiple hosts are always enabled.
- Multiple-hosts must be enabled to enable port security on the port.

Examples

The following command enables multiple hosts (clients) on an 802.1X-authorized port.

```
Console(config-if)# dot1x multiple-hosts
```

dot1x single-host-violation

The **dot1x single-host-violation** Interface Configuration mode command configures the action to be taken, when a station whose MAC address is not the supplicant MAC address, attempts to access the interface. Use the **no** form of this command to return to default.

Syntax

- **dot1x single-host-violation** {**forward** | **discard | discard-shutdown**} [**trap** *seconds*]
- **no port dot1x single-host-violation**
  - **forward** — Forwards frames with source addresses that are not the supplicant address, but does not learn the source addresses.
  - **discard** — Discards frames with source addresses that are not the supplicant address.

- **discard-shutdown** — Discards frames with source addresses that are not the supplicant address. The port is also shut down.
- **trap** — Indicates that SNMP traps are sent.
- *seconds* — Specifies the minimum amount of time in seconds between consecutive traps. (Range: 1 - 1000000)

Default Configuration

Frames with source addresses that are not the supplicant address are discarded.

No traps are sent.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- The command is relevant when multiple hosts is disabled and the user has been successfully authenticated.

Examples

The following example forwards frames with source addresses that are not the supplicant address and sends consecutive traps at intervals of 100 seconds.

```
Console(config-if)# dot1x single-host-violation forward trap 100
```

dot1x guest-vlan

The **dot1x guest-vlan** Interface Configuration mode command defines a guest VLAN. Use the **no** form of this command to return to the default configuration.

Syntax

- **dot1x guest-vlan**
- **no dot1x guest-vlan**

Default Configuration

No VLAN is defined as a guest VLAN.

Command Mode

Interface Configuration (VLAN) mode.

User Guidelines

- Use the **dot1x guest-vlan enable** Interface Configuration mode command to enable unauthorized users on an interface to access the guest VLAN.
- If the guest VLAN is defined and enabled, the port automatically joins the guest VLAN when the port is unauthorized and leaves it when the port becomes authorized.

Example

The following example defines VLAN 2 as a guest VLAN.

```
Console#
Console# configure
Console(config)# vlan database
Console(config-vlan)# vlan 2
Console(config-vlan)# exit
Console(config)# interface vlan 2
Console(config-if)# dot1x guest-vlan
```

dot1x guest-vlan enable

The **dot1x vlans guest-vlan enable** Interface Configuration mode command enables unauthorized users on the interface access to the Guest VLAN. Use the **no** form of this command to disable access

Syntax

- **dot1x guest-vlan enable**
- **no dot1x guest-vlan enable**

Default Configuration

Disabled.

Command Mode

Interface Configuration (Ethernet) mode.

User Guidelines

- A device can have only one global guest VLAN. The guest VLAN is defined using the **dot1x guest-vlan** Interface Configuration mode command.

Example

The following example enables unauthorized users on Ethernet port 1/e1 to access the guest VLAN.

```
Console# configure
Console(config)# interface ethernet 1/e1
Console(config-if)# dot1x guest-vlan enable
```

dot1x mac-authentication

The **dot1x mac-authentication** Interface Configuration mode command enables authentication based on the station's MAC address. Use the **no** form of this command to disable MAC authentication.

Syntax

- **dot1x mac-authentication** {**mac-only** | **mac-and-802.1x**}
- **no dot1x mac-authentication**
  - **mac-only** — Enable authentication based on the station's MAC address only. 802.1X frames are ignored.
  - **mac-and-802.1x** — Enable 802.1X authentication and MAC address authentication on the interface.

Default Configuration

Disabled.

Command Mode

Interface configuration (Ethernet) mode

User Guidelines

- Guest VLAN must be enabled, when MAC authentication is enabled.
- Static MAC addresses cannot be aurhorized. Do not change authenticated MAC address to static address.
- It is not recommended to delete authenticated MAC addresses.
- Reauthentication must be enabled when working in this mode.

Example

The following command enables authentication based on the station's MAC address.

```
console config-if(Config)# dot1x mac-authentication mac-only
```

dot1x traps mac-authentication failure

The **dot1x traps mac-authentication failure** Global Configuration mode command enables sending traps when a MAC address was failed in authentication of the 802.1X MAC authentication access control. Use the **no** form of this command to disable the traps.

Syntax

- **dot1x traps mac-authentication failure**
- **no dot1x traps mac-authentication failure**

Default Configuration
This command has no default configuration.

Command Mode
Global configuration mode.

User Guidelines

- There are no user guidelines for this command.

Example

The following command enables sending traps when a MAC address was failed in authentication of the 802.1X MAC authentication access control.

```
console config-if(Config)# dot1x traps mac-authentication failure
```

dot1x radius-attributes vlan

The **dot1x radius-attributes vlan** Interface Configuration mode command enables user-based VLAN assignment. Use the **no** form of this command to disable user-based VLAN assignment.

Syntax

- **dot1x radius-attributes vlan**
- **no dot1x radius-attributes vlan**

Default Configuration
Disabled.

Command Mode
Interface configuration (Ethernet) mode

User Guidelines

- The **dot1x radius-attributes vlan** command configuration is allowed only when the port is Forced Authorized.
- RADIUS attributes are supported only in the multiple sessions mode (multiple hosts with authentication).
- When RADIUS attributes are enabled and the RADIUS Accept message does not contain as an attribute the supplicant's VLAN, then the supplicant is rejected.
- Packets to the supplicant are sent untagged.
- After successful authentication the port remains member in the unauthenticated VLANs and in the Guest VLAN. Other static VLAN configuration is not applied on the port.
- If the supplicant VLAN does not exist on the switch, the supplicant is rejected.

Examples

The following command enables user-based VLAN assignment.

```
console config-if(Config)# dot1x radius-attributes vlan
```

show dot1x advanced

The **show dot1x advanced** Privileged EXEC mode command displays 802.1X advanced features for the device or specified interface.

Syntax

- **show dot1x advanced** [**ethernet** *interface*]
  - *interface* — Valid Ethernet port. (Full syntax: *unit/port*)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode.

User Guidelines

There are no user guidelines for this command.

Examples

The following example displays 802.1X advanced features for the switch.

```
Console# show dot1x advanced
Guest VLAN: 100
Guest VLAN timeout
Unauthenticated VLANs:

Interface  Multiple       Guest VLAN  MAC             Assignment  Async-
           Hosts                     Authentication              reqId
-----      -------        ----        --------------  ----------
                                      -
g1         Authenticate   Enabled     Disabled        Enabled     True
g2         Authenticate   Disabled    Disabled        Disabled    False
g3         Authenticate   Disabled    Disabled        Disabled    False
g4         Authenticate   Disabled    Disabled        Disabled    False
g5         Authenticate   Disabled    Disabled        Disabled    False
g6         Authenticate   Disabled    Disabled        Disabled    False
g7         Authenticate   Disabled    Disabled        Disabled    False
g8         Authenticate   Disabled    Disabled        Disabled    False
g9         Authenticate   Disabled    Disabled        Disabled    False
g10        Authenticate   Disabled    Disabled        Disabled    False
g11        Authenticate   Disabled    Disabled        Disabled    False
g12        Authenticate   Disabled    Disabled        Disabled    False
g13        Authenticate   Enabled     Disabled        Enabled     False
g14        Authenticate   Disabled    Disabled        Disabled    False
g15        Authenticate   Disabled    Disabled        Disabled    False
g16        Authenticate   Disabled    Disabled        Disabled    False
g17        Authenticate   Disabled    Disabled
g18        Authenticate   Disabled    Disabled
g19        Authenticate   Disabled    Disabled
g20        Authenticate   Disabled    Disabled
g21        Authenticate   Disabled    Disabled
g22        Authenticate   Disabled    Disabled
```