Command Line Interface Reference Guide

HP BladeSystem PC Blade Switch

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Å **WARNING:** Text set off in this manner indicates that failure to follow directions could result in bodily harm or loss of life.

Ä **CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

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HP BladeSystem PC Blade Switch

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Contents

Command Line Interface

802.1x Commands

AAA Commands

ACL Commands

Address Table Commands

Clock Commands

Configuration and Image File Commands

Ethernet Configuration Commands

GVRP Commands

IGMP Snooping Commands

IP Addressing Commands

LACP Commands

Line Commands

Management ACL Commands

PHY Diagnostics Commands

Port Channel Commands

Port Monitor Commands

QoS Commands

RADIUS Commands

RMON Commands

SNMP Commands

Spanning-Tree Commands

SSH Commands

Syslog Commands

System Management Commands

TACACS+ Commands

User Interface Commands

VLAN Commands

Web Server Commands

Index

1

Command Line Interface

Using the Command Line Interface (CLI)

Accessing the CLI

When accessing the management interface for the switch over a direct connection to the server's console port, or via a Telnet connection, the switch can be managed by entering command keywords and parameters at the prompt. Using the switch's command-line interface (CLI) is very similar to entering commands on a UNIX system.

Console Connection

To access the switch through the console port, perform these steps:

1. At the console prompt, enter the user name and password. When the administrator user name and password is entered, the CLI displays the "Console#" prompt and enters privileged access mode (i.e., Privileged Exec). But when the guest user name and password is entered, the CLI displays the "Console>" prompt and enters normal access mode (i.e., Normal Exec).
2. Enter the necessary commands to complete your desired tasks.
3. When finished, exit the session with the "quit" or "exit" command.

After connecting to the system through the console port, the login screen displays:

```
User Access Verification

Username: admin

Password:

    CLI session with the PC Blade Switch is opened.

        To end the CLI session, enter [Exit].

Console#
```

Telnet Connection

Telnet operates over the IP transport protocol. In this environment, your management station and any network device you want to manage over the network must have a valid IP address. Valid IP addresses consist of four numbers, 0 to 255, separated by periods. Each address consists of a network portion and host portion.

For example, the IP address assigned to this switch, 10.1.0.1, consists of a network portion (10.1.0) and a host portion (1).

The IP address for this switch is unassigned by default.

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To access the switch through a Telnet session, you must first set the IP address for the switch, and set the default gateway if you are managing the switch from a different IP subnet.

For example:

```
Console(config)#interface vlan 1
Console(config-if)#ip address 10.1.0.1 255.255.255.0
Console(config-if)#exit
Console(config)#ip default-gateway 10.1.0.254
```

If your corporate network is connected to another network outside your office or to the Internet, you need to apply for a registered IP address. However, if you are attached to an isolated network, then you can use any IP address that matches the network segment to which you are attached.

After you configure the switch with an IP address, you can open a Telnet session by performing these steps:

1. From the remote host, enter the Telnet command and the IP address of the device you want to access.
2. At the prompt, enter the user name and system password. The CLI will display the "Console#" prompt for the administrator to show that you are using privileged access mode (i.e., Privileged Exec), or "Console" for the guest to show that you are using normal access mode (i.e., Normal Exec).
3. Enter the necessary commands to complete your desired tasks.
4. When finished, exit the session with the "quit" or "exit" command.

After entering the Telnet command, the login screen displays:

```
Username: admin
Password:


    CLI session with the PC Blade Switch is opened.
     To end the CLI session, enter [Exit].


Console#
```

- You can open up to four sessions to the device via Telnet.

Entering Commands

This section describes how to enter CLI commands.

Keywords and Arguments

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 e5," **show interfaces** and **status** are keywords, **ethernet** is an argument that specifies the interface type, and **e5** specifies the port.

You can enter commands as follows:

- To enter a simple command, enter the command keyword.
- To enter multiple commands, enter each command in the required order. For example, to enable Privileged Exec command mode, and display the startup configuration, enter:

```
Console> enable
Console# show startup-config
```

- 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 smith
```

Minimum Abbreviation

The CLI will accept a minimum number of characters that uniquely identify a command. For example, the command "configure" can be entered as **con**. If an entry is ambiguous, the system will prompt for further input.

Command Completion

If you terminate input with a Tab key, the CLI will print the remaining characters of a partial keyword up to the point of ambiguity. In the "logging history" example, typing **log** followed by a tab will result in printing the command up to "**logging**."

Getting Help on Commands

You can display a brief description of the help system by entering the **help** command. You can also display command syntax by using the "?" character to list keywords or parameters.

Show Commands

If you enter a "?" at the command prompt, the system will display the first level of keywords for the current command class (Normal Exec or Privileged Exec) or configuration class (Global, ACL, DHCP, Interface, Line, VLAN Database, or MSTP). You can also display a list of valid keywords for a specific command. For example, the command "**show ?**" displays a list of possible show commands.

The command "**show interfaces ?**" will display the following information:

```
Console# show interfaces ?
counters            Information of interfaces counters
protocol-vlan       Protocol-vlan information
status s            Information of interfaces status
switchport          Information of interfaces switchport
Console#
```

Partial Keyword Lookup

If you terminate a partial keyword with a question mark, alternatives that match the initial letters are provided. (Remember not to leave a space between the command and question mark.) For example "**s?**" shows all the keywords starting with "s."

```
Console# show s?
snmp      sntp      spanning-tree   ssh      startup-config
system
Console#
```

Negating the Effect of Commands

For many configuration commands you can enter the prefix keyword "**no**" to cancel the effect of a command or reset the configuration to the default value. For example, the **logging** command will log system messages to a host server. To disable logging, specify the **no logging** command. This guide describes the negation effect for all applicable commands.

Using Command History

The CLI maintains a history of commands that have been entered. You can scroll back through the history of commands by pressing the up arrow key. Any command displayed in the history list can be executed again, or first modified and then executed.

Using the **show history** command displays a longer list of recently executed commands.

Understanding Command Modes

The command set is divided into Exec and Configuration classes. Exec commands generally display information on system status or clear statistical counters. Configuration commands, on the other hand, modify interface parameters or enable certain switching functions. These classes are further divided into different modes. Available commands depend on the selected mode. You can always enter a question mark "**?**" at the prompt to display a list of the commands available for the current mode.

Exec Commands

When you open a new console session on the switch with the user name and password "guest," the system enters the Normal Exec command mode (or guest mode), displaying the "Console>" command prompt. Only a limited number of the commands are available in this mode. You can access all commands only from the Privileged Exec command mode (or administrator mode).

To access the Privilege Exec mode, open a new console session with the user name and password "admin." The system will now display the "Console#" command prompt. You can also enter the Privileged Exec mode from within Normal Exec mode. To enter the Privileged Exec mode, enter the following user names and passwords:

```
Username: admin
Password: [admin login password]

    CLI session with the PC Blade Switch is opened.
    To end the CLI session, enter [Exit].

Console#
```

```
Username: guest
Password: [guest login password]

    CLI session with the PC Blade Switch is opened.
    To end the CLI session, enter [Exit].

Console#enable
Password: [privileged level password]
Console#
```

Configuration Commands

Configuration commands are privileged level commands used to modify switch settings. These commands modify the running configuration only and are not saved when the switch is rebooted. To store the running configuration in non-volatile storage, use the **copy running-config startup-config** command.

The configuration commands are organized into different modes:

- Global Configuration — These commands modify the system level configuration, and include commands such as **hostname** and **snmp-server community**.
- Access Control List Configuration — These commands are used for packet filtering.
- DHCP Configuration — These commands are used to configure the DHCP server.
- Interface Configuration — These commands modify the port configuration such as **speed-duplex** and **negotiation**.
- Line Configuration — These commands modify the console port and Telnet configuration, and include command such as **parity** and **databits**.
- Router Configuration — These commands configure global settings for unicast and multicast routing protocols.
- VLAN Configuration — Includes the command to create VLAN groups.
- Multiple Spanning Tree Configuration — These commands configure settings for the selected multiple spanning tree instance.

To enter the Global Configuration mode, enter the command **configure** in Privileged Exec mode. The system prompt will change to "Console(config)#" which gives you access privilege to all Global Configuration commands.

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

To enter the other modes, at the configuration prompt type one of the following commands. Use the exit or end command to return to the Privileged Exec mode.For example, you can use the following commands to enter interface configuration mode, and then return to Privileged Exec mode.

```
Console(config)#interface ethernet e5
Console(config-if)#exit
Console(config)#
```

Command Line Processing

Commands are not case sensitive. You can abbreviate commands and parameters as long as they contain enough letters to differentiate them from any other currently available commands or parameters. You can use the Tab key to complete partial commands, or enter a partial command followed by the "?" character to display a list of possible matches. You can also use the following editing keystrokes for command-line processing:

Keystroke Commands

Keystroke	Function
Up Arrows	Recalls commands from the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands.
Down Arrows	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.

Command Groups

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

Command Groups

Command Group	Description	Page
802.1x Commands	Specify authentication, authorization and accounting (AAA) methods for use on interfaces running IEEE 802.1x, and enable 802.1x globally.	2-1
AAA Commands	Define the authentication method lists for servers.	3-1
ACL Commands	Display Access Control Lists (ACLs) defined on the device.	4-1
Address Table Commands	Register MAC-layer multicast addresses, and handle MAC-layer secure address to a routed port.	5-1
Clock Commands	Show the configuration or status of the Simple Network Time Protocol (SNTP).	6-1
Configuration and Image File Commands	Display the contents of the currently running configuration file, specify contents of image files.	7-1
Ethernet Configuration Commands	Configure multiple Ethernet type interfaces.	8-1
GVRP Commands	Display the GARP VLAN Registration Protocol (GVRP) configuration information, enable GVRP globally or on an interface.	9-1
IGMP Snooping Commands	Enable the Internet Group Management Protocol (IGMP) snooping.	10-1
IP Addressing Commands	Define a default gateway, set an IP address for interface, delete entries from the host.	11-1
LACP Commands	Configure system or port priority using the Link Aggregation Control Protocol (LACP).	12-1
Line Commands	Display line parameters, enable the command history function, or configure the command history buffer size.	13-1
Management ACL Commands	Define a permit or deny a rule, or configure a management access control list.	14-1
PHY Diagnostics Commands	Display the optical transceiver diagnostics.	15-1
Port Channel Commands	Enter the interface configuration mode to configure a specific, or a multiple port-channel.	16-1
Port Monitor Commands	Start a port monitoring session, or display the port monitoring status.	17-1
QoS Commands	Enable Quality of Service (QoS) on the device, create policy maps, and define traffic classifications	18-1

Command Group	Description	Page
RADIUS Commands	Specify the source IP address used for communication with Remote Authentication Dial-in User Service (RADIUS) servers, and display the RADIUS server settings.	19-1
RMON Commands	Display the Remote Network Monitoring (RMON) Ethernet history statistics, alarms table and configuration.	20-1
SNMP Commands	Configure the community access string to permit access to the Simple Network Management Protocol (SNMP) server, create or update SNMP server entries, and specify SNMP engineID.	21-1
Spanning-Tree Commands	Configure the spanning-tree functionality.	22-1
SSH Commands	Display the Secure Socket Shell (SSH) public keys on the device, SSH server configuration, or which SSH public key is manually configured.	23-1
Syslog Commands	Log messages to a syslog server, or limit log messages to a syslog server.	24-1
System Management Commands	Display and list system, version or Telnet session information.	25-1
TACACS+ Commands	Display configuration and statistical information about a Terminal Access Controller Access Control System (TACACS+) server, or specify a TACACS+ host.	26-1
User Interface Commands	Display and list system, version or Telnet session information.	27-1
VLAN Commands	Enter the (Virtual Local Area Network) VLAN Configuration mode, enable simultaneously configuring multiple VLANs, or adds or remove VLANs.	28-1
Web Server Commands	Enable configuring the device from a browser, or display the HTTP server configuration.	29-1

2

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. To return to the default configuration, use the **no** form of this command.

Syntax

aaa authentication dot1x default *method1* [*method2*...]

no aaa authentication dot1x default

Parameters

n *method1* [*method2*...] - At least one keyword, as listed in the following table:

Keyword	Description
radius	Uses the list of all RADIUS servers for authentication.
none	Uses no authentication.

Default Setting

No authentication method is defined.

Command Mode

Global Configuration

Command Usage

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.

Example

The following command uses the **aaa authentication dot1x default** 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. To return to the default configuration, use the **no** form of this command.

Syntax

dot1x system-auth-control

no dot1x system-auth-control

Parameters

There are no parameters for this command.

Default Configuration

802.1x is disabled globally.

Command Modes

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To return to the default configuration, use the no form of this command.

Syntax

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

no dot1x port-control

Parameters

- **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)

Command Usage

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.

Example

The following command enables 802.1x authentication on Ethernet port e16.

```
Console(config)# interface ethernet 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. To return to the default configuration, use the **no** form of this command.

Syntax

dot1x re-authentication

no dot1x re-authentication

Parameters

There are no parameters for this command.

Default Setting

Periodic re-authentication is disabled.

Command Mode

Interface Configuration (Ethernet)

Command Usage

There are no user guidelines for this command.

Example

The following command enables periodic re-authentication of the client.

```
Console(config)# interface ethernet 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. To return to the default configuration, use the **no** form of this command.

Syntax

dot1x timeout re-authperiod *seconds*

no dot1x timeout re-authperiod

Parameters

n *seconds* — Number of seconds between re-authentication attempts. (Range: 300-4294967295)

Default Setting

Re-authentication period is 3600 seconds.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

There are no user guidelines for this command.

Example

The following command sets the number of seconds between re-authentication attempts, to 300.

```
Console(config)# interface ethernet 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***]**

Parameters

n *interface* — Valid Ethernet port. (Full syntax: *port*)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command manually initiates a re-authentication of 802.1x-enabled Ethernet port e16.

```
Console# dot1x re-authenticate ethernet 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). To return to the default configuration, use the **no** form of this command.

Syntax

dot1x timeout quiet-period *seconds*

no dot1x timeout quiet-period

Parameters

n *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 Setting

The default quiet period is 60 seconds.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

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.

Example

In the following example, the number of seconds that the device remains in the quiet state following a failed authentication exchange, is set to 3600.

```
Console(config)# interface ethernet 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. To return to the default configuration, use the **no** form of this command.

Syntax

dot1x timeout tx-period *seconds*

no dot1x timeout tx-period

Parameters

n *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: 1-65535 seconds)

Default Configuration

Timeout period is 30 seconds.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

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.

Example

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 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. To return to the default configuration, use the **no** form of this command.

Syntax

dot1x max-req *count*

no dot1x max-req

Parameters

n *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

Command Usage

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.

Example

The following command sets the number of times that the device sends an EAP-request or identity frame, to 6.

```
Console(config)# interface ethernet 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. To return to the default configuration, use the **no** form of this command.

Syntax

dot1x timeout supp-timeout *seconds*

no dot1x timeout supp-timeout

Parameters

n *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

Command Usage

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.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

dot1x timeout server-timeout *seconds*

no dot1x timeout server-timeout

Parameters

n *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

Command Usage

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 command sets the time for the retransmission of packets to the authentication server to 3600 seconds.

```
Console(config-if)# dot1x timeout server-timeout 3600
```

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***]**

Parameters

n *interface* — Valid Ethernet port. (Full syntax: *port*)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the status of 802.1x-enabled Ethernet ports.

```
Console# show dot1x

802.1x is enabled

Port        Admin Mode   Oper Mode      Reauth Control  Reauth Period  Username
----        ----------   ---------      -------         ------         --------
e1          Auto         Authorized     Ena             3600           Bob
e2          Auto         Authorized     Ena             3600           John
e3          Auto         Unauthorized   Ena             3600           Clark
e4          Force-auth   Authorized     Dis             3600           n/a
e5          Force-auth   Unauthorized*  Dis             3600           n/a

* Port is down or not present.

Console# show dot1x ethernet e3

802.1x is enabled.

Port        Admin Mode   Oper Mode      Reauth Control  Reauth Period  Username
----        ----------   ---------      -------         ------         --------
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 in the example:

Field	Description
Port	The port number.
Admin mode	The port admin mode. Possible values: FoTrce-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.

Field	Description
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***]**

Parameters

n *username* — Supplicant username (Range: 1-160 characters)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following commands display 802.1x users.

```
Console# show dot1x users

Port      Username    Session Time    Auth Method    MAC Address
-----     --------    ------------    -----------    --------------
e1        Bob         1d:03:08.58     Remote         0008:3b79:8787
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
-----     --------    ------------    -----------    --------------
e1        Bob         1d:03:08.58     Remote         0008:3b79:8787
```

The following table describes the significant fields shown in the example:

Keyword	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*

Parameters

n *interface* — Valid Ethernet port. (Full syntax: *port*)

Default Configuration

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays 802.1x statistics for the specified interface.

```
Console# show dot1x statistics ethernet 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 example:

Keyword	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.

Keyword	Description
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** Interface Configuration mode command enables unauthorized devices access to the VLAN. To disable access to the VLAN, use the **no** form of this command.

Syntax

dot1x auth-not-req

no dot1x auth-not-req

Parameters

There are no parameters for this command.

Default Configuration

Access is enabled.

Command Mode

Interface Configuration (VLAN) mode

Command Usage

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 would be accepted in the unauthorized state.)

Example

The following command 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.** To return to the default configuration, use the **no** form of this command.

Syntax

dot1x multiple-hosts

no dot1x multiple-hosts

Parameters

There are no parameters for this command.

Default Configuration

Multiple hosts are disabled.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

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.

Example

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

Parameters

- **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 Setting

Frames with source addresses that are not the supplicant address are discarded.

No traps are sent.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

The command is relevant when multiple hosts is disabled and the user has been successfully authenticated.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

dot1x guest-vlan

no dot1x guest-vlan

Parameters

There are no parameters for this command.

Default Setting

No VLAN is defined as a guest VLAN.

Command Mode

Interface Configuration (VLAN) mode

Command Usage

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. To be able to join or leave the guest VLAN, the port should not be a static member of the guest VLAN.

Example

The following command 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. To disable access, use the **no** form of this command

Syntax

dot1x guest-vlan enable

no dot1x guest-vlan enable

Parameters

There are no parameters for this command.

Default Setting

Disabled.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

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 command enables unauthorized users on Ethernet port e1 to access the guest VLAN.

```
Console# configure
Console(config)# interface ethernet e1
Console(config-if)# dot1x guest-vlan enable
```

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***]**

Parameters

n *interface* — Valid Ethernet port. (Full syntax: *port*)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays 802.1x advanced features for the device.

```
Console# show dot1x advanced

Guest VLAN: 2
Unauthenticated VLANs: 91,92

Interface          Multiple Hosts      Guest VLAN
---------          --------------      ----------
e1                 Disabled            Enabled
e2                 Enabled             Disabled

Console# show dot1x advanced ethernet e1

Interface          Multiple Hosts      Guest VLAN
---------          --------------      ----------
e1                 Disabled            Enabled

Single host parameters
Violation action: Discard
Trap: Enabled
Trap frequency: 100
Status: Single-host locked
Violations since last trap: 9
```

3

AAA Commands

aaa authentication login

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

Syntax

aaa authentication login {default | *list-name***}** *method1* [*method2*...]

no aaa authentication login {**default** | *list-name*}

Parameters

- **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.
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 Setting

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

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

Command Mode

Global Configuration mode

Command Usage

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 command configures the authentication login.

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

aaa authentication enable

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

Syntax

aaa authentication enable {default | *list-name***}** *method1* [*method2*...]

no aaa authentication enable {default | *list-name***}**

Parameters

- **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 keyword 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 Setting

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

Command Usage

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 command 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. To return to the default configuration specified by the **aaa authentication login** command, use the **no** form of this command.

Syntax

login authentication {default | *list-name***}**

no login authentication

Parameters

- **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 Setting

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

Command Mode

Line Configuration mode

Command Usage

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

Example

The following command 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. To return to the default configuration specified by the **aaa authentication enable** command, use the **no** form of this command.

Syntax

enable authentication {default | *list-name***}**

no enable authentication

Parameters

- **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 Setting

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

Command Mode

Line Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

ip http authentication *method1* [*method2*...]

no ip http authentication

Parameters

n *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 Setting

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

Command Mode

Global Configuration mode

Command Usage

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 command 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. To return to the default configuration, use the **no** form of this command.

Syntax

ip https authentication *method1* [*method2*...]

no ip https authentication

Parameters

n *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 Setting

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

Command Mode

Global Configuration mode

Command Usage

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 command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the authentication configuration.

```
Console# show authentication methods


---------------------------------
Default: RADIUS, Local, Line
Console_Login: Line, None

Enable Authentication Method Lists
---------------------------------
Default: RADIUS, Enable
Console_Enable: Enable, None

Line                Login Method List     Enable Method List
--------------      -----------------     ------------------
Console             Console_Login         Console_Enable
Telnet              Default               Default
SSH                 Default               Default

http: RADIUS, Local
https: RADIUS, Local
dot1x: RADIUS
```

password

The **password** Line Configuration mode command specifies a password on a line. To remove the password, use the **no** form of this command.

Syntax

password *password* [**encrypted**]

no password

Parameters

- *password* — Password for this level (Range: 1-160 characters).
- **encrypted** — Encrypted password to be entered, copied from another device configuration.

Default Setting

No password is defined.

Command Mode

Line Configuration mode

Command Usage

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

Example

The following command 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. To remove the password requirement, use the **no** form of this command.

Syntax

enable password [**level** *level*] **password** [**encrypted**]

no enable password [**level** *level*]

Parameters

- **password** — Password for this level (Range: 1-159 characters).
- *level* — The user privilege level with the following options:
  - 1 — Allows access but not configuration rights.
  - 15 — Enables access and configuration rights.
- **encrypted** — Encrypted password entered, copied from another device configuration.

Default Configuration

No enable password is defined.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

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

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

username

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

Syntax

username name [**password** *password*] [**level** *level*] [**encrypted**]

no username name

Parameters

- *name* — The name of the user (Range: 1- 20 characters).
- *password* — The authentication password for the user (Range: 1-159 characters).
- *level* — The user privilege level with the following options:
  - 1 — Allows access but not configuration rights.
  - 15 — Enables access and configuration rights.
- **encrypted** — Encrypted password entered, copied from another device configuration.

Default Configuration

No user is defined.

Command Mode

Global Configuration mode

Command Usage

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
```

4

ACL Commands

ip access-list

The **ip access-list** Global Configuration command enables the IP-Access Configuration mode and creates Layer 3 ACLs. To delete an ACL, use the **no** form of this command.

Syntax

ip access-list *name*

no ip access-list *name*

Parameters

n *name* — Specifies the name of the ACL.

Default Setting

The default for all ACLs is **deny-all**.

Command Mode

Global Configuration mode

Command Usage

Up to 1018 rules can be defined on the device, depending on the type of rule defined.

Example

The following command creates an IP ACL.

```
Console(config)# ip access-list ip-acl1
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** *dscp number* | **ip-precedence** *ip-precedence*]

permit-icmp {**any** | {*source source-wildcard*}} {**any** | {*destination destination-wildcard*}} {**any** | i*cmp-type*} {**any** | *icmp-code*} [**dscp** *number* | **ip-precedence** *number*]

permit-igmp {**any** | {*source source-wildcard*}} {**any** | {*destination destination-wildcard*}} {**any** | i*gmp-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*]

permit-udp {**any** | { *source source-wildcard*}} {**any** | *source-port*} {**any** | {*destination destination-wildcard*}} {**any** | *destination-port*} [***dscp*** *number* | **ip-precedence** *number*]

Parameters

- *source* — Specifies the source IP address of the packet. Specify **any** to indicate IP address 0.0.0.0 and mask 255.255.255.255.
- *source-wildcard* — Specifies wildcard to be applied to the source IP address. Use 1s in bit positions to be ignored. Specify **any** to indicate IP address 0.0.0.0 and mask 255.255.255.255.
- *destination* — Specifies the destination IP address of the packet. Specify **any** to indicate IP address 0.0.0.0 and mask 255.255.255.255.
- *destination-wildcard* — Specifies wildcard to be applied to the destination IP address. Use 1s in bit positions to be ignored. Specify **any** to indicate IP address 0.0.0.0 and mask 255.255.255.255.
- *protocol* — Specifies the abbreviated name or number of an IP protocol. (Range: 0-255)

The following table lists protocols that can be specified:

IP Protocol	Abbreviated Name	Protocol Number
Internet Control Message Protocol	icmp	1
Internet Group Management Protocol	igmp	2
IP in IP (encapsulation) Protocol	ipinip	4
Transmission Control Protocol	tcp	6
Exterior Gateway Protocol	egp	8
Interior Gateway Protocol	igp	9
User Datagram Protocol	udp	17
Host Monitoring Protocol	hmp	20
Reliable Data Protocol	rdp	27
Inter-Domain Policy Routing Protocol	idpr	35

IP Protocol	Abbreviated Name	Protocol Number
Ipv6 Protocol	ipv6	41
Routing Header for IPv6	ipv6-route	43
Fragment Header for IPv6	ipv6-frag	44
Inter-Domain Routing Protocol	idrp	45
Reservation Protocol	rsvp	46
General Routing Encapsulation	gre	47
Encapsulating Security Payload (50)	esp	50
Authentication Header	ah	51
ICMP for IPv6Protocol	ipv6-icmp	58
EIGRP Routing Protocol	eigrp	88
Open Shortest Path Protocol	ospf	89
Protocol Independent Multicast	pim	103
Layer Two Tunneling Protocol	l2tp	115
ISIS over IPv4 Protocol	isis	124
(any IP protocol)	any	(25504)

- **DSCP** — Indicates matching the dscp number with the packet DSCP value.
- **ip-precedence** — Indicates matching ip-precedence with the packet ip-precedence value.
- *icmp-type* — Specifies an ICMP message type for filtering ICMP packets. Enter a value 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**, **ipv6-where-are-you**, **ipv6-i-am-here**, **mobile-registration-request**, **mobile-registration-reply**, **domain-name-request**, **domain-name-reply, skip and photuris**. (Range: 0-255)
- *icmp-code* — Specifies an ICMP message code for filtering ICMP packets. ICMP packets that are filtered by ICMP message type can also be filtered by the ICMP message code. (Range: 0-255)
- *igmp-type* — IGMP packets can be filtered by IGMP message type. Enter a number or one of the following values: **dvmrp**, **host-query**, **host-report**, **pim** or **trace**, **host-report-v2**, **host-leave-v2**, **host-report-v3** (Range: 0-255)
- *destination-port* — Specifies the UDP/TCP destination port. (Range: 0-65535)
- *source-port* — Specifies the UDP/TCP source port. (Range: 0-65535)
- *list-of-flags* — Specifies a list of TCP flags that can be triggered. If a flag is set, it is prefixed by "+". If a flag is not set, it is prefixed by "-". Possible values: **+urg, +ack, +psh, +rst, +syn**, **+fin**, **-urg**, **-ack**, **-psh**, **-rst**, **-syn** and **-fin**. The flags are concatenated into one string. For example: **+fin-ack**.

Default Setting

No IPv4 ACL is defined.

Command Mode

IP-Access List Configuration mode

Command Usage

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 command 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** *dscp number* | **ip-precedence** *ip-precedence*]

deny {**any | protocol**} {**any** | {**source** *source-wildcard*}} {**any** | {**destination** *destination-wildcard*}} [**dscp** *dscp-number* | **ip-precedence** *ip-precedence*]

deny-icmp {any | {**source** *source-wildcard*}} {**any** | {**destination** *destination-wildcard*}} {**any** | *icmp-type*} {**any** | *icmp-code*} [**dscp** *number* | **ip-precedence** *number*]

deny-igmp {**any** | {**source** *source-wildcard*}} {**any** | {**destination** *destination-wildcard*}} {**any** | *igmp-type*} [**dscp** *number* | **ip-precedence** *number*]

Parameters

- *disable-port* — Specifies that the port should be disabled if the conditions defined match.
- *source* — Specifies the IP address or host name from which the packet was sent. Specify **any** to indicate IP address 0.0.0.0 and mask 255.255.255.255.
- *source-wildcard* — Specifies wildcard bits by placing 1s in bit positions to be ignored. Specify **any** to indicate IP address 0.0.0.0 and mask 255.255.255.255.
- *destination* — Specifies the IP address or host name to which the packet is being sent. Specify **any** to indicate IP address 0.0.0.0 and mask 255.255.255.255.
- *destination-wildcard* — Specifies wildcard bits by placing 1s in bit positions to be ignored. Specify **any** to indicate IP address 0.0.0.0 and mask 255.255.255.255.
- *protocol* — Specifies the abbreviated name or number of an IP protocol.

The following table lists protocols that can be specified:

IP Protocol	Abbreviated Name	Protocol Number
Internet Control Message Protocol	icmp	1
Internet Group Management Protocol	igmp	2
IP in IP (encapsulation) Protocol	ipinip	4
Transmission Control Protocol	tcp	6
Exterior Gateway Protocol	egp	8
Interior Gateway Protocol	igp	9
User Datagram Protocol	udp	17
Host Monitoring Protocol	hmp	20
Reliable Data Protocol	rdp	27
Inter-Domain Policy Routing Protocol	idpr	35
Ipv6 Protocol	ipv6	41
Routing Header for IPv6	ipv6-route	43
Fragment Header for IPv6	ipv6-frag	44

IP Protocol	Abbreviated Name	Protocol Number
Inter-Domain Routing Protocol	idrp	45
Reservation Protocol	rsvp	46
General Routing Encapsulation	gre	47
Encapsulating Security Payload (50)	esp	50
Authentication Header	ah	51
ICMP for IPv6	ipv6-icmp	58
EIGRP rOuting Protocol	eigrp	88
Open Shortest Path Protocol	ospf	89
Protocol Independent Multicast	pim	103
Layer Two Tunneling Protocol	l2tp	115
ISIS over IPv4	isis	124
(any IP protocol)	any	(25504)

- **dscp** — Indicates matching the dscp number with the packet dscp value.
- **ip-precedence** — Indicates matching ip-precedence with the packet ip-precedence value.

Default Setting

This command has no default configuration.

Command Mode

IP-Access List Configuration mode

Command Usage

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 commands 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 enables the MAC-Access List Configuration mode and creates Layer 2 ACLs. To delete an ACL, use the **no** form of this command.

Syntax

mac access-list *name*

no mac access-list *name*

Parameters

n *name* — Specifies the name of the ACL.

Default Setting

The default for all ACLs is **deny all**.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command creates a MAC ACL.

```
Console(config)# mac access-list macl-acl1
Console(config-mac-al)#
```

permit (MAC)

The **permit** MAC-Access List Configuration mode command defines permit conditions of an MAC ACL.

Syntax

permit {**any** | {**host** *source source-wildcard*} **any** | {*destination destination-wildcard*}} [**vlan** *vlan-id*] [**cos** *cos cos-wildcard*] [**ethtype** *eth-type*]

Parameters

- *source* — Specifies the source MAC address of the packet.
- *source-wildcard* — Specifies wildcard bits to be applied to the source MAC address. Use 1s in bit positions to be ignored.
- *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. Use 1s in bit positions to be ignored.
- *vlan-id* — Specifies the ID of the packet VLAN. (Range: 0-4095)
- *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 Ethernet type of the packet.(Range: 0-65535)

Default Setting

No MAC ACL is defined.

Command Mode

MAC-Access List Configuration mode

Command Usage

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.

If the VLAN ID is specified, the policy map cannot be connected to the VLAN interface.

Example

The following commands create a MAC ACL with permit rules.

```
Console(config)# mac access-list macl-acl1
Console(config-mac-al)# permit 6:6:6:6:6:6 0:0:0:0:0:0 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 *destination*

deny [**disable-port**] {**any** | {*source source-wildcard*}}{**any** | {*destination destination-wildcard*}}[**vlan** *vlan-id*] [**cos** *cos cos-wildcard*] [**ethtype** *eth-type*]

Parameters

- **disable-port** — Indicates that the port is disabled if the statement is deny.
- *source* — Specifies the MAC address of the host from which the packet was sent.
- *source-wildcard* — (Optional for the first type) Specifies wildcard bits by placing 1s in bit positions to be ignored.
- *destination* — Specifies the MAC address of the host to which the packet is being sent.
- *destination-wildcard* — (Optional for the first type) Specifies wildcard bits by placing 1s in bit positions to be ignored.
- *vlan-id* — Specifies the ID of the packet vlan.
- *cos* — Specifies the packets's Class of Service (CoS).
- *cos-wildcard* — Specifies wildcard bits to be applied to the CoS.
- *eth-type* — Specifies the packet's Ethernet type.

Default Setting

This command has no default configuration.

Command Mode

MAC-Access List Configuration mode

Command Usage

MAC BPDU packets cannot be denied.

This command defines an Access Control Element (ACE). An ACE can only be removed by deleting the ACL, using the **no mac access-list** Global Configuration mode command. Alternatively, the Web-based interface can be used to delete ACEs from an ACL.

Use the following 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.
- If the VLAN ID is specified, the policy map cannot be connected to the VLAN interface.

Example

The following commands create a MAC ACL with deny rules on a device.

```
Console(config)# mac access-list macl1
Console (config-mac-acl)# deny 06:06:06:06:06:06:00:00:00:00:00:00 any
```

service-acl

The **service-acl** Interface Configuration mode command applies an ACL to the input interface. To detach an ACL from an input interface, use the **no** form of this command.

Syntax

service-acl {**input** *acl-name*}

no service-acl {input}

Parameters

n *acl-name* — Specifies the ACL to be applied to the input interface.

Default Setting

This command has no default configuration.

Command Mode

Interface (Ethernet, port-channel) Configuration mode.

Example

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

```
Console(config)# interface vlan 2
Console(config-if)# service-acl input macl1
```

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*]

Parameters

n *name* — Name of the ACL.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays access lists on a device.

```
Console# show access-lists
IP access list ACL1
permit ip host 172.30.40.1 any
permit rsvp host 172.30.8.8 any
```

5

Address Table Commands

bridge address

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

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*]

Parameters

- *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 Setting

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

Command Mode

Interface Configuration (VLAN) mode

Command Usage

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

On interfaces that have an IP address configured, use the command "port security routed secure address" to configure an address with "secure" option.

Example

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

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

bridge multicast filtering

The **bridge multicast filtering** Global Configuration mode command enables filtering multicast addresses. To disable filtering multicast addresses, use the **no** form of this command.

Syntax

bridge multicast filtering

no bridge multicast filtering

Parameters

There are no parameters for this command.

Default Setting

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

Command Mode

Global Configuration mode

Command Usage

If multicast devices exist on the VLAN, do not change the unregistered multicast addresses state to drop on the switch ports.

If multicast devices exist on the VLAN and IGMP-snooping is not enabled, the **bridge multicast forward-all** command should be used to enable forwarding all multicast packets to the multicast switches.

Example

The following command 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. To unregister the MAC address, use the **no** form of this command.

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*}

Parameters

- **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 nonconsecutive Ethernet ports with a comma and no spaces; a hyphen is used to designate a range of ports.
- *port-channel-number-list* — Separate nonconsecutive port-channels with a comma and no spaces; a hyphen is used to designate a range of ports.

Default Setting

No multicast addresses are defined.

Command Mode

Interface configuration (VLAN) mode

Command Usage

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 command registers the MAC address:

```
Console(config)# interface vlan 1
Console(config-if)# bridge multicast address 01:00:5e:02:02:03
```

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

```
Console(config)# interface vlan 1
Console(config-if)# bridge multicast address 01:00:5e:02:02:03 add ethernet e1-e9
```

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*}

Parameters

- **add** —Defines the port as forbidden. Forbidden ports are not included the Multicast group, even if IGMP snooping designated the port to join a Multicast group.
- **remove** — Removes ports from the Forbidden Port list.
- *mac-multicast-address* — A valid MAC multicast address.
- *ip- multicast-address* — A valid IP multicast address.
- *interface-list* — Separate nonconsecutive Ethernet ports with a comma and no spaces; hyphen is used to designate a range of ports.
- *port-channel-number-list* — Separate nonconsecutive valid port-channels with a comma and no spaces; a hyphen is used to designate a range of port-channels.

Default Setting

No forbidden addresses are defined.

Command Modes

Interface Configuration (VLAN) mode

Command Usage

Before defining forbidden ports, the multicast group should be registered.

Example

The following command forbids MAC address 0100.5e02.0203 on port e9 within VLAN 1.

```
Console(config)# interface vlan 1
Console(config-if)# bridge multicast address 0100.5e02.0203
Console(config-if)# bridge multicast forbidden address 0100.5e02.0203 add ethernet e9
```

bridge multicast forward-all

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

Syntax

bridge multicast forward-all {**add** | **remove**} {**ethernet** *interface-list* | **port-channel** *port-channel-number-list*}

no bridge multicast forward-all

Parameters

- **add** — Force forwarding all multicast packets.
- **remove** — Do not force forwarding all multicast packets.
- *interface-list* — Separate nonconsecutive Ethernet ports with a comma and no spaces; a hyphen is used to designate a range of ports.
- *port-channel-number-list* — Separate nonconsecutive port-channels with a comma and no spaces; a hyphen is used to designate a range of port-channels.

Default Setting

This setting is disabled.

Command Mode

Interface Configuration (VLAN) mode

Command Usage

There are no user guidelines for this command.

Example

The following command configures the device to forward all multicast packets on port e8.

```
Console(config)# interface vlan 1
Console(config-if)# bridge multicast forward-all add ethernet 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. To restore the default configuration, use the **no** form of this command.

Syntax

bridge multicast forbidden forward-all {**add** | **remove**} {**ethernet** *interface-list* | **port-channel** *port-channel-number-list*}

no bridge multicast forbidden forward-all

Parameters

- **add** — Forbids forwarding all multicast packets.
- **remove** — Does not forbid forwarding all multicast packets.
- *interface-list* — Separates nonconsecutive Ethernet ports with a comma and no spaces; a hyphen is used to designate a range of ports.
- *port-channel-number-list* — Separates nonconsecutive port-channels with a comma and no spaces; a hyphen is used to designate a range of port-channels.

Default Setting

This setting is disabled.

Command Mode

Interface Configuration (VLAN) mode

Command Usage

IGMP snooping dynamically discovers multicast device ports. When a multicast device port is discovered, all the multicast packets are forwarded to it unconditionally.

This command prevents a port from becoming a multicast device port.

Example

The following command configures the device to forbid all forwarding of Multicast packets to e1 with VLAN 1.

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

bridge aging-time

The **bridge aging-time** Global Configuration mode command sets the address table aging time. To restore the default configuration, use the **no** form of this command.

Syntax

bridge aging-time *seconds*

no bridge aging-time

Parameters

n *seconds* — Time in seconds. (Range: 10-630 seconds)

Default Setting

The default is 300 seconds.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command sets the bridge aging time to 250 seconds.

```
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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

port security [**forward** | **discard** | **discard-shutdown**] [**trap** *seconds*]

no port security

Parameters

- **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 Setting

This setting is disabled.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

In the following example, port e1 forwards 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 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. To return to the default configuration, use the **no** form of this command.

Syntax

port security mode {**lock** | **dynamic**}

no port security mode

Parameters

- **lock** — Saves the current dynamic MAC addresses associated with the port and disables learning, relearning and aging.
- **dynamic** — Deletes the current dynamic MAC addresses associated with the port and learns up to the maximum number addresses allowed on the port. Relearning and aging are enabled.

Default Setting

This setting is disabled.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

In the following command, the port security mode is set to dynamic for Ethernet interface e7.

```
Console(config)# interface ethernet 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. To return to the default configuration, use the **no** form of this command.

Syntax

port security max *max-addr*

no port security max

Parameters

n *max-addr* — Maximum number of addresses that can be learned by the port. (Range: 1-128)

Default Setting

The default is 1 address.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

This command is only relevant in dynamic learning modes.

Example

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

```
Console(config)# interface ethernet 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*

Parameters

n *mac-address* — A valid MAC address.

Default Setting

No addresses are defined.

Command Mode

Interface Configuration (Ethernet, port-channel) mode. Cannot be configured for a range of interfaces (range context).

Command Usage

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.

Use this command on interfaces that have an IP address configured, instead of the command **bridge address mac-address** {**ethernet interface port-channel port-channel-number**} [**secure**].

Example

The following command adds the MAC-layer address 66:66:66:66:66:66 to port e1.

```
Console(config)# interface ethernet 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*]

Parameters

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

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

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 command displays all classes of entries in the bridge-forwarding database.

```
Console# show bridge address-table

Aging time is 300 sec

Interface   MAC Address        Port    Type
---------   --------------     ----    -------
1           00:60:70:4C:73:FF  e8      dynamic
1           00:60:70:8C:73:FF  e8      dynamic
200         00:10:0D:48:37:FF  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.
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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  e8      Permanent
1       00:60.70.8C.73:FF  e8      delete-on-timeout
200     00:10:0D:48:37:FF  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*]

Parameters

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

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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** User 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**]

Parameters

- *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 Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

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 command 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    e1
19       01:00:5e:02:02:08   static    e1-e8
19       00:00:5e:02:02:08   dynamic   e9-e11

Forbidden ports for multicast addresses:

VLAN     MAC Address         Ports
----     -----------         -----
1        01:00:5e:02:02:03   e8
19       01:00:5e:02:02:08   e8
```

Console# **show bridge multicast address-table format ip**

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

Forbidden ports for multicast addresses:

VLAN	IP/MAC Address	Ports
----	----------	------
1	224-239.130|2.2.3	e8
19	224-239.130|2.2.8	e8

- A multicast MAC address maps to multiple IP addresses as shown in the example.

show bridge multicast filtering

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

Syntax

show bridge multicast filtering *vlan-id*

Parameters

n *vlan-id* — VLAN ID value.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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
----        ---------   ---------   ---------   ----------
e1          Forbidden   Filter      Forbidden   Filter
e2          Forward     Forward(s)  Forward     Forward(s)
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*]

Parameters

- *interface* — A valid Ethernet port.
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays all classes of port-lock status entries.

```
Console# show ports security

Port   Status    Learning   Action          Maximum  Trap     Frequency
----   -------   --------   -------         -------  -------  ---------
e1     Locked    Dynamic    Discard         3        Enable   100
e2     Unlocked  Dynamic    -               28       -        -
e3     Locked    Disabled   Discard,        8        Disable  -
                            Shutdown
```

The following table describes the fields shown in the example.

Field	Description
Port	Port number
Status	Locked/Unlocked
Learning	Learning mode
Action	Action on violation
Maximum	Maximum addresses that can be associated on this port in Static Learning mode or in Dynamic Learning mode
Trap	Indicates if traps are sent in case of a violation
Frequency	Minimum time between consecutive 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*]

Parameters

- *interface* — A valid Ethernet port.
- *port-channel-number* — A valid port-channel number

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC Mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the dynamic addresses in currently locked ports.

```
Console# show ports security addresses

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

The following command displays the dynamic addresses in currently locked port e1.

```
Console# show ports security addresses ethernet e1

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

6

Clock Commands

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*

Parameters

- *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 Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command sets the system time to 13:32:00 on March 7th, 2006.

```
Console# clock set 13:32:00 7 Mar 2006
```

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

Parameters

n **sntp** — SNTP servers

Default Setting

No external clock source.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To set the time to the Coordinated Universal Time (UTC), use the **no** form of this command.

Syntax

clock timezone *hours-offset* [**minutes** *minutes-offset*] [**zone** *acronym*]

no clock timezone

Parameters

- *hours-offset* — Hours difference from UTC. (Range: -12 – +13)
- *minutes-offset* — Minutes difference from UTC. (Range: 0–59 minutes)
- *acronym* — The acronym of the time zone. (Range: Up to 4 characters)

Default Setting

Clock set to UTC.

Command Mode

Global Configuration mode

Command Usage

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

Example

The following command sets the time zone 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). To configure the software not to automatically switch to summer time, use the **no** form of this command.

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

Parameters

- **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 Setting

- Summer time is disabled by default.
- *offset* — Default summer time is 60 minutes.
- *acronym* — If unspecified default to the timezone acronym.
- If the time zone has not been defined, the default is UTC.

Command Mode

Global Configuration mode

Command Usage

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 the user is in the southern hemisphere.

USA rule for daylight savings time:

- Start: First Sunday in April
- End: Last Sunday in October
- Time: 2 am local time

EU rule for daylight savings time:

- Start: Last Sunday in March
- End: Last Sunday in October
- Time: 1.00 am (01:00)

Example

The following command sets the summer time, starting on the first Sunday in April at 2 am and finishing on the last Sunday in October at 2 am.

```
Console(config)# clock summer-time recurring first sun apr 2:00 last sun oct 2:00
```

sntp authentication-key

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

Syntax

sntp authentication-key *number* **md5** *value*

no sntp authentication-key *number*

Parameters

- *number* — Key number (Range: 1-4294967295)
- *value* — Key value (Range: 1-8 characters)

Default Setting

No authentication key is defined.

Command Mode

Global Configuration mode

Command Usage

Multiple keys can be generated.

Example

The following command defines the authentication key for SNTP.

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

sntp authenticate

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

Syntax

sntp authenticate

no sntp authenticate

Parameters

There are no parameters for this command.

Default Setting

No authentication

Command Mode

Global Configuration mode

Command Usage

The command is relevant for both unicast and broadcast.

Example

The following command defines the authentication key for SNTP and grants 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. To disable authentication of the identity of the system, use the **no** form of this command.

Syntax

sntp trusted-key *key-number*

no sntp trusted-key *key-number*

Parameters

n *key-number* — Key number of authentication key to be trusted. (Range: 1-4294967295)

Default Setting

No keys are trusted.

Command Mode

Global Configuration mode

Command Usage

The command is relevant for both received unicast and broadcast.

If there is at least 1 trusted key, then unauthenticated messages will be ignored.

Example

The following command authenticates key number 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. To return to default configuration, use the **no** form of this command.

Syntax

sntp client poll timer *seconds*

no sntp client poll timer

Parameters

n *seconds* — Polling interval in seconds (Range: 60-86400)

Default Setting

Polling interval is 1024 seconds.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To disable SNTP broadcast clients, use the **no** form of this command.

Syntax

sntp broadcast client enable

no sntp broadcast client enable

Parameters

There are no parameters for this command.

Default Setting

The SNTP broadcast client is disabled.

Command Mode

Global Configuration mode

Command Usage

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

Example

The following command 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. To disable the SNTP anycast client, use the **no** form of this command.

Syntax

sntp anycast client enable

no sntp anycast client enable

Parameters

There are no parameters for this command.

Default Setting

The SNTP anycast client is disabled.

Command Mode

Global Configuration mode

Command Usage

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

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

Example

The following command enables the SNTP anycast clients.

```
Console(config)# sntp anycast 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. To disable the SNTP client, use the **no** form of this command.

Syntax

sntp client enable

no sntp client enable

Parameters

There are no parameters for this command.

Default Setting

The SNTP client is disabled on an interface.

Command Mode

Interface configuration (Ethernet, port-channel, VLAN) mode

Command Usage

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.

Example

The following command enables the SNTP client on Ethernet port e3.

```
Console(config)# interface ethernet 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. To disable requesting and accepting SNTP traffic from servers, use the **no** form of this command.

Syntax

sntp unicast client enable

no sntp unicast client enable

Parameters

There are no parameters for this command.

Default Setting

The SNTP unicast client is disabled.

Command Mode

Global Configuration mode

Command Usage

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

Example

The following command 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. To disable the polling for SNTP client, use the **no** form of this command.

Syntax

sntp unicast client poll

no sntp unicast client poll

Parameters

There are no parameters for this command.

Default Setting

Polling is disabled.

Command Mode

Global Configuration mode

Command Usage

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

Example

The following command enables polling for 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. To remove a server from the list of SNTP servers, use the **no** form of this command.

Syntax

sntp server {*ip-address* | *hostname*}[**poll**] [**key** *keyid*]

no sntp server *host*

Parameters

- *ip-address* — IP address of the server.
- *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 Setting

No servers are defined.

Command Mode

Global Configuration mode

Command Usage

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.

Example

The following command 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]

Parameters

n **detail** — Shows timezone and summertime configuration.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

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

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

Example

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

```
Console> show clock
15:29:03 PDT(UTC-7) Jun 17 2006
Time source is SNTP
Console> show clock detail
15:29:03 PDT(UTC-7) Jun 17 2006
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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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: e1, e3
```

show sntp status

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

Syntax

show sntp status

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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 2006)

Unicast servers:
Server          Status      Last Response                 Offset [mSec]  Delay [mSec]
-----------     -------     ---------------------------   ------         ------
176.1.1.8       Up          19:58:22.289 PDT Feb 19 2006  7.33           117.79
176.1.8.179     Unknown     12:17.17.987 PDT Feb 19 2006  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 2006   7.19    119.89

Broadcast:
Interface       Interface           Last Response
---------       ---------           ---------------------------
176.9.1.1       VLAN 119            19:17:59.792 PDT Feb 19 2006
```

7

Configuration and Image File Commands

copy

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

Syntax

copy *source-url destination-url*

Parameters

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

The following table displays keywords and URL prefixes:

Keyword	Description
flash:	Source or destination URL for flash memory. This 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.
image	If the source file, represents the active image file. If the destination file, represents 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 represented by its IP address or hostname.
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.This is a user-defined name for up to five backup configuration files.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

Up to five backup configuration files are supported on the device.

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.

*.prv and *.sys files cannot be copied.

Understanding Invalid Combinations of Source and Destination

Some invalid combinations of source and destination exist. Specifically, you cannot copy if one of the following conditions exist:

The source file and destination file are the same file.

n **tftp://** is the source file and destination file on the same copy.

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 an Image File from a Server to Flash Memory

To copy an image file from a server to flash memory, use the **copy** *source-url* **image** command.

Copying a Boot File from a Server to Flash Memory

To copy a boot file from a server to flash memory, enter the **copy** *source-url* **boot** command.

Copying a Configuration File from a Server to the Running Configuration File

To load a configuration file from a network server to the running configuration file of the device, enter the **copy** *source-url* **running-config** command. The commands in the loaded configuration file are added to those in the running configuration file as if the commands were typed in the command-line interface (CLI). Thus, the resulting configuration file is a combination of the previous running configuration and the loaded configuration files with the loaded configuration file taking precedence.

Copying a Configuration File from a Server to the Startup Configuration

To copy a configuration file from a network server to the startup configuration file of the device, enter **copy** *source-url* **startup-config**. The startup configuration file is replaced by 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.

Saving the Running Configuration to the Startup Configuration

To copy the running configuration to the startup configuration file, enter the **copy running-config startup-config** command.

Backing up the Running or Startup Configuration to a Backup Configuration File

To copy the running configuration file to a backup configuration file, enter the **copy running-config file** command. To copy the startup configuration file to a backup configuration file, enter the c**opy startup-config file** command.

Before copying from the backup configuration file to the running configuration file, make sure that the backup configuration file has not been corrupted.

Example

The following command copies system image file1 from the TFTP server 172.16.101.101 to a 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*

Parameters

n *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	Description
flash	Source or destination URL for flash memory. This is the default when a URL is specified without a prefix.
startup-config	Represents the startup configuration file.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

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

Example

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

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

boot system

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

Syntax

boot system {**image-1** | **image-2**}

Parameters

- **image-1** — Specifies image 1 as the system startup image.
- **image-2** — Specifies image 2 as the system startup image.

Default Setting

The command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

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

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

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

```
Console# show running-config
spanning-tree mode mstp
spanning-tree mst mstp-rstp
interface range ethernet e(1-41)
spanning-tree disable
exit
spanning-tree mst configuration
instance 1 add vlan 1
instance 2 add vlan 2
instance 15 add vlan 3-4093
exit
spanning-tree mst 1 priority 61440
spanning-tree mst 2 priority 61440
spanning-tree mst 3 priority 61440
spanning-tree mst 4 priority 61440
spanning-tree mst 5 priority 61440
spanning-tree mst 6 priority 61440
spanning-tree mst 7 priority 61440
spanning-tree mst 8 priority 61440
spanning-tree mst 9 priority 61440
spanning-tree mst 10 priority 61440
```

.

```
spanning-tree mst 11 priority 61440
spanning-tree mst 12 priority 61440
spanning-tree mst 13 priority 61440
spanning-tree mst 14 priority 61440
spanning-tree mst 15 priority 61440
vlan database
vlan 1-2
exit
interface range ethernet e(1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41-42,45-46)
switchport access vlan 1
exit
interface range ethernet e(2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,43-44)
switchport access vlan 2
exit
interface vlan 1
ip address dhcp
exit
interface vlan 2
ip address dhcp
exit
snmp-server community public ro view Default
```

show startup-config

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

Syntax

show startup-config

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

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

```
Console# show startup-config
spanning-tree mode mstp
spanning-tree mst mstp-rstp
interface range ethernet e(1-41)
spanning-tree disable
exit
spanning-tree mst configuration
instance 1 add vlan 1
instance 2 add vlan 2
instance 15 add vlan 3-4093
exit
spanning-tree mst 1 priority 61440
spanning-tree mst 2 priority 61440
spanning-tree mst 3 priority 61440
spanning-tree mst 4 priority 61440
spanning-tree mst 5 priority 61440
spanning-tree mst 6 priority 61440
spanning-tree mst 7 priority 61440
spanning-tree mst 8 priority 61440
spanning-tree mst 9 priority 61440
spanning-tree mst 10 priority 61440
```

```
spanning-tree mst 11 priority 61440
spanning-tree mst 12 priority 61440
spanning-tree mst 13 priority 61440
spanning-tree mst 14 priority 61440
spanning-tree mst 15 priority 61440
vlan database
vlan 1-2
exit
interface range ethernet e(1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41-42,45-46)
switchport access vlan 1
exit
interface range ethernet e(2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,43-44)
switchport access vlan 2
exit
interface vlan 1
ip address dhcp
exit
interface vlan 2
ip address dhcp
exit
snmp-server community public ro view Default
```

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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

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

```
Console# show bootvar
Images currently available on the flash
image-1          active (selected for next boot)
image-2          not active
```

8

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*

Parameters

n *interface* — Valid Ethernet port. (Full syntax: *port*)

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command enables configuring Ethernet port e18.

```
Console(config)# interface ethernet 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 nonconsecutive ports with a comma and no spaces, use a hyphen to designate a range of ports and group a list separated by commas in brackets.
- **all** — All Ethernet ports.

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

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 odd ports e1 to e39 are grouped to receive the same command.

```
Console(config)# interface range ethernet
e(1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39)

Console(config-if)#
```

shutdown

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

Syntax

shutdown

no shutdown

Parameters

There are no parameters for this command.

Default Setting

The interface is disabled.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

The following command disables Ethernet port e45 operations.

```
Console(config)# interface ethernet e45
Console(config-if)# shutdown
```

The following command restarts the disabled Ethernet port.

```
Console(config)# interface ethernet e45
Console(config-if)# no shutdown
```

description

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

Syntax

description *string*

no description

Parameters

n *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 Setting

The interface does not have a description.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

The following command adds a description to Ethernet port e45.

```
Console(config)# interface ethernet e45
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. To restore the default configuration, use the **no** form of this command.

Syntax

speed {10 | 100 | 1000}

no speed

Parameters

- **10** — Forces10 Mbps operation.
- **100** — Forces 100 Mbps operation.
- **1000** — Forces 1000 Mbps operation.

Default Setting

Maximum port capability

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

The **no speed** command in a port-channel context returns each port in the port-channel to its maximum capability.

Example

The following command configures the speed operation of Ethernet port e45 to 100 Mbps operation.

```
Console(config)# interface ethernet e45
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. To restore the default configuration, use the **no** form of this command.

Syntax

duplex {half | full}

no duplex

Parameters

- **half** — Forces half-duplex operation
- **full** — Forces full-duplex operation

Default Setting

The interface is set to full duplex.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

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 command configures the duplex operation of Ethernet port e42 to full duplex operation.

```
Console(config)# interface ethernet e42
Console(config-if)# duplex full
```

negotiation

The **negotiation** Interface Configuration (Ethernet, port-channel) mode command enables auto-negotiation operation for the speed and duplex parameters of a given interface. To disable auto-negotiation, use the **no** form of this command.

Syntax

negotiation *[capability1 [capability2…capability5]]*

no negotiation

Parameters

n *capability* — Specifies the capabilities to advertise. (Possible values: 10h, 10f, 100h,100f, 1000f)

Default Setting

Auto-negotiation is enabled.

If unspecified, the default setting is to enable all capabilities of the port.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

If capabilities were specified when auto-negotiation was previously entered, not specifying capabilities when currently entering auto-negotiation overrides the previous configuration and enables all capabilities.

Example

The following command enables auto-negotiation on Ethernet port e42.

```
Console(config)# interface ethernet e42
Console(config-if)# negotiation
```

flowcontrol

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

Syntax

flowcontrol {auto | on | off}

no flowcontrol

Parameters

- **auto** — Indicates auto-negotiation
- **on** — Enables flow control.
- **off** — Disables flow control.

Default Setting

Flow control is off.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

Negotiation should be enabled for **flowcontrol auto**.

Example

In the following example, flow control is enabled on port e42.

```
Console(config)# interface ethernet e42
Console(config-if)# flowcontrol on
```

mdix

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

Syntax

mdix {on | auto}

no mdix

Parameters

- **on** — Manual mdix
- **auto** — Automatic mdi/mdix

Default Setting

- **auto** for ports 42-46
- **on** for port 41
- **off** for ports 1-40

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

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

In the following example, automatic crossover is enabled on port e42.

```
Console(config)# interface ethernet e42
Console(config-if)# mdix auto
```

back-pressure

The **back-pressure** Interface Configuration (Ethernet, port-channel) mode command enables back pressure on a given interface. To disable back pressure, use the **no** form of this command.

Syntax

back-pressure

no back-pressure

Parameters

There are no parameters for this command.

Default Setting

Back pressure is disabled.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

This feature is only available on ports operating in half-duplex.

Example

In the following example, back pressure is enabled on port e42.

```
Console(config)# interface ethernet e42
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*]

Parameters

- *interface* — Valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — Valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

In the following example, the counters for interface e1 are cleared.

```
Console> clear counters ethernet 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*}

Parameters

- *interface* — Valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — Valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

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

Example

The following command reactivates interface e45.

```
Console# set interface active ethernet e45
```

show interfaces advertise

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

Syntax

show interfaces advertise [**ethernet** *interface* | **port-channel** *port-channel-number*]

Parameters

- *interface* — Valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — Valid port-channel number.

Default Setting

This command has no default configuration.

Command Modes

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays auto negotiation information.

```
Console# show interfaces advertise

Port     Type          Neg      Operational Link Advertisement
----     ----------    -------  ------------------------------
e1       100M-Copper   Enabled  --
e2       100M-Copper   Enabled  --
e3       100M-Copper   Enabled  --
e4       100M-Copper   Enabled  --
e5       100M-Copper   Enabled  100f, 100h, 10f, 10h
e6       100M-Copper   Enabled  --
e7       100M-Copper   Enabled  --
e8       100M-Copper   Enabled  --
e9       100M-Copper   Enabled  --
e10      100M-Copper   Enabled  --
e11      100M-Copper   Enabled  --
e12      100M-Copper   Enabled  --
e13      100M-Copper   Enabled  --
e14      100M-Copper   Enabled  --
e15      100M-Copper   Enabled  --
e16      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*]

Parameters

- *interface* — Valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — Valid port-channel number.

Default Setting

This command has no default configuration.

Command Modes

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the configuration of all configured interfaces:

Console# **show interfaces configuration**

Port	Type	Duplex	Speed	Neg	Flow Ctrl	Link State	Back Pressure	Mdix Mode
----	----------	------	-----	-------	----	-----	--------	----
e1	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e2	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e3	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e4	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e5	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e6	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e7	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e8	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e9	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e10	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e11	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e12	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e13	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e14	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e15	100M-Copper	Full	100	Enabled	Off	Up	Disabled	Auto
e16	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*]

Parameters

- *interface* — A valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the status of all configured interfaces:

Console# **show interfaces status**

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

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*]

Parameters

- *interface* — Valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays descriptions of configured interfaces:

```
Console# show interfaces description

Port            Description
----            -----------
e1              lab
e2
e3
e4
e5
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*]

Parameters

- *interface* — A valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays traffic seen by the physical interface:

```
Console# show interfaces counters

Port      InOctets    InUcastPkts    InMcastPkts    InBcastPkts
----      --------    -----------    -----------    -----------
e1        183892      0              0              0
e1        0           0              0              0
e1        123899      0              0              0

Port      OutOctets   OutUcastPkts   OutMcastPkts   OutBcastPkts
-----     ----------  ------------   ------------   ------------
e1        9188        0              0              0
e1        0           0              0              0
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 command displays counters for Ethernet port e1:

```
Console# show interfaces counters ethernet e1

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

Port      OutOctets    OutUcastPkts    OutMcastPkts    OutBcastPkts
------    ----------   ----------      ----------      ----------
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 example.

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 slot time 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.

Field	Description
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 (IC)

The **port storm-control include-multicast** Interface Configuration (Ethernet) mode command counts multicast packets in broadcast storm control. To disable counting multicast packets, use the **no** form of this command.

Syntax

port storm-control include-multicast [*unknown-unicast*]

no port storm-control include-multicast

Parameters

n *unknown-unicast* — Specifies also counting unknown unicast packets.

Default Setting

Multicast packets are not counted.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

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

Example

The following command enables counting broadcast and multicast packets on Ethernet port e42.

```
Console(config)# interface ethernet e42
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. To disable broadcast storm control, use the **no** form of this command.

Syntax

port storm-control broadcast enable

no port storm-control broadcast enable

Parameters

There are no parameters for this command.

Default Setting

Broadcast storm control is disabled.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

Use the **port storm-control broadcast rate** Interface Configuration (Ethernet) mode command, to set the maximum allowable broadcast rate.

Example

The following command enables broadcast storm control on port e5 of a device.

```
Console(config)# interface ethernet e5
Console(config)# 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. To return to the default configuration, use the **no** form of this command.

Syntax

port storm-control broadcast rate *rate*

no port storm-control broadcast rate

Parameters

n *rate* — Maximum kilobits per second of broadcast and multicast traffic on a port. (Range: 70-100000).

Default Setting

The default storm control broadcast rate is 3500 Kbits/Sec.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

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

Example

The following command configures the maximum storm control broadcast rate at 900 Kbits/Sec on Ethernet port e42 of a device.

```
Console(config)# interface ethernet e42
Console(config-if)# port storm-control broadcast rate 900
```

show ports storm-control

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

Syntax

show ports storm-control [*interface*]

Parameters

n *interface* — A valid Ethernet port. (Full syntax: *port*)

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode.

Command Usage

There are no user guidelines for this command.

Example

The following command displays the storm control configuration.

```
Console# show ports storm-control
Port    State     Rate [Kbits/Sec]   Included
----    --------  ----------------   ----------------------------------------
e1      Enabled   70                 Broadcast, Multicast, Unknown Unicast
e1      Enabled   100                Broadcast
e1      Disabled  100                Broadcast
```

9

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. To disable GVRP on the device, use the **no** form of this command.

Syntax

gvrp enable

no gvrp enable

Parameters

There are no parameters for this command.

Default Setting

GVRP is globally disabled.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To disable GVRP on an interface, use the **no** form of this command.

Syntax

gvrp enable

no gvrp enable

Parameters

There are no parameters for this command.

Default Setting

GVRP is disabled on all interfaces.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

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 command enables GVRP on Ethernet port e45.

```
Console(config)# interface ethernet e45
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. To return to the default configuration, use the **no** form of this command.

Syntax

garp timer {**join | leave | leaveall**} *timer_value*

no garp timer

Parameters

- {**join | leave | leaveall**} — Indicates the type of timer.
- *timer_value* — Timer values in milliseconds in multiples of 10. (Range: 10-2147483647)

Default Setting

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

Command Usage

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

In the following example, the leave timer for Ethernet port e45 is set to 900 milliseconds.

```
Console(config)# interface ethernet e45
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. To enable dynamic VLAN creation or modification, use the **no** form of this command.

Syntax

gvrp vlan-creation-forbid

no gvrp vlan-creation-forbid

Parameters

There are no parameters for this command.

Default Setting

Dynamic VLAN creation or modification is enabled.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

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 command disables dynamic VLAN creation on Ethernet port g45.

```
Console(config)# interface ethernet g45
Console(config-if)# gvrp vlan-creation-forbid
```

gvrp registration-forbid

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

Syntax

gvrp registration-forbid

no gvrp registration-forbid

Parameters

There are no parameters for this command.

Default Setting

Dynamic registration of VLANs on the port is allowed.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

The following command forbids dynamic registration of VLANs on Ethernet port g45.

```
Console(config)# interface ethernet g45
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*]

Parameters

- *interface* — A valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command clears all GVRP statistical information on Ethernet port e45.

```
Console# clear gvrp statistics ethernet e45
```

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*]

Parameters

- *interface* — A valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays GVRP configuration information:

```
Console> show gvrp configuration

GVRP Feature is currently enabled on the device.

                                                          Timers (milliseconds)
Port(s)   Status   Registration   Dynamic VLAN Creation   Join   Leave   Leave All
------    -------  ------------   ---------               ----   -----   ---------
e45       Enabled  Normal         Enabled                 200    600     10000
e45       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*]

Parameters

- *interface* — A valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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*]

Parameters

- *interface* — A valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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
```

10

IGMP Snooping Commands

ip igmp snooping (Global)

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

Syntax

ip igmp snooping

no ip igmp snooping

Parameters

There are no parameters for this command.

Default Setting

IGMP snooping is disabled.

Command Mode

Global Configuration mode

Command Usage

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

Example

The following command 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. To disable IGMP snooping on a VLAN interface, use the **no** form of this command.

Syntax

ip igmp snooping

no ip igmp snooping

Parameters

There are no parameters for this command.

Default Setting

IGMP snooping is disabled.

Command Mode

Interface Configuration (VLAN) mode

Command Usage

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

Example

The following command enables IGMP snooping on VLAN 2.

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

nip 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. To return to the default configuration, use the **no** form of this command.

Syntax

ip igmp snooping host-time-out *time-out*

no ip igmp snooping host-time-out

Parameters

n *time-out* — Host timeout in seconds. (Range: 1-2147483647)

Default Setting

The default host-time-out is 260 seconds.

Command Mode

Interface Configuration (VLAN) mode

Command Usage

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

Example

In the following example, the host timeout is configured 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 device ports are automatically learned. To return to the default configuration, use the **no** form of this command.

Syntax

ip igmp snooping mrouter-time-out *time-out*

no ip igmp snooping mrouter-time-out

Parameters

n *time-out* — Multicast device timeout in seconds. (Range: 1-2147483647)

Default Setting

The default value is 300 seconds.

Command Mode

Interface Configuration (VLAN) mode

Command Usage

There are no user guidelines for this command.

Example

In the following example, the multicast device timeout is configured to 200 seconds.

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

ip igmp snooping mrouter learn-pim-dvmrp

The **ip igmp snooping mrouter learn-pim-dvmrp** Interface Configuration (VLAN) mode command enables automatic learning of multicast router ports in the context of a specific VLAN. To remove automatic learning of multi-cast router ports, use the **no** form of this command.

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

There are no user guidelines for this command.

Example

The following command enables automatic learning of multicast router ports on VLAN 2.

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

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.To return to the default configuration, use the **no** form of this command.

Syntax

ip igmp snooping leave-time-out {*time-out* | **immediate-leave**}

no ip igmp snooping leave-time-out

Parameters

- *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 Setting

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

Command Mode

Interface Configuration (VLAN) mode

Command Usage

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 command configures the host leave-time-out to 60 seconds.

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

show ip igmp snooping mrouter

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

Syntax

show ip igmp snooping mrouter [**interface** *vlan-id*]

Parameters

n *vlan-id* — VLAN number.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays multicast device interfaces in VLAN 1000.

```
Console> show ip igmp snooping mrouter interface 1000

VLAN    Ports
----    -----
1000    e45

Detected multicast routers that are forbidden statically:
VLAN    Ports
----    -----
1000    e43
```

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*

Parameters

n *vlan-id* — VLAN number.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays IGMP snooping information on VLAN 1000.

```
Console> show ip igmp snooping interface 1000


IGMP Snooping is globally enabled
IGMP Snooping is enabled on VLAN 1000
IGMP host timeout is 300 sec
IGMP Immediate leave is disabled. IGMP leave timeout is 10 sec
IGMP mrouter timeout is 200 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*]

Parameters

- *vlan-id* — VLAN number.
- *ip-multicast-address* — IP multicast address.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

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

Example

The following command 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        e45

IGMP Reporters that are forbidden statically:
-----------------------------------------------
VLAN    IP Address          Ports
----    ----------          -----
2       224-239.130|2.2.3   e43
```

11

IP Addressing Commands

ip address

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

Syntax

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

no ip address [*ip-address*]

Parameters

- *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 Setting

Two interfaces are configured:

- one for VLAN 1
- one for VLAN 2, with DHCP set by default

Command Mode

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

Command Usage

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

Example

The following command 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. To deconfigure an acquired IP address, use the **no** form of this command.

Syntax

ip address dhcp [**hostname** *host-name*]

no ip address dhcp

Parameters

n *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 Setting

This command has no default configuration.

Command Mode

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

Command Usage

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 DHCPDISCOVER 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 de-configures any IP address that was acquired, thus sending a DHCPRELEASE message.

Example

The following command acquires an IP address for VLAN 1 from DHCP.

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

ip default-gateway

The **ip default-gateway** Global Configuration mode command defines a default gateway. To return to the default configuration, use the **no** form of this command.

Syntax

ip default-gateway *ip-address*

no ip default-gateway

Parameters

n *ip-address* — Valid IP address of the default gateway.

Default Setting

No default gateway is defined.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command defines default gateway 192.168.1.1.

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

show ip interface

The **show ip interface** Privileged 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*]

Parameters

- *interface-number* — Valid Ethernet port.
- *vlan-id* — Valid VLAN number.
- *port-channel number* — Valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To remove an entry from the ARP cache, use the **no** form of this command.

Syntax

arp *ip_addr hw_addr* {**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *port-channel number*}

no arp *ip_addr* {**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *port-channel number*}

Parameters

- *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 Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

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 command 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 e1
```

arp timeout

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

Syntax

arp timeout *seconds*

no arp timeout

Parameters

n *seconds* — Time (in seconds) that an entry remains in the ARP cache. (Range: 1-40000000)

Default Setting

The default timeout is 60000 seconds.

Command Mode

Global Configuration mode

Command Usage

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

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays entries in the ARP table.

```
Console# show arp

ARP timeout: 80000 Seconds

Interface    IP address     HW address         Status
---------    ----------     ------------------ -------
e1           10.7.1.102     00:10:B5:04:DB:4B  Dynamic
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. To disable DNS-based host name-to-address translation, use the **no** form of this command.

Syntax

ip domain-lookup

no ip domain-lookup

Parameters

There are no parameters for this command.

Default Setting

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

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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). To remove the default domain name, use the **no** form of this command.

Syntax

ip domain-name *name*

no ip domain-name

Parameters

n *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 Setting

A default domain name is not defined.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command defines default domain name www.Marvell.com.

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

ip name-server

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

Syntax

ip name-server *server-address* [*server-address2 … server-address8*]

no ip name-server [*server-address1 … server-address8*]

Parameters

n *server-address* — Specifies IP addresses of the name server.

Default Setting

No name server addresses are specified.

Command Mode

Global Configuration mode

Command Usage

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.

Example

The following command 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. To remove the name-to-address mapping, use the **no** form of this command.

Syntax

ip host *name address*

no ip host *name*

Parameters

- *name* — Name of the host (Range: 1-158 characters)
- *address* — Associated IP address.

Default Setting

No host is defined.

Command Mode

Global Configuration mode

Command Usage

Up to 8 host names can be configured.

Example

The following command defines a static host name-to-address mapping in the host cache.

```
Console(config)# ip host accounting.Marvell.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* | *)

Parameters

- *name* — Specifies the host entry to be removed. (Range: 1-158 characters)
- * — Removes all entries.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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* | *}

Parameters

- *name* — Specifies the host entry to be removed. (Range: 1-158 characters)
- * — Removes all entries.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

This command deletes the host name-to-address mapping temporarily until the next renewal of the IP address.

Example

The following command 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*]

Parameters

n *name* — Specifies the host name. (Range: 1-158 characters)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays host information.

```
Console# show hosts

System 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
```

12

LACP Commands

lacp system-priority

The **lacp system-priority** Global Configuration mode command configures the system priority. To return to the default configuration, use the **no** form of this command.

Syntax

lacp system-priority *value*

no lacp system-priority

Parameters

n *value* — Specifies system priority value. (Range: 1-65535)

Default Setting

The default system priority is 1.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

lacp port-priority *value*

no lacp port-priority

Parameters

n *value* — Specifies port priority. (Range: 1 - 65535)

Default Setting

The default port priority is 1.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

There are no user guidelines for this command.

Example

The following command defines the priority of Ethernet port e45 as 247.

```
Console(config)# interface ethernet e45
Console(config-if)# lacp port-priority 247
```

lacp timeout

The **lacp timeout** Interface Configuration (Ethernet) mode command assigns an administrative LACP timeout. To return to the default configuration, use the **no** form of this command.

Syntax

lacp timeout {long | short}

no lacp timeout

Parameters

- **long** — Specifies the long timeout value.
- **short** — Specifies the short timeout value.

Default Setting

The default port timeout value is **long**.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

There are no user guidelines for this command.

Example

The following command assigns a long administrative LACP timeout to Ethernet port e45.

```
Console(config)# interface ethernet e45
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**]

Parameters

- *interface* — Valid Ethernet port. (Full syntax: *port*)
- **parameters** — Link aggregation parameter information.
- **statistics** — Link aggregation statistics information.
- **protocol-state** — Link aggregation protocol-state information.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

All LACP statistics is shown if no keyword is specified.

LACP should be enabled for selected Ethernet port.

Example

The following command displays LACP information for Ethernet port e45.

```
Console# show lacp ethernet e45

Port e45 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 e45 LACP Statistics:
LACP PDUs sent:                             2
LACP PDUs received:                         2

Port e45 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-channe*l*** Privileged EXEC mode command displays LACP information for a port-channel.

Syntax

show lacp port-channel [*port_channel_number*]

Parameters

n *port_channel_number* — Valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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
```

13

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}

Parameters

- **console** — Console terminal line.
- **telnet** — Virtual terminal for remote console access (Telnet).
- **ssh** — Virtual terminal for secured remote console access (SSH).

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To return to the default configuration, use the **no** form of the command.

Syntax

speed *bps*

no speed

Parameters

n *bps* — Baud rate in bits per second (bps). Possible values are 2400, 9600, 19200, 38400, 57600 and 115200.

Default Setting

The default speed is 9600 bps.

Command Mode

Line Configuration (console) mode

Command Usage

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.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

Autobaud is disabled.

Command Mode

Line Configuration (console) mode

Command Usage

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.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

exec-timeout *minutes* [*seconds*]

no exec-timeout

Parameters

- *minutes* — Specifies the number of minutes. (Range: 0-65535)
- *seconds* — Specifies additional time intervals in seconds. (Range: 0-59)

Default Setting

The default configuration is 10 minutes.

Command Mode

Line Configuration mode

Command Usage

To specify no timeout, enter the **exec-timeout** 0 command.

Example

The following command 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. To disable the command history function, use the **no** form of this command.

Syntax

history

no history

Parameters

There are no parameters for this command.

Default Setting

The command history function is enabled.

Command Mode

Line Configuration mode

Command Usage

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 command 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. To reset the command history buffer size to the default configuration, use the **no** form of this command.

Syntax

history size *number-of-commands*

no history size

Parameters

n *number-of-commands* — Number of commands that the system records in its history buffer. (Range: 10-216)

Default Setting

The default history buffer size is 10.

Command Mode

Line Configuration mode

Command Usage

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. The maximum number of commands in all buffers is 256.

Example

The following command 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. To disable the command history function, use the **no** form of this command.

Syntax

terminal history

terminal no history

Parameters

There are no parameters for this command.

Default Setting

The default configuration for all terminal sessions is defined by the **history** line configuration command.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To reset the command history buffer size to the default setting, use the **no** form of this command.

Syntax

terminal history size *number-of-commands*

terminal no history size

Parameters

n *number-of-commands* — Specifies the number of commands the system may record in its command history buffer. (Range: 10-216)

Default Setting

The default history size for all terminal sessions is defined by the **history size** line configuration command.

Command Mode

User EXEC mode

Command Usage

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.

Example

The following command 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]

Parameters

- **console** — Console terminal line.
- **telnet** — Virtual terminal for remote console access (Telnet).
- **ssh** — Virtual terminal for secured remote console access (SSH).

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

If line is not specified information for all lines is given.

Example

The following command 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
```

14

Management ACL Commands

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. To delete an access list, use the **no** form of this command.

Syntax

management access-list *name*

no management access-list *name*

Parameters

n *name* — Access list name. (Range: 1-32 characters)

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

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 reenter 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.

Example

The following commands create a management access list called mlist, configure management Ethernet interfaces e45 and e46 and make the new access list the active list.

```
Console(config)# management access-list mlist
Console(config-macl)# permit ethernet e45
Console(config-macl)# permit ethernet e46
Console(config-macl)# exit
Console(config)# management access-class mlist
```

The following commands create a management access list called mlist, configure all interfaces to be management interfaces except Ethernet interfaces e45 and e46 and make the new access list the active list.

```
Console(config)# management access-list mlist
Console(config-macl)# deny ethernet e45
Console(config-macl)# deny ethernet e46
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 *ip-address* [**mask** *mask* | *prefix-length*] [**ethernet** *interface-number* | **vlan** *vlan-id* | port-channel *port-channel-number* |] [**service** *service*]

Parameters

- *interface-number* — A valid Ethernet port number.
- *vlan-id* — A valid VLAN number.
- *port-channel-number* — A valid port channel index.
- *ip-address* — A valid source IP address.
- *mask* — A valid network mask of the source IP address.
- *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 type. Possible values: **telnet**, **ssh**, **http**, **https** and **snmp**.

Default Setting

If no permit rule is defined, the default is set to deny.

Command Mode

Management Access-list Configuration mode

Command Usage

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 command 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 *ip-address* [**mask** *mask* | *prefix-length*] [**ethernet** *interface-number* | **vlan** *vlan-id* | **port-channel** *port-channel-number* |] [**service** *service*]

Parameters

- *interface-number* — A valid Ethernet port number.
- *vlan-id* — A valid VLAN number.
- *port-channel-number* — A valid port-channel number.
- *ip-address* — A valid source IP address.
- *mask* — A valid network mask of the source IP address.
- *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 type. Possible values: **telnet**, **ssh**, **http**, **https** and **snmp**.

Default Setting

This command has no default configuration.

Command Mode

Management Access-list Configuration mode

Command Usage

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 command 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. To disable this restriction, use the **no** form of this command.

Syntax

management access-class {**console-only** | *name*}

no management access-class

Parameters

- **console-only** — Indicates that the device can be managed only from the console.
- *name* — Specifies the name of the access list to be used. (Range: 1-32 characters)

Default Setting

No active management access list specified.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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*]

Parameters

n *name* — Specifies the name of a management access list. (Range: 1-32 characters)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the mlist management access list.

```
Console# show management access-list mlist
mlist
-----
                permit ethernet e45
                permit ethernet e46
! (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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays information about the active management access list.

```
Console# show management access-class
Management access-class is enabled, using access list mlist
```

15

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*

Parameters

n *interface* — A valid Ethernet port. (Full syntax: *port*)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

The port to be tested should be shut down during the test, unless it is a combination port with the fiber port active.

The maximum length of the cable for the TDR test is 120 meters.

Example

The following command results in a report on the cable attached to port e42.

```
Console# test copper-port tdr e42
Cable is open at 64 meters
Console# test copper-port tdr e45
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.

Syntax

show copper-ports tdr [*interface*]

Parameters

n *interface* — A valid Ethernet port. (Full syntax: *port*)

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

The maximum length of the cable for the TDR test is 120 meters.

Example

The following command displays information on the last TDR test performed on all copper ports.

```
Console> show copper-ports tdr

Port    Result                      Length [meters]   Date
----    ------                      ---------------   ----
e43     Short                       50                13:32:00 23 July 2005
e44     Test has not been performed
e45     Open                        64                13:32:00 23 July 2005
e46     Fiber                       -                 -
```

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*]

Parameters

n *interface* — A valid Ethernet port. (Full syntax: *port*)

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

The port must be active and working in 100M or 1000M mode.

Example

The following command displays the estimated copper cable length attached to all ports.

```
Console> show copper-ports cable-length

Port            Length [meters]
----            ---------------------
e43             < 50
e44             Copper not active
e45             110-140
e46             Fiber
```

show fiber-ports optical-transceiver

The **show fiber-ports optical-transceiver** Privileged EXEC command displays the optical transceiver diagnostics.

Syntax

show fiber-ports optical-transceiver [*interface*] [**detailed**]

Parameters

- *interface* — A valid Ethernet port. (Full syntax: *port*)
- **detailed** — Detailed diagnostics.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

To test optical transceivers, ensure a fiber link is present.

Examples

The following commands display the optical transceiver diagnostics.

```
Console# show fiber-ports optical-transceiver


                                                Power
Port      Temp      Voltage   Current   Output    Input     TX Fault  LOS
----      ----      -------   -------   ------    -----     --------  ---
e1        W         OK        E         OK        OK        OK        OK
e2        OK        OK        OK        OK        OK        E         OK
e3        Copper

Temp – Internally measured transceiver temperature.
Voltage - Internally measured supply voltage.
Current – Measured TX bias current.
Output Power – Measured TX output power.
Input Power – Measured RX  received power.
Tx Fault – Transmitter fault
LOS – Loss of signal
N/A - Not Available, N/S - Not Supported, W - Warning, E - Error
```

Console# **show fiber-ports optical-transceiver detailed**

Port	Temp [C]	Voltage [Volt]	Current [mA]	Power Output [mWatt]	Input [mWatt]	TX Fault	LOS
----	----	------	-------	------	-----	-------	---
e1	48	5.15	50	1.789	1.789	No	No
e2	43	5.15	10	1.789	1.789	No	No
e3	Copper						

Temp – Internally measured transceiver temperature.

Voltage - Internally measured supply voltage.

Current – Measured TX bias current.

Output Power – Measured TX output power.

Input Power – Measured RX received power.

Tx Fault – Transmitter fault

LOS – Loss of signal

16

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*

Parameters

n *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

Eight aggregated links can be defined with up to eight member ports per port-channel. The aggregated links' valid IDs are 1-8.

Example

The following command enters the context of port-channel number 1.

```
Console(config)# interface port-channel 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**}

Parameters

- *port-channel-range* — List of valid port-channels to add. Separate nonconsecutive port-channels with a comma and no spaces. A hyphen designates a range of port-channels.
- **all** — All valid port-channels.

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

Commands under the interface range context are executed independently on each interface in the range.

Example

In the following example, port-channels 1, 2 and 6 are grouped 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. To remove a port from a port-channel, use the **no** form of this command.

Syntax

channel-group *port-channel-number* **mode** {**on** | **auto**}

no channel-group

Parameters

- *port-channel_number* — Specifies the ID 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 Setting

The port is not assigned to a port-channel.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

There are no user guidelines for this command.

Example

The following command forces port e45 to join port-channel 1 without an LACP operation.

```
Console(config)# interface ethernet e45
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*]

Parameters

n *port-channel-number* — Valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays information on all port-channels.

```
Console# show interfaces port-channel

Channel                 Ports
-------                 ---------------------------------
1                       Active: e45, e46
2                       Active: e43 Inactive: e44
```

17

Port Monitor Commands

port monitor

The **port monitor** Interface Configuration mode command starts a port monitoring session. To stop a port monitoring session, use the **no** form of this command.

Syntax

port monitor *src-interface* **[rx | tx]**

no port monitor *src-interface*

Parameters

- *src-interface* — Valid Ethernet port. (Full syntax: *port*)
- **rx** — *Monitors received packets only.*
- **tx** — *Monitors transmitted packets only.*

Default Setting

Monitors both received and transmitted packets. No port monitors are configured by default.

Command Mode

Interface Configuration (Ethernet) mode

Command Usage

This command enables traffic on one port to be copied to another port, or between the source port (src-interface) and a destination port (port being configured).

The following restrictions apply to ports configured as 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 of a 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:
- The port cannot be already configured as a destination port.

Example

The following command copies traffic on port e45 (source port) to port e46 (destination port).

```
Console(config)# interface ethernet e46
Console(config-if)# port monitor e45
```

show ports monitor

The **show ports monitor** User EXEC mode command displays the port monitoring status.

Syntax

show ports monitor

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the port monitoring status.

```
Console> show ports monitor
Source Port      Destination Port    Type      Status      VLAN Tagging
-----------      ----------------    -----     -------     ------------
e45              e46                 RX,TX     Active      No
e43              e44                 RX,TX     Active      No
e1               e42                 RX        Active      No
```

18

QoS Commands

qos

The **qos** Global Configuration mode command enables Quality of Service (QoS) on the device. To disable QoS on the device, use the **no** form of this command.

Syntax

qos [**basic** | **advanced**]

no qos

Parameters

- **basic** — QoS basic mode. **This mode is applied if no keyword is specified.**
- **advanced** — QoS advanced mode, which enables the full range of QoS configuration.

Default Setting

The QoS basic mode is enabled.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command enables QoS on the device.

```
Console(config)# qos
```

show qos

The **show qos** User EXEC mode command displays the quality of service (QoS) mode for the device.

Syntax

show qos

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

Trust mode is displayed if QoS is enabled in basic mode.

Example

The following command displays QoS attributes when QoS is enabled in basic mode on the device.

```
Console> show qos
Qos: basic
Basic trust: dscp
```

class-map

The **create-map** Global Configuration mode command creates or modifies a class map and enters the Class-map Configuration mode. To delete a class map, use the **no** form of this command.

Syntax

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

no class-map *class-map-name*

Parameters

- *class-map-name* — Specifies the name of the class map.
- **match-all** — Checks that the packet matches all classification criteria in the class map match statement **(**Logical AND for selected ACLs**)**.
- **match-any** — Checks that the packet matches one or more classification criteria in the class map match statement (Logical OR for selected ACLs).

Default Setting

By default, the **match-all** parameter is selected.

Command Mode

Global Configuration mode

Command Usage

The **class-map** Global Configuration mode command is used to define packet classification, marking and aggregate policing as part of a globally named service policy applied on a per-interface basis.

The Class-Map Configuration mode enables entering up to two **match** Class-map Configuration mode commands to configure the classification criteria for the specified class. If two **match** Class-map Configuration mode commands are entered, each should point to a different type of ACL (e.g., one to an IP ACL and one to a MAC ACL). Since packet classification is based on the order of the classification criteria, the order in which the **match** Class-Map Configuration mode commands are entered is important.

If there is more than one match statement in a **match-all** class map and the same classification field appears in the participating ACLs, an error message is generated.

Note the following:

- A class map in match-all mode cannot be configured if it contains both an IP ACL and a MAC ACL with an ether type that is not 0x0800.
- Class map can be defined only in QoS Advanced mode.

Example

The following command creates a class map called class1 and configures it to check that packets match all classification criteria in the class map match statement.

```
Console(config)# class-map class1 match-all
Console(config-cmap)#
```

show class-map

The **show class-map** User EXEC mode command displays all class maps.

Syntax

show class-map [*class-map-name*]

Parameters

n *class-map-name* — Specifies the name of the class map to be displayed.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command shows the class map for class1.

```
Console> show class-map class1
Class Map match-any class1 (id4)
Match Ip dscp 11 21
```

match

The **match** Class-map Configuration mode command defines the match criteria for classifying traffic. To delete the match criteria, use the **no** form of this command.

Syntax

match access-group *acl-name*

no match access-group *acl-name*

Parameters

n *acl-name* — Specifies the name of an IP or MAC ACL.

Default Setting

No match criterion is supported.

Command Mode

Class-map Configuration mode.

Command Usage

There are no user guidelines for this command.

Example

The following command defines the match criterion for classifying traffic as an access group called HP in a class map called class1.

```
Console(config)# class-map class1
Console(config-cmap)# match access-group hp
```

policy-map

The **policy-map** Global Configuration mode command creates a policy map and enters the Policy-map Configuration mode. To delete a policy map, use the **no** form of this command.

Syntax

policy-map *policy-map-name*

no policy-map *policy-map-name*

Parameters

n *policy-map-name* — Specifies the name of the policy map.

Default Setting

If the packet is an IP packet, the DCSP value of the policy map is 0.

If the packet is tagged, the CoS value is 0.

Command Mode

Global Configuration mode

Command Usage

Before configuring policies for classes whose match criteria are defined in a class map, use the **policy-map** Global Configuration mode command to specify the name of the policy map to be created or modified.

Class policies in a policy map can only be defined if match criteria has already been defined for the classes. Use the **class-map** Global Configuration and **match** Class-map Configuration commands to define the match criteria of a class.

Only one policy map per interface per direction is supported. A policy map can be applied to multiple interfaces and directions.

Example

The following command creates a policy map called policy1 and enters the Policy-map Configuration mode.

```
Console (config)# policy-map policy1
Console (config-pmap)#
```

class

The **class** Policy-map Configuration mode command defines a traffic classification and enters the Policy-map Class Configuration mode. To remove a class map from the policy map, use the **no** form of this command.

Syntax

class *class-map-name* [**access-group** *acl-name*]

no class *class-map-name*

Parameters

- *class-map-name* — Specifies the name of an existing class map. If the class map does not exist, a new class map will be created under the specified name.
- *acl-name* — Specifies the name of an IP or MAC ACL.

Default Setting

No policy map is defined.

Command Mode

Policy-map Configuration mode

Command Usage

Before modifying a policy for an existing class or creating a policy for a new class, use the **policy-map** Global Configuration mode command to specify the name of the policy map to which the policy belongs and to enter the Policy-map Configuration mode.

Use the **service-policy** (Ethernet, Port-channel) Interface Configuration mode command to attach a policy map to an interface.

Use an existing class map to attach classification criteria to the specified policy map and use the **access-group** parameter to modify the classification criteria of the class map.

If this command is used to create a new class map, the name of an IP or MAC ACL must also be specified.

Example

The following command defines a traffic classification called class1 with an access-group called HP. The class is in a policy map called policy1.

```
Console(config)# policy-map policy1
Console (config-pmap)# class class1 access-group HP
```

show policy-map

The **show policy-map** User EXEC command displays the policy maps.

Syntax

show policy-map [*policy-map-name* [**class** *class-name*]]

Parameters

- *policy-map-name* — Specifies the name of the policy map to be displayed.
- *class-name* — Specifies the name of the class whose QoS policies are to be displayed.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays all policy maps.

```
Console> show policy-map
Policy Map policy1
  class class1
    set Ip dscp 7

Policy Map policy2
  class class 2
    police 96000 4800 exceed-action drop
  class class3
    police 124000 96000 exceed-action policed-dscp-transmit
```

trust cos-dscp

The **trust cos-dscp** Policy-map Class Configuration mode command configures the trust state. The trust state determines the source of the internal DSCP value used by Quality of Service (QoS). To return to the default configuration, use the **no** form of this command.

Syntax

trust cos-dscp

no trust cos-dscp

Parameters

There are no parameters for this command.

Default Setting

The port is not in the trust mode.

If the port is in trust mode, the internal DSCP value is derived from the ingress packet.

Command Mode

Policy-map Class Configuration mode

Command Usage

Action serviced to a class, so that if an IP packet arrives, the queue is assigned per DSCP. If a non-IP packet arrives, the queue is assigned per CoS (VPT).

Example

The following command configures the trust state for a class called class1 in a policy map called policy1.

```
Console (config)# policy-map policy1
Console (config-pmap)# class class1
Console (config-pmap-c)# trust cos-dscp
```

set

The **set** Policy-map Class Configuration mode command sets new values in the IP packet.

Syntax

set {**dscp** *new-dscp* | **queue** *queue-id* | **cos** *new-cos*}

no set

Parameters

- *new-dscp* — Specifies a new DSCP value for the classified traffic. (Range: 0-63)
- *queue-id* — Specifies an explicit queue ID for setting the egress queue.
- *new-cos* — Specifies a new user priority for marking the packet. (Range: 0-7)

Default Setting

This command has no default configuration.

Command Mode

Policy-map Class Configuration mode

Command Usage

This command is mutually exclusive with the **trust** Policy-map Class Configuration command within the same policy map.

Policy maps that contain **set** or **trust** Policy-map Class Configuration commands or that have ACL classifications cannot be attached to an egress interface by using the **service-policy** (Ethernet, Port-channel) Interface Configuration mode command.

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

Example

The following command sets the DSCP value in the packet to 56 for classes in in policy map called policy class map class1.

```
Console (config)# policy-map policy1
Console (config-pmap)# class class1
Console (config-pmap-c)# set dscp 56
```

police

The **police** Policy-map Class Configuration mode command defines the policer for classified traffic. To remove a policer, use the **no** form of this command.

Syntax

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

no police

Parameters

- *committed-rate-bps* — Specifies the average traffic rate (CIR) in bits per second (bps).
- *committed-burst-byte* — Specifies normal burst size (CBS) in bytes.
- **drop** — Indicates that when the rate is exceeded, the packet is dropped.
- **policed-dscp-transmit** — Indicates that when the rate is exceeded, the DSCP of the packet is remarked according to the policed-DSCP map as configured by the **qos map policed-dscp** Global Configuration mode command.

Default Setting

This command has no default configuration.

Command Mode

Policy-map Class Configuration mode

Command Usage

Policing uses a token bucket algorithm. CIR represents the speed with which the token is removed from the bucket. CBS represents the depth of the bucket.

- Policy maps that contain **set** or **trust** Policy-map Class Configuration commands or that have ACL classifications cannot be attached to an egress interface by using the **service-policy** (Ethernet, Port-channel) Interface Configuration mode command.

Example

The following command defines a policer for classified traffic. When the traffic rate exceeds 124,000 bps or the normal burst size exceeds 96000 bytes, the packet is dropped. The class is called class1 and is in a policy map called policy1.

```
Console (config)# policy-map policy1
Console (config-pmap)# class class1
Console (config-pmap-c)# police 124000 9600 exceed-action drop
```

service-policy

The **service-policy** Interface Configuration (Ethernet, port-channel) mode command applies a policy map to the input of a particular interface. To detach a policy map from an interface, use the **no** form of this command.

Syntax

service-policy {input *policy-map-name***}**

no service-policy {input}

Parameters

n *policy-map-name* — Specifies the name of the policy map to be applied to the input interface.

Default Setting

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet, port-Channel) mode

Command Usage

Only one policy map per interface per direction is supported.

Example

The following command attaches a policy map called policy1 to the input interface.

```
Console(config-if)# service-policy input policy1
```

qos aggregate-policer

The **qos aggregate-policer** Global Configuration mode command defines the policer parameters that can be applied to multiple traffic classes within the same policy map. To remove an existing aggregate policer, use the **no** form of this command.

Syntax

qos aggregate-policer *aggregate-policer-name committed-rate-bps excess-burst-byte* **exceed-action** {**drop | policed-dscp-transmit**} [**dscp** *dscp***]**

no qos aggregate-policer

Parameters

- *aggregate-policer-name* — Specifies the name of the aggregate policer.
- *committed-rate-bps* — Specifies the average traffic rate (CIR) in bits per second (bps).
- *excess-burst-byte* — Specifies the normal burst size (CBS) in bytes.
- **drop** — Indicates that when the rate is exceeded, the packet is dropped.
- **policed-dscp-transmit** — Indicates that when the rate is exceeded, the DSCP of the packet is remarked.
- *dscp* — Specifies the value that the DSCP would be remarked. If unspecified, the DSCP would be remarked according to the policed-DSCP map as configured by the **qos map policed-dscp** Global Configuration mode command.

Default Setting

No aggregate policer is define.

Command Mode

Global Configuration mode

Command Usage

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

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

An aggregate policer can be applied to multiple classes in the same policy map; An aggregate policer cannot be applied across multiple policy maps.

An aggregate policer cannot be deleted if it is being used in a policy map. The **no police aggregate** Policy-map Class Configuration command must first be used to delete the aggregate policer from all policy maps.

Policing uses a token bucket algorithm. CIR represents the speed with which the token is removed from the bucket. CBS represents the depth of the bucket.

Example

The following command defines the parameters of an aggregate policer called policer1 that can be applied to multiple classes in the same policy map. When the average traffic rate exceeds 124,000 bps or the normal burst size exceeds 96000 bytes, the packet is dropped.

```
Console (config)# qos aggregate-policer policer1 124000 96000 exceed-action drop
```

show qos aggregate-policer

The **show qos aggregate-policer** User EXEC mode command displays the aggregate policer parameter.

Syntax

show qos aggregate-policer [*aggregate-policer-name*]

Parameters

n *aggregate-policer-name* — Specifies the name of the aggregate policer to be displayed.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines.

Example

The following command displays the parameters of the aggregate policer called policer1.

```
Console> show qos aggregate-policer policer1
aggregate-policer policer1 96000 4800 exceed-action drop
not used by any policy map
```

police aggregate

The **police aggregate** Policy-map Class Configuration mode command applies an aggregate policer to multiple classes within the same policy map. To remove an existing aggregate policer from a policy map, use the **no** form of this command.

Syntax

police aggregate *aggregate-policer-name*

no police aggregate *aggregate-policer-name*

Parameters

n *aggregate-policer-name* — Specifies the name of the aggregate policer.

Default Setting

This command has no default configuration.

Command Mode

Policy-map Class Configuration mode

Command Usage

An aggregate policer can be applied to multiple classes in the same policy map; An aggregate policer cannot be applied across multiple policy maps or interfaces.

To return to the Policy-map Configuration mode, use the **exit** command. To return to the Privileged EXEC mode, use the **end** command.

Example

The following command applies the aggregate policer called policer1 to a class called class1 in policy map called policy1.

```
Console(config)# policy-map policy1
Console(config-pmap)# class class1
Console(config-pmap-c)# police aggregate policer1
```

wrr-queue cos-map

The **wrr-queue cos-map** Global Configuration mode command maps Class of Service (CoS) values to a specific egress queue. To return to the default configuration, use the **no** form of this command.

Syntax

wrr-queue cos-map *queue-id cos1...cos8*

no wrr-queue cos-map [*queue-id*]

Parameters

- *queue-id* — Specifies the queue number to which the CoS values are mapped.
- *cos1...cos8* — Specifies CoS values to be mapped to a specific queue. (Range: 0-7)

Default Setting

Default cos to queue map

Command Mode

Global Configuration mode

Command Usage

This command can be used to distribute traffic into different queues, where each queue is configured with different Weighted Round Robin (WRR) and Weighted Random Early Detection (WRED) parameters.

It is recommended to specifically map a single VPT to a queue, rather than mapping multiple VPTs to a single queue. Use the **priority-queue out num-of-queues** Interface Configuration (Ethernet, Port-channel) mode command to enable expedite queues.

Example

The following command maps CoS 7 to queue 2.

```
Console(config)# wrr-queue cos-map 2 7
```

priority-queue out num-of-queues

The **priority-queue out num-of-queues** Global Configuration mode command configures the number of expedite queues. To return to the default configuration, use the **no** form of this command.

Syntax

priority-queue out num-of-queues *number-of-queues*

no priority-queue out num-of-queues

Parameters

n *number-of-queues* — Specifies the number of expedite queues. Expedite queues have higher indexes. (Range: 0-4)

Default Setting

All queues are expedite queues.

Command Mode

Global Configuration mode

Command Usage

Configuring the number of expedite queues affects the Weighted Round Robin (WRR) weight ratio because fewer queues participate in the WRR.

Example

The following command 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 configures the shaper of the egress port/queue. To disable the shaper, use the **no** form of this command.

Syntax

traffic-shape {*committed-rate committed-burst*}

no traffic-shape

Parameters

- *committed-rate* — Specifies the average traffic rate (CIR) in bits per second (bps). (Range: 6510-1073741800)
- *excess-burst* — Specifies the excess burst size (CBS) in bytes.

Default Setting

No shape is defined.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

This command activates the shaper on a specified egress port or egress queue.

Use the command with the “burst” parameter for GE ports, and without the “burst” parameter for FE ports.

To activate the shaper on an egress port, enter the Interface Configuration mode. Then run this command without the **queue-id** parameter. The CIR and the CBS will be applied to the specified port.

To activate the shaper for specific queue, run this command with the **queue-id** parameter.

Example

The following command sets a shaper on Ethernet port e4 when the average traffic rate exceeds 124000 bps or the normal burst size exceeds 96000 bps.

```
Console(config)# interface ethernet e4
Console(config-if) traffic-shape 124000 96000
```

show qos interface

The **show qos interface** User EXEC mode command displays Quality of Service (QoS) information on the interface.

Syntax

show qos interface [**ethernet** *interface-number* | **port-channel** *number*] [**buffers** | **queueing** | **policers** | **shapers**]

Parameters

- *interface-number* — Valid Ethernet port number.
- *number* — Valid port-channel number.
- **buffers** – Displays the buffer setting for the interface's queues. Displays the queue depth for each queue and the thresholds for the WRED.
- **queuing** — Displays the queue strategy (WRR or EF), the weight for WRR queues, the CoS to queue map and the EF priority.
- **policers** — Displays all the policers configured for this interface, their setting and the number of policers currently unused.
- **shapers** — Displays the shaper of the specified interface and the shaper for the queue on the specified interface.

Default Setting

There is no default configuration for this command.

Command Mode

User EXEC mode

Command Usage

If no keyword is specified, port QoS mode (e.g., DSCP trusted, CoS trusted, untrusted), default CoS value, DSCP-to-DSCP-mutation map attached to the port, and policy map attached to the interface are displayed.

If no interface is specified, QoS information about all interfaces is displayed.

Example

The following command displays the buffer settings for queues on Ethernet port e45.

```
Console# show qos interface buffers ethernet e45
Ethernet e3
Port e45 wrong port type= 2

Notify Q depth:
qid - size
1 - 300
2 - 300
3 - 300
4 - 300

qid threshTMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and
object type!
1 0
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
2 0
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
3 0
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
4 0

qid WRED thresh0 thresh1 thresh2
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
1 disable 0 0 0
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
2 disable 0 0 0
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
3 disable 0 0 0
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
4 disable 0 0 0

qid MinDP0 MaxDP0 ProbDP0 MinDP1 MaxDP1 ProbDP1 MinDP2 MaxDP2 ProbDP2 weight
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
1 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
2 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
3 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A
TMibScalarC_SetValue: var: rlIfProfileName mismatching between var mib type and object type!
4 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A
Console#
```

wrr-queue threshold

The **wrr-queue threshold** Global Configuration mode command assigns queue thresholds globally. To return to the default configuration, use the **no** form of this command.

Syntax

qos wrr-queue threshold gigabitethernet *queue-id threshold-percentage*

no qos wrr-queue threshold gigabitethernet *queue-id*

no qos wrr-queue threshold tengigabitethernet *queue-id*

Parameters

- **gigabitethernet** — Indicates that the thresholds are to be applied to Gigabit Ethernet ports.
- *queue-id* — Specifies the queue number to which the threshold is assigned.
- *threshold-percentage 0,1,2* — Specifies the queue threshold percentage value. Each value is separated by a space. (Range: 0-100)

Default Setting

80 percent for all thresholds.

Command Mode

Global Configuration mode.

Command Usage

The packet refers to a certain threshold by the conformance level. If threshold 0 is exceeded, packets with the corresponding DP (Drop Precedence) are dropped until the threshold is no longer exceeded. However, packets assigned to threshold 1 or 2 continue to be queued and sent as long as the second or third threshold is not exceeded.

Example

The following command assigns a threshold of 80 percent to WRR queue 1.

```
Console (config)# qos wrr-queue threshold gigabitethernet 1
```

qos map dscp-dp

The **qos map dscp-dp** global configuration mode command maps DSCP to Drop Precedence. To return to the default setting, use the **no** form of this command.

Syntax

qos map dscp-dp *dscp-list* **to** *dp*

no qos map dscp-dp

Parameters

- *dscp-list* — Specifies up to 8 DSCP values separated by a space (Range: 0-63).
- *dp* — Enter the Drop Precedence value to which the DSCP value corresponds. (Possible values are 0 - 2 where 2 is the highest Drop Precedence)

Default Setting

All the DSCPs are mapped to Drop Precedence 0.

Command Mode

Global Configuration mode.

Command Usage

There are no user guidelines for this command.

Example

The following command maps DSCP to Drop Precedence.

```
console (config) # qos map dscp-dp 0 to 63
```

qos map policed-dscp

The **qos map policed-dscp** Global Configuration mode command modifies the policed-DSCP map for remarking purposes. To return to the default map, use the **no** form of this command.

Syntax

qos map policed-dscp *dscp-list* **to** *dscp-mark-down*

no qos map policed-dscp

Parameters

- *dscp-list* — Specifies up to 8 DSCP values separated by a space. (Range: 0-63)
- *dscp-mark-down* — Specifies the DSCP value to mark down. (Range: 0-63)

Default Setting

The default map is the Null map, which means that each incoming DSCP value is mapped to the same DSCP value.

Command Mode

Global Configuration mode.

Command Usage

DSCP values 3,11,19… cannot be remapped to other values. The mapping of the IP DSCP to priority queue is set on a per system basis. If this mode is active, a non-IP packet is always classified to the best effort queue.

Example

The following command fails to mark down incoming DSCP value 3 as DSCP value 43 on the policed-DSCP map.

```
Console(config)# qos map policed-dscp 3 to 43
Reserved DSCP. DSCP 3  was not configured.
```

qos map dscp-queue

The **qos map dscp-queue** Global Configuration mode command modifies the DSCP to CoS map. To return to the default map, use the **no** form of this command.

Syntax

qos map dscp-queue *dscp-list* **to** *queue-id*

no qos map dscp-queue

Parameters

- *dscp-list* — Specifies up to 8 DSCP values separated by a space. (Range: 0-63)
- *queue-id* — Specifies the queue number to which the DSCP values are mapped.

Default Setting

The following table describes the default map.

DSCP Value	Queue Number
0-15	q1 (Lowest Priority)
16-31	q2
32-47	q3
48-63	q4

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To return to default state (trust VPT), use the **no** form of the command.

Syntax

qos trust {cos | dscp}

no qos trust

Parameters

- **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 Setting

CoS is the default trust mode.

Command Mode

Global Configuration mode

Command Usage

To disable QoS trust compleletly, use the **no qos** command. If **no qos trust** is used, trust VPT is set, and QoS trust is not disabled.

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.

A switch port on an inter-QoS domain boundary can be configured to the DSCP trust state, and, if the DSCP values are different between the QoS domains, the DSCP to DSCP mutation map can be applied.

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.

The following table describes the VPT Default Mapping Table.

VPT Value	Queue Number
0	2
1	1
2	1
3	2
4	3
5	3

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

qos cos *default-cos*

Parameters

n *default-cos* — Specifies the default CoS value of the port. (Range: 0-7)

Default Setting

Default CoS value of a port is 0.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

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 command configures port e45 default CoS value to 3.

```
Console(config)# interface ethernet e45
Console(config-if) qos cos 3
```

qos dscp-mutation

The **qos dscp-mutation** Global Configuration mode command applies the DSCP Mutation map to a system DSCP trusted port. To return to the trust state with no DSCP mutation, use the **no** form of this command.

Syntax

qos dscp-mutation

no qos dscp-mutation

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode.

Command Usage

The DSCP to DSCP mutation map is applied to a port at the boundary of a Quality of Service (QoS) administrative domain.

If two QoS domains have different DSCP definitions, use the DSCP to DSCP mutation map to match one set of DSCP values with the DSCP values of another domain.

Apply the DSCP to DSCP mutation map only to ingress and to DSCP-trusted ports. Applying this map to a port causes IP packets to be rewritten with newly mapped DSCP values at the ingress ports.

If the DSCP to DSCP mutation map is applied to an untrusted port, class of service (CoS) or IP-precedence trusted port, this command has no immediate effect until the port becomes DSCP-trusted.

Example

The following command applies the DSCP Mutation map to system DSCP trusted ports.

```
Console(config)# qos dscp-mutation
```

qos map dscp-mutation

The **qos map dscp-mutation** Global Configuration mode command modifies the DSCP to DSCP mutation map. To return to the default DSCP to DSCP mutation map, use the **no** form of this command.

Syntax

qos map dscp-mutation *in-dscp* **to** *out-dscp*

no qos map dscp-mutation

Parameters

- *in-dscp* — Specifies up to 8 DSCP values separated by spaces. (Range: 0-63)
- *out-dscp* — Specifies up to 8 DSCP values separated by spaces. (Range: 0-63)

Default Setting

The default map is the Null map, which means that each incoming DSCP value is mapped to the same DSCP value.

Command Mode

Global Configuration mode.

Command Usage

There are no user guidelines for this command.

Example

The following command changes DSCP values 1, 2, 4, 5 and 6 to DSCP mutation map value 63.

```
Console config)# qos map dscp-mutation 1 2 4 5 6 to 63
```

19

RADIUS Commands

radius-server host

The **radius-server host** Global Configuration mode command specifies a RADIUS server host. To delete the specified RADIUS host, use the **no** form of this command.

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*]

no radius-server host {*ip-address* | *hostname*}

Parameters

- *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 RADIUS daemon 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)
- *usage* — Specifies the usage type of the server. Can be one of the following values: login, dot.1x or all. If unspecified, defaults to all.

Default Setting

No RADIUS server host is specified.

The port number for authentication requests is 1812.

The usage type is **all**.

Command Mode

Global Configuration mode

Command Usage

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 command 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. To return to the default configuration, use the **no** form of this command.

Syntax

radius-server key [*key-string*]

no radius-server key

Parameters

n *key-string* — Specifies the authentication and encryption key for all RADIUS communications between the device and the RADIUS server. This key must match the RADIUS daemon key used on the RADIUS daemon. (Range: 0-128 characters)

Default Setting

The key-string is an empty string.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command defines the authentication and encryption key for all RADIUS communications between the device and the RADIUS daemon.

```
Console(config)# radius-server key hp-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. To reset the default configuration, use the **no** form of this command.

Syntax

radius-server retransmit *retries*

no radius-server retransmit

Parameters

n *retries* — Specifies the retransmit value. (Range: 1-10)

Default Setting

The software searches the list of RADIUS server hosts 3 times.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

radius-server source-ip *source*

no radius-source-ip *source*

Parameters

n *source* — Specifies a valid source IP address.

Default Setting

The source IP address is the IP address of the outgoing IP interface.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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 timeout

The **radius-server timeout** Global Configuration mode command sets the interval during which the device waits for a server host to reply. To return to the default configuration, use the **no** form of this command.

Syntax

radius-server timeout *timeout*

no radius-server timeout

Parameters

n *timeout* — Specifies the timeout value in seconds. (Range: 1-30)

Default Setting

The timeout value is 3 seconds.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

radius-server deadtime deadtime

no radius-server deadtime

Parameters

n *deadtime* — Length of time in minutes during which a RADIUS server is skipped over by transaction requests. (Range: 0-2000)

Default Setting

The deadtime setting is 0.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays RADIUS server settings.

```
Console# show radius-servers

IP address  Authin CLI  TimeOut  Retran in CLI  DeadTime  Source in CLI  Prio in CLI  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
```

20

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*}

Parameters

- *interface number* — Valid Ethernet port.
- *port-channel-number* — Valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays RMON Ethernet statistics for Ethernet port e45.

```
Console> show rmon statistics ethernet e45

Port: e45
Octets: 878128                  Packets: 978
Broadcast: 7                    Multicast: 1
CRC Align Errors: 0             Collisions: 0
Undersize Pkts: 0               Oversize Pkts: 0
Fragments: 0                    Jabbers: 0
64 Octets: 98                   65 to 127 Octets: 0
128 to 255 Octets: 0            256 to 511 Octets: 0
512 to 1023 Octets: 491         1024 to 1518 Octets: 389
```

The following table describes significant fields shown in the example:

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 1518 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 1518 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 1518 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).

Field	Description
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 1518 Octets	The total number of packets (including bad packets) received that are between 1024 and 1518 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. To remove a specified RMON history statistics group, use the **no** form of this command.

Syntax

rmon collection history *index* [**owner** *ownername*] [**buckets** *bucket-number*] [**interval** *seconds*]

no rmon collection history *index*

Parameters

- *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:1-65535)
- *seconds* — Number of seconds in each polling cycle. (Range: 1-3600)

Default Setting

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

Command Usage

Cannot be configured for a range of interfaces (range context).

Example

The following command enables a Remote Monitoring (RMON) MIB history statistics group on Ethernet port e45 with index number 1 and a polling interval period of 2400 seconds.

```
Console(config)# interface ethernet e45
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*]

Parameters

- *interface* — Valid Ethernet port. (Full syntax: *port*)
- *port-channel-number* — Valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays all RMON history group statistics.

```
Console> show rmon collection history

Index   Interface  Interval  Requested Samples  Granted Samples  Owner
-----   ---------  --------  -----------------  ---------------  -------
1       e45        30        50                 50               CLI
2       e46        1800      50                 50               Manager
```

The following table describes significant fields shown in the example:

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*]

Parameters

- *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 Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Examples

The following command displays RMON Ethernet history statistics for index 1.

```
Console> show rmon history 1 throughput

Sample Set: 1                                 Owner: CLI
Interface: e45                                Interval: 1800
Requested samples: 50                         Granted samples: 50

Maximum table size: 500

Time                 Octets      Packets  Broadcast  Multicast  Util
-------------------- ----------  -------  ---------- ---------  -----
Jan 18 2005 21:57:00 303595962   357568   3289       7287       19%
Jan 18 2005 21:57:30 287696304   275686   2789       5878       20%

Console> show rmon history 1 errors
Sample Set: 1                                 Owner: Me
Interface: e45                                Interval: 1800
Requested samples: 50                         Granted samples: 50
```

```
Maximum table size: 500 (800 after reset)

Time                 CRC Align  Undersize  Oversize  Fragments  Jabbers
-------------------- ---------  ---------  --------  ---------  -------
Jan 18 2005 21:57:00 1          1          0         49         0
Jan 18 2005 21:57:30 1          1          0         27         0

Console> show rmon history 1 other
Sample Set: 1                          Owner: Me
Interface: e45                         Interval: 1800
Requested samples: 50                  Granted samples: 50

Maximum table size: 500

Time                 Dropped    Collisions
-------------------- ---------  ----------
Jan 18 2005 21:57:00 3          0
Jan 18 2005 21:57:30 3          0
```

The following table describes significant fields shown in the example:

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 1518 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 that were 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 that were longer than 1518 octets (excluding framing bits but including FCS octets) but were otherwise well formed.

Field	Description
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 1518 octets (excluding framing bits but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
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. To remove an alarm, use the **no** form of this command.

Syntax

rmon alarm *index variable interval rthreshold fthreshold revent fevent* [**type** *type*] [**startup** *direction*] [**owner** *name*]

no rmon alarm *index*

Parameters

- *index* — Specifies the alarm index. (Range: 1-65535)
- *variable* — Specifies the object identifier of the 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 Setting

The type is **absolute**.

The startup direction is **rising-falling**.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command configures the following alarm conditions:

- Alarm index — 1000
- Variable identifier — HP
- 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 HP 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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 in the example:

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*

Parameters

n *number* — Specifies the alarm index. (Range: 1-65535)

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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 example:

Field	Description
Alarm	Alarm index.
OID	Monitored variable OID.

Field	Description
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. To remove an event, use the **no** form of this command.

Syntax

rmon event *index type* [**community** *text*] [**description** *text*] [**owner** *name*]

no rmon event *index*

Parameters

- *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 Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

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 command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the RMON events table.

```
Console> show rmon events

Index  Description     Type      Community  Owner    Last Time Sent
---    -------------   --------  ---------  ------   --------------------
1      Errors          Log                  CLI      Jan 18 2005 23:58:17
2      High Broadcast  Log-Trap  device     Manager  Jan 18 2005 23:59:48
```

The following table describes significant fields shown in the example:

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*]

Parameters

n *event* — Specifies the event index. (Range: 0 - 65535)

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the RMON log table.

```
Console> show rmon log

Maximum table size: 500
Event       Description          Time
-------     --------------       ---------
1           Errors               Jan 18 2005 23:48:19
1           Errors               Jan 18 2005 23:58:17

Console> show rmon log 1

Maximum table size: 500 (800 after reset)
Event       Description          Time
-------     --------------       ---------
1           Errors               Jan 18 2005 23:48:19
1           Errors               Jan 18 2005 23:58:17
```

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. To return to the default configuration, use the **no** form of this command.

Syntax

rmon table-size {**history** *entries* | **log** *entries*}

no rmon table-size {history | log}

Parameters

- **history** *entries* — Maximum number of history table entries. (Range: 20-270)
- **log** *entries* — Maximum number of log table entries. (Range: 20-100)

Default Setting

History table size is 270.

Log table size is 200.

Command Mode

Global Configuration mode

Command Usage

The configured table size takes effect after the device is rebooted.

Example

The following command configures the maximum RMON history table sizes to 100 entries.

```
Console(config)# rmon table-size history 100
```

21

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. To remove the specified community string, use the **no** form of this command.

Syntax

snmp-server community *community* [**ro** | **rw** | **su**] [*ip-address*] [**view** *view-name*]

snmp-server community-group *community group-name* [*ip-address*]

no snmp-server community *community* [*ip-address*]

Parameters

- *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.
- *ip-address* — Specifies the IP address of the management station.
- *group-name* — Specifies the name of a previously defined group. A group defines the objects available to the community. (Range: 1-30 characters)
- *view-name* — Specifies the name of a previously defined view. The view defines the objects available to the community. (Range: 1-30 characters)

Default Setting

The community PUBLIC is set with read-only access. No write communities are defined by default.

Command Mode

Global Configuration mode

Command Usage

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.

Example

The following command 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. To remove a specified SNMP server view entry, use the **no** form of this command.

Syntax

snmp-server view *view-name oid-tree* {**included** | **excluded**}

no snmp-server view *view-name* [*oid-tree*]

Parameters

- *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 sub-identifier with the asterisk (*) wildcard to specify a subtree family; for example 1.3.*.4.
- **included** — Indicates that the view type is included.
- **excluded** — Indicates that the view type is excluded.

Default Setting

No view entry exists.

Command Mode

Global Configuration mode

Command Usage

This command can be entered multiple times for the same view record.

The number of views is limited to 64.

No check is made to determine that a MIB node corresponds to the “starting portion” of the OID until the first wildcard.

Example

The following command 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. To remove a specified SNMP group, use the **no** form of this command.

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**]}

Parameters

- *groupname*—Specifies the name of the group.
- **v1** — Indicates the SNMP Version 1 security model.
- **v2** — Indicates the SNMP Version 2 security model.
- **v3** — Indicates the SNMP Version 3 security model.
- **noauth** — Indicates no authentication of a packet. Applicable only to the SNMP Version 3 security model.
- **auth** — Indicates authentication of a packet without encrypting it. Applicable only to the SNMP Version 3 security model.
- **priv** — Indicates authentication of a packet with encryption. Applicable only to the SNMP Version 3 security model.
- *readview* — Specifies a string that is the name of the view that enables only viewing the contents of the agent. If unspecified, all objects except for the community-table and SNMPv3 user and access tables are available.
- *writeview* — Specifies a string that is the name of the view that enables entering data and configuring the contents of the agent. If unspecified, nothing is defined for the write view.
- *notifyview* — Specifies a string that is the name of the view that enables specifying an inform or a trap. If unspecified, nothing is defined for the notify view. Applicable only to the SNMP Version 3 security model.

Default Setting

No group entry exists.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To remove a user, use the **no** form of this command.

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***]**

Parameters

- *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: engineID must contain from 9 through 64 hexadecimal digits)
- **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 Setting

No group entry exists.

Command Mode

Global Configuration mode

Command Usage

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.

Example

The following command 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) engine ID on the local device. To remove the configured engine ID, use the **no** form of this command.

Syntax

snmp-server engineid local {*engineid-string* | **default**}

no snmp-server engineid local

Parameters

- *engineid-string* — Specifies a character string that identifies the engine ID. (Range: engine ID must contain from 9 through 64 hexadecimal digits)
- **default** — The engine ID is created automatically based on the device MAC address.

Default Setting

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

Command Usage

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 123400000000000000000000, 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.

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 **show snmp engineid** Global Configuration mode command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

SNMP traps are enabled.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To remove the specified SNMP server filter entry, use the **no** form of this command.

Syntax

snmp-server filter *filter-name oid-tree* {**included** | **excluded**}

no snmp-server filter *filter-name* [*oid-tree*]

Parameters

- *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.
- **included** — Indicates that the filter type is included.
- **excluded** — Indicates that the filter type is excluded.

Default Setting

No filter entry exists.

Command Mode

Global Configuration mode

Command Usage

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.

Example

The following command 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. To remove the specified host, use the **no** form of this command.

Syntax

snmp-server host {*ip-address* | *hostname*} *community-string* [**traps** | **informs**] [**1** | **2**] [**udp-port** *port*] [**filter** *filtername*] [**timeout** *seconds*] [**retries** *retries*]

no snmp-server host {*ip-address* | *hostname*} [**traps** | **informs**]

Parameters

- *ip-address* — Specifies the IP address of the host (targeted recipient).
- *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.
- *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: 1-255)

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

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 **Informs** 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.

Example

The following command 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. To remove the specified host, use the **no** form of this command.

Syntax

snmp-server v3-host {*ip-address*|*hostname*} *username* [**traps** | **informs**] {**noauth** | **auth** | **priv**} [**udp-port** *port*] [**filter** *filtername***] [timeout** *seconds*] [**retries** *retries*]

no snmp-server host {*ip-address* | *hostname*} *username* [**traps** | **informs**]

Parameters

- *ip-address* — Specifies the IP address of the host (targeted recipient).
- *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. If unspecified, the default maximum number of retries is 3. (Range: 1-255)

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

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.

Example

The following command 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. To disable SNMP failed authentication traps, use the **no** form of this command.

Syntax

snmp-server trap authentication

no snmp-server trap authentication

Parameters

There are no parameters for this command.

Default Setting

SNMP failed authentication traps are enabled.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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

Parameters

n *text* — Specifies the string that describes system contact information. (Range: 0-160 characters)

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

Do not include spaces in the text string or place text that includes spaces inside quotation marks.

Example

The following command configures the system contact point called **HP_Technical_Support**.

```
Console(config)# snmp-server contact HP_Technical_Support
```

snmp-server location

The **snmp-server location** Global Configuration mode command configures the system location string. To remove the location string, use the **no** form of this command.

Syntax

snmp-server location *text*

no snmp-server location

Parameters

n *text* — Specifies a string that describes system location information. (Range: 0-160 characters)

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

Do not include spaces in the text string or place text that includes spaces inside quotation marks.

Example

The following command 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* …]

Parameters

- *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 Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

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.

Example

The following command configures the scalar MIB sysName with the value HP.

```
Console(config)# snmp-server set sysName sysname HP
```

show snmp

The **show snmp** Privileged EXEC mode command displays the SNMP status.

Syntax

show snmp

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the SNMP communications status.

```
Console# show snmp

Community-String  Community-Access  View Name   IP 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 Port  Filter Name  To Sec  Retries
--------------   -----   ---------   -------  ----      ------       ---     -----
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 Level  UDP Port  Filter Name  To Sec  Retries
--------------      -----   ---------   --------------  --------  -----------  ------  -------
192.122.173.42      Inform  Bob         Priv            162                    15      3

System Contact: Robert
System Location: Marketing
```

The following table describes significant fields shown in the example.

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.
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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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*]

Parameters

n *viewname* — Specifies the name of the view. (Range: 1-30)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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*]

Parameters

n *groupname* — Specifies the name of the group. (Range: 1-30)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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 in the example.

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*]

Parameters

n *filtername* — Specifies the name of the filter. (Range: 1-30)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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*]

Parameters

n *username* — Specifies the name of the user. (Range: 1-30)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the configuration of users.

```
Console# show snmp users

Name        Group Name    Auth Method   Remote
------      ------------  ---------     -------------------------
John        user-group    md5
John        user-group    md5           08009009020C0B099C075879
```

22

Spanning-Tree Commands

spanning-tree

The **spanning-tree** Global Configuration mode command enables spanning-tree functionality. To disable spanning-tree functionality, use the **no** form of this command.

Syntax

spanning-tree

no spanning-tree

Parameters

There are no parameters for this command.

Default Setting

Spanning-tree is enabled. The MSTP-RSTP conversion parameter is enabled, which maps VLAN 1 to instance 1 and VLAN 2 to instance 2. This default provides interoperability with PVST/PVST+ by treating each MSTP instance as a separate spanning tree using standard RSTP and STP BPDUs.

Command Modes

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command enables spanning-tree functionality.

```
Console(config)# spanning-tree
```

spanning-tree mode

The **spanning-tree mode** Global Configuration mode command configures the spanning-tree protocol. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree mode {**stp** | **rstp**| **mstp**}

no spanning-tree mode

Parameters

- **stp** — Indicates that the Spanning Tree Protocol (STP) is enabled.
- **rstp** — Indicates that the Rapid Spanning Tree Protocol (RSTP) is enabled.
- **mstp** — Indicates that the Multiple Spanning Tree Protocol (RSTP) is enabled.

Default Setting

STP is enabled.

Command Modes

Global Configuration mode

Command Usage

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 command 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. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree forward-time *seconds*

no spanning-tree forward-time

Parameters

n *seconds* — Time in seconds. (Range: 4-30)

Default Setting

The default forwarding time for the IEEE Spanning Tree Protocol (STP) is 15 seconds.

Command Modes

Global Configuration mode

Command Usage

When configuring the forwarding time, the following relationship should be kept:

2*(Forward-Time - 1) >= Max-Age

Example

The following command 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 hello messages to other devices.To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree hello-time *seconds*

no spanning-tree hello-time

Parameters

n *seconds* — Time in seconds. (Range: 1-10)

Default Setting

The default hello time for IEEE Spanning Tree Protocol (STP) is 2 seconds.

Command Modes

Global Configuration mode

Command Usage

When configuring the hello time, the following relationship should be kept:

Max-Age >= 2*(Hello-Time + 1)

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree max-age *seconds*

no spanning-tree max-age

Parameters

n *seconds* — Time in seconds. (Range: 6-40)

Default Setting

The default maximum age for IEEE Spanning Tree Protocol (STP) is 20 seconds.

Command Modes

Global Configuration mode

Command Usage

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 command 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. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree priority *priority*

no spanning-tree priority

Parameters

n *priority* — Priority of the bridge. (Range: 0-61440 in steps of 4096)

Default Setting

The default bridge priority for IEEE Spanning Tree Protocol (STP) is 32768.

Command Modes

Global Configuration mode

Command Usage

The bridge with the lowest priority is elected as the root bridge.

Example

The following command 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. To enable spanning tree on a port, use the **no** form of this command.

Syntax

spanning-tree disable

no spanning-tree disable

Parameters

There are no parameters for this command.

Default Setting

Spanning tree is enabled on all ports.

Command Modes

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

The following command disables spanning-tree on Ethernet port e42.

```
Console(config)# interface ethernet e42
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. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree cost *cost*

no spanning-tree cost

Parameters

n *cost* — Path cost of the port (Range: 1 - 200,000,000)

Default Setting

Default path cost is determined by port speed and path cost method (long or short) as shown in the following table:

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 Modes

Interface Configuration (Ethernet, port-channel) mode

Command Usage

The path cost method is configured using the **spanning-tree pathcost method** Global Configuration mode command.

Example

The following command configures the spanning-tree cost on Ethernet port e42 to 35000.

```
Console(config)# interface ethernet e42
Console(config-if)# spanning-tree cost 35000
```

spanning-tree port-priority

The **spanning-tree port-priority** Interface Configuration mode command configures port priority. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree port-priority *priority*

no spanning-tree port-priority

Parameters

n *priority* — The priority of the port. (Range: 0-240 in multiples of 16)

Default Setting

The default port priority for IEEE Spanning Tree Protocol (STP) is 128.

Command Modes

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

The following command configures the spanning priority on Ethernet port e42 to 96.

```
Console(config)# interface ethernet e42
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. To disable PortFast mode, use the **no** form of this command.

Syntax

spanning-tree portfast [auto]

no spanning-tree portfast

Parameters

n **auto** — Specifies that the software waits for 3 seconds (with no BPDUs received on the interface) before putting the interface into PortFast mode.

Default Setting

PortFast mode is disabled.

Command Modes

Interface Configuration (Ethernet, port-channel) mode

Command Usage

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.

An interface with PortFast mode enabled is moved directly to the spanning tree forwarding state when linkup occurs without waiting the standard forward-time delay.

Example

The following command enables PortFast on Ethernet port e42.

```
Console(config)# interface ethernet e42
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. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree link-type {point-to-point | shared}

no spanning-tree link-type

Parameters

- **point-to-point** —Indicates that the port link type is point-to-point.
- **shared** — Indicates that the port link type is shared.

Default Setting

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 Modes

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

The following command enables shared spanning-tree on Ethernet port e42.

```
Console(config)# interface ethernet e42
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. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree pathcost method {long | short}

no spanning-tree pathcost method

Parameters

- *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 Setting

Short path cost method.

Command Mode

Global Configuration mode

Command Usage

This command applies to all spanning tree instances on the device.

The cost is set using the **spanning-tree cost** command.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree bpdu {filtering | flooding}

Parameters

- **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 Setting

The default setting is flooding.

Command Modes

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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 restarts the protocol migration process (forces renegotiation with neighboring devices) on all interfaces or on a specified interface.

Syntax

clear spanning-tree detected-protocols [**ethernet** *interface* | **port-channel** *port-channel-numbe*r]

Parameters

- *interface* — A valid Ethernet port.
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Modes

Privileged EXEC mode

Command Usage

This feature should be used only when working in RSTP or MSTP mode.

Example

The following command restarts the protocol migration process on Ethernet port e45.

```
Console# clear spanning-tree detected-protocols ethernet e45
```

spanning-tree mst priority

The **spanning-tree mst priority** Global Configuration mode command configures the device priority for the specified spanning-tree instance. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree mst *instance-id* **priority** *priority*

no spanning-tree mst *instance-id* **priority**

Parameters

- *instance-id* — ID of the spanning -tree instance (Range: 1-16).
- *priority* — Device priority for the specified spanning-tree instance (Range: 0-61440 in multiples of 4096).

Default Setting

The default bridge priority for IEEE Spanning Tree Protocol (STP) is 32768.

Command Mode

Global Configuration mode

Command Usage

The device with the lowest priority is selected as the root of the spanning tree.

Example

The following command 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 priority** 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. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree mst max-hops *hop-count*

no spanning-tree mst max-hops

Parameters

n *hop-count* — Number of hops in an MST region before the BDPU is discarded. (Range: 1-40)

Default Setting

The default number of hops is 20.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

spanning-tree mst *instance-id* **port-priority** *priority*

no spanning-tree mst *instance-id* **port-priority**

Parameters

- *instance-ID* — ID of the spanning tree instance. (Range: 1-16)
- *priority* — The port priority. (Range: 0-240 in multiples of 16)

Default Setting

The default port priority for IEEE Multiple Spanning Tree Protocol (MSTP) is 128.

Command Modes

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

The following command configures the port priority of port e1 to 142.

```
Console(config)# interface ethernet 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. To return to the default configuration, use the ***no*** form of this command.

Syntax

spanning-tree mst *instance-id* **cost** *cost*

no spanning-tree mst *instance-id* **cost**

Parameters

- *instance-ID* — ID of the spanning-tree instance (Range: 1-16).
- *cost* — The port path cost. (Range: 1-200,000,000)

Default Setting

Default path cost is determined by port speed and path cost method (long or short) as shown in the following table:

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 Modes

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

The following command configures the MSTP instance 1 path cost for Ethernet port e42 to 4.

```
console(config) # interface ethernet e42
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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

All devices in an MST region must have the same VLAN mapping, configuration revision number and name.

Example

The following command 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*

Parameters

- *instance-ID* — ID of the MST instance (Range: 1-16).
- *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 Setting

VLANs are mapped to the common and internal spanning tree (CIST) instance (instance 0).

Command Modes

MST Configuration mode

Command Usage

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 command 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 configuration name. To return to the default setting, use the **no** form of this command.

Syntax

name *string*

Parameters

n *string* — MST configuration name. Case-sensitive (Range: 1-32 characters).

Default Setting

The default name is a bridge ID.

Command Mode

MST Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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 configuration revision number. To return to the default configuration, use the **no** form of this command.

Syntax

revision *value*

no revision

Parameters

n *value* — Configuration revision number (Range: 0-65535).

Default Setting

The default configuration revision number is 0.

Command Mode

MST Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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}

Parameters

- **current** — Indicates the current region configuration.
- **pending** — Indicates the pending region configuration.

Default Setting

This command has no default configuration.

Command Mode

MST Configuration mode

Command Usage

The pending MST region configuration takes effect only after exiting the MST configuration mode.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

MST Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

MST Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command exits the MST configuration mode without saving changes.

```
console(config) # spanning-tree mst configuration
console(config-mst) # abort
```

spanning-tree guard root

The **spanning-tree guard root** Interface Configuration (Ethernet, port-channel) mode command enables root guard on all spanning tree instances on the interface. Root guard prevents the interface from becoming the root port of the device. To disable root guard on the interface, use the **no** form of this command.

Syntax

spanning-tree guard root

no spanning-tree guard root

Parameters

There are no parameters for this command.

Default Setting

Root guard is disabled.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

Root guard can be enabled when the device operates in STP, RSTP, and MSTP.

When root guard is enabled, the port changes to the alternate state if spanning-tree calculations selects the port as the root port.

Example

The following command prevents Ethernet port e1 from being the root port of the device.

```
console(config) # interface ethernet e1
console(config-mst) # spanning-tree guard root
```

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

Parameters

- *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 Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

The mstp-rstp feature is enabled by default, so the example below illustrates how the show spanning-tree command output can be understood. Use the following guidelines when interpreting these results:

- Ignore the instrumented output from MST 0 and 15, they are for internal use only when mstp-rstp (PVST-Interoperability) is enabled.
- Instrumentation is only valid for switch port members of a VLAN that is a member of that specific MST instance.
- If out-of-band management is desired, follow these steps:

  1.Add a third VLAN to the VLAN database.

  2.Create MST Instance 3.

  3.Remove the new VLAN from MST Instance 15.

  4.Add the new VLAN to MST Instance 3.

  5.Save your changes.

  It is important to isolate the new VLAN to its own MST instance to preserve limited PVST/RPVST interoperability.

In the output below, VLAN 1 is a member of MST 1 and since switch ports e45 and e46 are static members of VLAN 1, the output below for MST 1 indicates that e45 is forwarding to the root of the STP domain and e46 is blocking and therefore the alternate path. VLAN 2 is a member of MST 2 and since switch ports e43 and e44 are static members of VLAN 1, the output below for MST 2 indicates that e43 is forwarding to the root of the STP domain and e44 is blocking and therefore the alternate path. Note: Results may be somewhat different in your specific environment. Just keep in mind that the purpose of the mstp-rstp feature is to isolate PVST Instances. When connecting the HP PC Blade Switch to any standards based Spanning-Tree infrastructure, this feature must be disabled and the switch must be reconfigured to interoperate using the appropriate IEEE Standardized Spanning-Tree Protocol.

Example

The following commands display spanning-tree information.

```
Console# show spanning-tree active

Spanning tree enabled mode MSTP
Default port cost method: short
MSTP to RSTP conversion:   Enabled

Gathering information .....
###### MST 0 Vlans Mapped:
CST Root ID          Priority    32768
                     Address     00:15:60:a0:e9:b0
                     This switch is root for CST and IST master
                     Hello Time 2 sec     Max Age 20 sec     Forward Delay 15 sec
                     Max hops    20

Name   State    Prio.Nbr  Cost  Sts  Role  PortFast  Type
----   -------  --------  ----- ---  ----  --------  ----------
e43    Enabled  128.43    4     Frw  Desg  No        P2p Intr
e44    Enabled  128.44    4     Frw  Desg  No        P2p Intr
e45    Enabled  128.45    4     Frw  Desg  No        P2p Intr
e46    Enabled  128.46    4     Frw  Gesg  No        P2p Intr

###### MST 1 Vlans Mapped: 1

Root                 Priority    24676
ID
                     Address     00:17:59:9f:9f:80
                     Path Cost   4
                     Root Port   e45
                     Rem hops    19
```

Bridge ID		Priority	61440				
		Address	00:15:60:a0:e9:b0				
Interfaces							
Name	State	Prio.Nbr	Cost	Sts	Role	PortFast	Type
----	-------	--------	-----	---	----	--------	----------
e43	Enabled	128.43	4	Frw	Desg	No	P2p Inter
e44	Enabled	128.44	4	Frw	Desg	No	P2p Inter
e45	Enabled	128.45	4	Frw	Root	No	P2p Inter
e46	Enabled	128.46	4	Blk	Altr	No	P2p Inter

MST 2 Vlans Mapped: 2

Root ID		Priority	24776				
		Address	00:17:59:9f:9f:80				
		Path Cost	4				
		Root Port	e43				
		Rem hops	19				
Bridge ID		Priority	61440				
		Address	00:15:60:a0:e9:b0				
Interfaces							
Name	State	Prio.Nbr	Cost	Sts	Role	PortFast	Type
----	-------	--------	-----	---	----	--------	----------
e43	Enabled	128.43	4	Frw	Root	No	P2p Inter
e44	Enabled	128.44	4	Blk	Altr	No	P2p Inter
e45	Enabled	128.45	4	Frw	Desg	No	P2p Inter
e46	Enabled	128.46	4	Frw	Desg	No	P2p Inter

MST 15Vlans Mapped:

```
Root ID         Priority    61440
                Address     00:15:60:a0:e9:b0
                This switch is the regional Root

Interfaces
Name    State       Prio.Nbr    Cost    Sts    Role    PortFast    Type
----    -------     --------    -----   ---    ----    --------    ----------
e43     Enabled     128.43      4       Frw    Desg    No          P2p Inter
e44     Enabled     128.44      4       Frw    Desg    No          P2p Inter
e45     Enabled     128.45      4       Frw    Desg    No          P2p Inter
e46     Enabled     128.46      4       Frw    Desg    No          P2p Inter
Console# show spanning-tree blockedports

Spanning tree enabled mode MSTP
Default port cost method: short
MSTP to RSTP conversion:   Enabled

Gathering information .....
###### MST 0 Vlans Mapped:
CST Root ID     Priority    32768
                Address     00:15:60:a0:e9:b0
                This switch is root for CST and IST master
                Hello Time 2 sec        Max Age 20 sec    Forward Delay 15 sec
                Max hops    20
Name    State       Prio.Nbr    Cost    Sts    Role    PortFast    Type
----    -------     --------    -----   ---    ----    --------    ----------


###### MST 1 Vlans Mapped: 1

Root ID         Priority    24676
                Address     00:17:59:9f:9f:80
                Path Cost   4
                Root Port   e45
                Rem hops    19
```

```
Bridge ID               Priority    61440
                        Address     00:15:60:a0:e9:b0
Interfaces
Name    State       Prio.Nbr    Cost    Sts    Role    PortFast    Type
----    -------     --------    -----   ---    ----    --------    ----------
e46     Enabled     128.46      4       Blk    Altr    No          P2p Inter

###### MST 2 Vlans Mapped: 2

Root                    Priority    24776
ID
                        Address     00:17:59:9f:9f:80
                        Path Cost   4
                        Root Port   e43
                        Rem hops    19

Bridge ID               Priority    61440
                        Address     00:15:60:a0:e9:b0
Interfaces
Name    State       Prio.Nbr    Cost    Sts    Role    PortFast    Type
----    -------     --------    -----   ---    ----    --------    ----------
e44     Enabled     128.44      4       Blk    Altr    No          P2p Inter

###### MST 15Vlans Mapped:

Root                    Priority    61440
ID
                        Address     00:15:60:a0:e9:b0
                        This switch is the regional Root
Interfaces
Name    State       Prio.Nbr    Cost    Sts    Role    PortFast    Type
----    -------     --------    -----   ---    ----    --------    ----------


Console# show spanning-tree detail active

Spanning tree enabled mode MSTP
Default port cost method: short
MSTP to RSTP conversion:   Enabled
```

```
Gathering information .....
###### MST 0 Vlans Mapped:
CST Root ID       Priority    32768
                  Address     00:15:60:a0:e9:b0
                  This switch is root for CST and IST master
                  Hello Time 2 sec      Max Age 20 sec    Forward Delay 15 sec
                  Max hops    20

Number of topology changes 10 last change occurred 00:04:14 ago
Times:  hold 1, topology change 35, notification 2
        hello 2, max age 20, forward delay 15

Port e43 enabled
State: Forwarding                       Role: designated
Port id: 128.43                         Port cost: 4
Type: P2p (configured: auto) Internal   Port Fast: No (configured:no)
Designated bridge Priority: 32768       Address: 00:15:60:a0:e9:b0
Designated port id: 128.43              Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 1
BPDU: sent 1634, received 1252

Port e44 enabled
State: Forwarding                       Role: designated
Port id: 128.44                         Port cost: 4
Type: P2p (configured: auto) Internal   Port Fast: No (configured:no)
Designated bridge Priority: 32768       Address: 00:15:60:a0:e9:b0
Designated port id: 128.44              Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 1
BPDU: sent 1568, received 1181

Port e45 enabled
State: Forwarding                       Role: designated
Port id: 128.45                         Port cost: 4
Type: P2p (configured: auto) Internal   Port Fast: No (configured:no)
Designated bridge Priority: 32768       Address: 00:15:60:a0:e9:b0
```

```
Designated port id: 128.45                      Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 1
BPDU: sent 3833, received 3765

Port e46 enabled
State: Forwarding                               Role: designated
Port id: 128.46                                 Port cost: 4
Type: P2p (configured: auto) Internal           Port Fast: No (configured:no)
Designated bridge Priority: 32768               Address: 00:15:60:a0:e9:b0
Designated port id: 128.46                      Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 1
BPDU: sent 3808, received 3735
###### MST 1 Vlans Mapped: 1
Root ID         Priority    24676
                Address     00:17:59:9f:9f:80
                Path Cost   4
                Root Port   e45
                Rem hops    19

Bridge ID       Priority    61440
                Address     00:15:60:a0:e9:b0

Number of topology changes 1 last change occurred 00:04:48 ago
Times:  hold 1, topology change 35, notification 2
        hello 2, max age 20, forward delay 15

Port e43 enabled
State: Forwarding                               Role: designated
Port id: 128.43                                 Port cost: 4
Type: P2p (configured: auto) Internal           Port Fast: No (configured:no)
Designated bridge Priority: 61440               Address: 00:15:60:a0:e9:b0
Designated port id: 128.43                      Designated path cost: 4
Guard root: Disabled
Number of transitions to forwarding state: 0
BPDU: sent 1637, received 1255
```

```
Port e44 enabled
State: Forwarding                          Role: designated
Port id: 128.44                            Port cost: 4
Type: P2p (configured: auto) Internal      Port Fast: No (configured:no)
Designated bridge Priority: 61440          Address:00:15:60:a0:e9:b0
Designated port id: 128.44                 Designated path cost: 4
Guard root: Disabled
Number of transitions to forwarding state: 0
BPDU: sent 1571, received 1183

Port e45 enabled
State: Forwarding                          Role: designated
Port id: 128.45                            Port cost: 4
Type: P2p (configured: auto) Internal      Port Fast: No (configured:no)
Designated bridge Priority: 24676          Address: 00:17:59:9f:9f:80
Designated port id: 128.45                 Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 1
BPDU: sent 3836, received 3767

Port e46 enabled
State: blocking                            Role: alternate
Port id: 128.46                            Port cost: 4
Type: P2p (configured: auto) Internal      Port Fast: No (configured:no)
Designated bridge Priority: 24676          Address: 00:17:59:9f:9f:80
Designated port id: 128.46                 Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 1
BPDU: sent 3811, received 3737

###### MST 2 Vlans Mapped: 2
Root ID         Priority    24776
                Address     00:17:59:9f:9f:80
                Path Cost   4
                Root Port   e43
                Rem hops    19
```

```
Bridge ID           Priority    61440
                    Address     00:15:60:a0:e9:b0

Number of topology changes 1 last change occurred 00:04:23 ago
Times:  hold 1, topology change 35, notification 2
        hello 2, max age 20, forward delay 15

Port e43 enabled
State: Forwarding                           Role: root
Port id: 128.43                             Port cost: 4
Type: P2p (configured: auto) Internal       Port Fast: No (configured:no)
Designated bridge Priority: 24776           Address: 00:17:59:9f:9f:80
Designated port id: 128.7                   Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 0
BPDU: sent 1639, received 1257

Port e44 enabled
State: Blocking                             Role: alternate
Port id: 128.44                             Port cost: 4
Type: P2p (configured: auto) Internal       Port Fast: No (configured:no)
Designated bridge Priority: 24776           Address:00:17:59:9f:9f:80
Designated port id: 128.8                   Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 0
BPDU: sent 1573, received 1185

Port e45 enabled
State: Forwarding                           Role: designated
Port id: 128.45                             Port cost: 4
Type: P2p (configured: auto) Internal       Port Fast: No (configured:no)
Designated bridge Priority: 61440           Address: 00:15:60:a0:e9:b0
Designated port id: 128.45                  Designated path cost: 4
Guard root: Disabled
Number of transitions to forwarding state: 1
BPDU: sent 3838, received 3769
```

```
Port e46 enabled
State: Forwarding                                Role: alternate
Port id: 128.46                                  Port cost: 4
Type: P2p (configured: auto) Internal            Port Fast: No (configured:no)
Designated bridge Priority: 61440                Address: 00:15:60:a0:e9:b0
Designated port id: 128.46                       Designated path cost: 4
Guard root: Disabled
Number of transitions to forwarding state: 1
BPDU: sent 3812, received 3739

###### MST 15 Vlans Mapped:
Root ID          Priority    61440
                 Address     00:15:60:a0:e9:b0
                 This switch is the regional Root

Number of topology changes 2 last change occurred 00:04:27 ago
Times:  hold 1, topology change 35, notification 2
        hello 2, max age 20, forward delay 15

Port e43 enabled
State: Forwarding                                Role: designated
Port id: 128.43                                  Port cost: 4
Type: P2p (configured: auto) Internal            Port Fast: No (configured:no)
Designated bridge Priority: 61440                Address: 00:15:60:a0:e9:b0
Designated port id: 128.43                       Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 0
BPDU: sent 1641, received 1259

Port e44 enabled
State: Forwarding                                Role: designated
Port id: 128.44                                  Port cost: 4
Type: P2p (configured: auto) Internal            Port Fast: No (configured:no)
Designated bridge Priority: 61440                Address: 00:15:60:a0:e9:b0
Designated port id: 128.44                       Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 0
BPDU: sent 1575, received 1187
```

```
Port e45 enabled
State: Forwarding                          Role: designated
Port id: 128.45                            Port cost: 4
Type: P2p (configured: auto) Internal      Port Fast: No (configured:no)
Designated bridge Priority: 61440          Address: 00:15:60:a0:e9:b0
Designated port id: 128.45                 Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 1
BPDU: sent 3840, received 3771

Port e46 enabled
State: Forwarding                          Role: alternate
Port id: 128.46                            Port cost: 4
Type: P2p (configured: auto) Internal      Port Fast: No (configured:no)
Designated bridge Priority: 61440          Address: 00:15:60:a0:e9:b0
Designated port id: 128.46                 Designated path cost: 0
Guard root: Disabled
Number of transitions to forwarding state: 1
BPDU: sent 3815, received 3741
```

spanning-tree pvst-interop

The **spanning-tree pvst-interop** privileged EXEC command configures the device for PVST/PVST+ interoperability.

Syntax

spanning-tree pvst-interop

To disable this feature, see the "spanning-tree mst mstp-rstp" command.

Parameters

This command has no arguments or keywords.

Default Setting

Enabled

Command Modes

Privileged EXEC

Command Usage

Before enabling this command the following is required:

- All switch ports set to port mode Access
- Number of configured VLANs is less then 16

If there is a VLAN to MSTP mapping, the software asks the user to confirm that the existing mapping will be deleted.

This command performs the following:

- Enable MSTP
- Map each VLAN to MSTP instance
- Enable spanning-tree mst mstp-rstp feature

The commands that shown in the startup-config, or running-config files, are the configuration commands executed by the script and not the command itself.

Example

The following command executes a script that configures the device for PVST/PVST+ interoperability.

```
Console# spanning-tree pvst-interop
```

spanning-tree mst mstp-rstp

The **spanning-tree mst mstp-rstp** interface configuration command configures the port to convert RSTP packets to MSTP instances. Use the **no** form of this command to disable this feature.

When interoperating with switches that do not support or are not configured for Per VLAN Spanning-Tree (PVST/PVST+) disable this feature and configure the HP PC Blade switch to use the matching IEEE standard Spanning-Tree Protocol mode.

- When MSTP-to-RSTP is enabled (enabled by default), attempting to put any switch port into trunk or general mode will cause the following error message: **Port <Number>, extension separated-bridge exist**. This feature does not support VLAN Trunking (a.k.a VLAN Tagging).

Syntax

spanning-tree mst mstp-rstp

no spanning-tree mst mstp-rstp

Parameters

This command has no arguments or keywords.

Default Setting

Enabled.

Command Modes

Global Configuration mode

Command Usage

This feature can only be enabled when the switch is configured for **spanning-tree mode mstp**.

This is a non-standard feature that maps an individual PVST instance [e.g., Cisco PVST/PVST+ or Rapid PVST/PVST+] to an individual MSTP instance over a statically assigned VLAN.

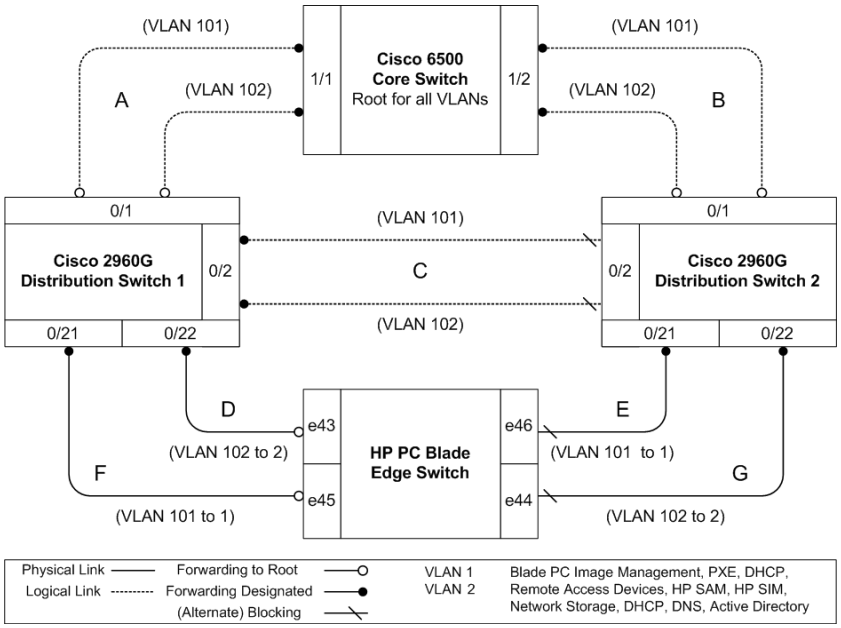
Ingress BPDUs are handled by the internal MSTP instance for which the participating static VLAN switch port is assigned.

The egress Spanning-Tree BPDU will have a bridge ID composed of the configured priority for the switch multiplied by 4096, plus the VLAN ID assigned to the egress port, concatenated to the bridge MAC address.

By default, all external switch port egress IEEE 802.1w BPDUs. If the port encounters a legacy IEEE 802.1D BPDU, the conversion process will communicate with the legacy version.

For this feature to work as expected, only one VLAN can be assigned to each switch port on both the upstream and downstream switch. Since the switch ports are Access mode, the VLANs on each side of the link do not need to have the same VLAN ID. If desirable, the VLAN assigned to the HP PC Blade Switch can be changed so that its ID matches the VLAN ID of the upstream switch.

Example



Description

- VLAN 1 assigned to all odd ports e1 - e39, e45 & e46.
- VLAN 2 assigned to all even ports e2 - e40, e43 & e44.

This reference design illustrates how four uplinks can connect the HP PC Blade Switch to two separate aggregation switches forming a fully redundant network. If either link A & C or D were to fail, link E would take over. HP recommends starting with this example for Cisco networks using PVST/PVST+ where you want switch-based redundancy. If either link A & C or D were to fail, link E and G would take over.

Network Considerations

- You can deploy the HP PC Blade Switch into this scenario without making changes to the default configuration.
- For Cisco networks running PVST/PVST+, links A, B, and C may use either 802.1q or ISL.encapsulation.
- In this scenario 802.1q (Virtual Bridged VLAN) can be used on links D, E, F, or G.
- You can achieve VLAN Load Balancing by reversing the links at the aggregation layer for links E and F. Optimal load balancing may depend upon the configuration of the rest of the network, and further optimization may require addition configuration.
- For large deployments, 802.1w may be a better option because the same type of redundancy can be achieved with two instead of four uplinks.

23

SSH Commands

ip ssh port

The **ip ssh port** Global Configuration mode command specifies the port to be used by the SSH server. To return to the default configuration, use the **no** form of this command.

Syntax

ip ssh port *port-number*

no ip ssh port

Parameters

n *port-number* — Port number for use by the SSH server (Range: 1-65535).

Default Setting

The default port number is 22. SSH is disabled by default.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To disable this function, use the **no** form of this command.

Syntax

ip ssh server

no ip ssh server

Parameters

There are no parameters for this command.

Default Setting

Device configuration from a SSH server is enabled. SSH is disabled by default.

Command Mode

Global Configuration mode

Command Usage

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 command 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

Parameters

There are no parameters for this command.

Default Setting

DSA key pairs do not exist.

Command Mode

Global Configuration mode

Command Usage

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 command 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

Parameters

There are no parameters for this command.

Default Setting

RSA key pairs do not exist.

Command Mode

Global Configuration mode

Command Usage

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 command 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. To disable this function, use the **no** form of this command.

Syntax

ip ssh pubkey-auth

no ip ssh pubkey-auth

Parameters

There are no parameters for this command.

Default Setting

Public Key authentication for incoming SSH sessions is disabled.

Command Mode

Global Configuration mode

Command Usage

AAA authentication is independent

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

No keys are specified.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following example shows how to enter the SSH Public Key-chain Configuration mode and manually configure 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. To remove an SSH public key, use the **no** form of this command.

Syntax

user-key *username* {**rsa** | **dsa**}

no user-key *username*

Parameters

- *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 Setting

No SSH public keys exist.

Command Mode

SSH Public Key-string Configuration mode

Command Usage

Follow this command with the **key-string** SSH Public Key-String Configuration mode command to specify the key.

Example

The following commands enable 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*

Parameters

- **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 Setting

No keys exist.

Command Mode

SSH Public Key-string Configuration mode

Command Usage

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 command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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 username    Version     Cipher    Auth Code
---------       ----------      ---------   -------   ----------
172.16.0.1      John Brown      2.0 3       DES       HMAC-SHA1
```

The following table describes significant fields shown in the example.

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)

24

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. To disable the logging process, use the **no** form of this command.

Syntax

logging on

no logging on

Parameters

There are no parameters for this command.

Default Setting

Logging is enabled.

Command Mode

Global Configuration mode

Command Usage

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 command enables logging error messages.

```
Console(config)# logging on
```

logging

The **logging** Global Configuration mode command logs messages to a syslog server. To delete the syslog server with the specified address from the list of syslogs, use the **no** form of this command.

Syntax

logging {*ip-address* | *hostname*} [**port** *port*] [**severity** *level*] [**facility** *facility*] [**description** *text*]

no logging {*ip-address* | *hostname*}

Parameters

- ip-address — IP address of the host to be used as a syslog server.
- *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**, **local6**, **local7**.
- *text* — Syslog server description. (Range: 1-64 characters)

Default Setting

The default port number is 514.

The default logging message level is **informational**.

The default facility is local7.

Command Mode

Global Configuration mode

Command Usage

Up to 8 syslog servers can be used.

If no severity level is specified, the global values apply to each server.

Example

The following command 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. To disable logging to the console, use the **no** form of this command.

Syntax

logging console *level*

no logging console

Parameters

n *level* — Specifies the severity level of logged messages displayed on the console. Possible values: **emergencies**, **alerts**, **critical**, **errors**, **warnings**, **notifications**, **informational** and **debugging**.

Default Setting

The default severity level is **informational**.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To cancel using the buffer, use the **no** form of this command.

Syntax

logging buffered *level*

no logging buffered

Parameters

n *level* — Specifies the severity level of messages logged in the buffer. Possible values: **emergencies**, **alerts**, **critical**, **errors**, **warnings**, **notifications**, **informational** and **debugging**.

Default Setting

The default severity level is **informational**.

Command Mode

Global Configuration mode

Command Usage

All the syslog messages are logged to the internal buffer. This command limits the messages displayed to the user.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

logging buffered size *number*

no logging buffered size

Parameters

n *number* — Specifies the maximum number of messages stored in the history table. (Range: 20-400)

Default Setting

The default number of messages is 200.

Command Mode

Global Configuration mode

Command Usage

This command takes effect only after Reset.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command clears messages from the internal logging buffer.

```
Console# clear logging
Clear logging buffer [confirm]
```

logging file

The **logging file** Global Configuration mode command limits syslog messages sent to the logging file based on severity. To cancel using the buffer, use the **no** form of this command.

Syntax

logging file *level*

no logging file

Parameters

n *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 Setting

The default severity level is **errors**.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command clears messages from the logging file.

```
Console# clear logging file
Clear Logging File [confirm]
```

aaa logging

The **aaa logging** Global Configuration mode command enables logging AAA login events. To disable logging AAA login events, use the **no** form of this command.

Syntax

aaa logging login

no aaa logging login

Parameters

n **login** — Indicates logging messages related to successful login events, unsuccessful login events and other login-related events.

Default Setting

Logging AAA login events is enabled.

Command Mode

Global Configuration mode

Command Usage

Other types of AAA events are not subject to this command.

Example

The following command 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. To disable logging file system events, use the **no** form of this command.

Syntax

file-system logging copy

no file-system logging copy

file-system logging delete-rename

no file-system logging delete-rename

Parameters

- **copy** — Indicates logging messages related to file copy operations.
- **delete-rename** — Indicates logging messages related to file deletion and renaming operations.

Default Setting

Logging file system events is enabled.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To disable logging management access list events, use the **no** form of this command.

Syntax

management logging deny

no management logging deny

Parameters

n **deny** — Indicates logging messages related to deny actions of management ACLs.

Default Setting

Logging management ACL events is enabled.

Command Mode

Global Configuration mode

Command Usage

Other types of management ACL events are not subject to this command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the state of logging and the syslog messages stored in the internal buffer.

```
console# show logging
Logging is enabled.
Console Logging: Level info. Console Messages: 0 Dropped.
Buffer Logging: Level info. Buffer Messages: 65 Logged, 65 Displayed, 200 Max.
File Logging: Level error. File Messages: 0 Logged, 68 Dropped.
4 messages were not logged


Application filtering control
Application             Event                Status
--------------------    --------------------    ---------
AAA                  Login                Enabled
File system             Copy                 Enabled
File system             Delete-Rename           Enabled
Management ACL          Deny                 Enabled
19-Nov-2004 20:03:42 :%STP-W-PORTSTATUS: e42 of instance 1: STP status Forwarding
19-Nov-2004 20:03:42 :%LINK-I-Up:  e43
19-Nov-2004 20:03:42 :%LINK-I-Up:  Vlan 2
19-Nov-2004 20:03:42 :%LINK-I-Up:  e45
19-Nov-2004 20:03:42 :%LINK-I-Up:  e42
```

```
19-Nov-2004 20:03:42 :%LINK-I-Up:  e41
19-Nov-2004 20:03:42 :%LINK-I-Up:  Vlan 1
19-Nov-2004 20:03:40 :%LINK-W-Down:  e41
19-Nov-2004 20:03:40 :%LINK-W-Down:  e46
19-Nov-2004 20:03:40 :%LINK-W-Down:  e45
19-Nov-2004 20:03:40 :%LINK-W-Down:  e44
19-Nov-2004 20:03:40 :%LINK-W-Down:  e43
19-Nov-2004 20:03:40 :%LINK-W-Down:  e42
19-Nov-2004 20:03:40 :%LINK-W-Down:  Vlan 1
19-Nov-2004 20:03:40 :%LINK-I-Up:  e41
19-Nov-2004 20:03:40 :%LINK-W-Down:  e40
19-Nov-2004 20:03:40 :%LINK-W-Down:  e39
19-Nov-2004 20:03:40 :%LINK-W-Down:  e38
19-Nov-2004 20:03:40 :%LINK-W-Down:  e37
19-Nov-2004 20:03:40 :%LINK-W-Down:  e36
19-Nov-2004 20:03:40 :%LINK-W-Down:  e35
19-Nov-2004 20:03:40 :%LINK-W-Down:  e34
19-Nov-2004 20:03:40 :%LINK-W-Down:  e33
19-Nov-2004 20:03:40 :%LINK-I-Up:  Vlan 1
19-Nov-2004 20:03:40 :%LINK-W-Down:  e32
19-Nov-2004 20:03:40 :%LINK-W-Down:  e31
19-Nov-2004 20:03:40 :%LINK-W-Down:  e30
19-Nov-2004 20:03:40 :%LINK-W-Down:  e29
19-Nov-2004 20:03:40 :%LINK-W-Down:  e28
19-Nov-2004 20:03:40 :%LINK-W-Down:  e27
19-Nov-2004 20:03:40 :%LINK-W-Down:  e26
19-Nov-2004 20:03:40 :%LINK-W-Down:  e25
19-Nov-2004 20:03:39 :%LINK-W-Down:  e24
19-Nov-2004 20:03:39 :%LINK-W-Down:  e23
19-Nov-2004 20:03:39 :%LINK-W-Down:  e22
19-Nov-2004 20:03:39 :%LINK-W-Down:  e21
19-Nov-2004 20:03:39 :%LINK-W-Down:  e20
19-Nov-2004 20:03:39 :%LINK-W-Down:  e19
19-Nov-2004 20:03:39 :%LINK-W-Down:  e18
19-Nov-2004 20:03:39 :%LINK-W-Down:  e17
19-Nov-2004 20:03:39 :%LINK-W-Down:  e16
19-Nov-2004 20:03:39 :%LINK-W-Down:  e15
19-Nov-2004 20:03:39 :%LINK-W-Down:  e14
19-Nov-2004 20:03:39 :%LINK-W-Down:  e13
19-Nov-2004 20:03:39 :%LINK-W-Down:  e12
```

```
19-Nov-2004 20:03:39 :%LINK-W-Down:  e11
19-Nov-2004 20:03:39 :%LINK-W-Down:  e10
19-Nov-2004 20:03:39 :%LINK-W-Down:  e9
19-Nov-2004 20:03:39 :%LINK-W-Down:  e8
19-Nov-2004 20:03:39 :%LINK-W-Down:  e7
19-Nov-2004 20:03:39 :%LINK-W-Down:  e6
19-Nov-2004 20:03:39 :%LINK-W-Down:  e5
19-Nov-2004 20:03:39 :%LINK-W-Down:  e4
19-Nov-2004 20:03:39 :%LINK-W-Down:  e3
19-Nov-2004 20:03:39 :%LINK-W-Down:  e2
19-Nov-2004 20:03:39 :%LINK-W-Down:  e1
19-Nov-2004 20:03:33 :%SNMP-I-CDBITEMSNUM: Number of startup configuration items loaded: 4172
19-Nov-2004 20:03:33 :%SNMP-I-CDBITEMSNUM: Number of running configuration items loaded: 4172
19-Nov-2004 20:03:33 :%Box-I-SFP-PRESENT-CHNG: SFP# 4 status is - present.
19-Nov-2004 20:03:33 :%Box-I-SFP-PRESENT-CHNG: SFP# 2 status is - present.
19-Nov-2004 20:03:33 :%Box-I-SFP-PRESENT-CHNG: SFP# 4 status is - present.
19-Nov-2004 20:03:33 :%Box-I-SFP-PRESENT-CHNG: SFP# 3 status is - not present.
19-Nov-2004 20:03:33 :%Box-I-SFP-PRESENT-CHNG: SFP# 2 status is - present.
19-Nov-2004 20:03:33 :%Box-I-SFP-PRESENT-CHNG: SFP# 1 status is - not present.
19-Nov-2004 20:03:33 :%INIT-I-InitCompleted: Initialization task is completed
```

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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the logging state and the syslog messages stored in the logging file.

The default File Logging level is error only..

```
console# show logging file
Logging is enabled.
Console Logging: Level info. Console Messages: 0 Dropped.
Buffer Logging: Level info. Buffer Messages: 77 Logged, 77 Displayed, 200 Max.
File Logging: Level error. File Messages: 0 Logged, 80 Dropped.
4 messages were not logged

Application filtering control
Application          Event              Status
-------------------- ------------------ ---------
AAA                  Login              Enabled
File system          Copy               Enabled
File system          Delete-Rename      Enabled
Management ACL       Deny               Enabled
```

25

System Management Commands

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*]

Parameters

- *ip-address* — IP address to ping.
- *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 Setting

Default buffer size is 56 bytes.

Default number of packets to send is 4.

Default timeout value is 2000 milliseconds.

Command Mode

User EXEC mode

Command Usage

Press **Esc** to stop pinging.

Following are examples of unsuccessful pinging:

- *Destination does not respond* — If the host does not respond, a “no answer from host” appears in ten seconds.
- *Destination unreachable* — The gateway for this destination indicates that the destination is unreachable.
- *Network or host unreachable* — The device found no corresponding entry in the route table.

Example

The following command 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*]

Parameters

- *ip-address* — IP address of the destination host.
- *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 Setting

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

Command Usage

The **traceroute** command takes advantage of the error messages generated by the devices 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 device 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 device 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 command discovers the routes that packets will actually take when traveling to their destination.

```
Console# traceroute 192.168.2.5


Tracing the route to 192.168.2.5 (192.168.2.5), 30 hops max, 40 byte packets
Type Esc to abort.
1 192.168.2.5 (192.168.2.5) <20 ms <20 ms <20 ms

Trace complete.
Console#
```

The following table describes significant fields shown in the example.

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*.....]

Parameters

- *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 Command Usage.
- *keyword* — One or more keywords listed in the Keywords table in the Command Usage.

Default Setting

The default port is the Telnet port (decimal23) on the host.

Command Mode

User EXEC mode

Command Usage

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.

Telnet Sequence

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, as shown in the following example. 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
Ctrl-shift-6 x suspends the session (return to system command prompt)
```

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 on-screen 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.
Ctrl-shift-6 x	Return to system command prompt.

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

Keyword	Description	Port Number
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 command connects 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*]

Parameters

n *connection* — The connection number. (Range: 1-4 connections)

Default Setting

The default connection number is that of the most recent connection.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

Caution should be exercised when resetting the device, to ensure that no other activity is being performed. In particular, the user should verify that no configuration files are being downloaded at the time of reset.

Example

The following command reloads the operating system.

```
Console# reload

This command will reset the whole system and disconnect your current session. Do you want to
continue (y/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

Parameters

n *name* — The host name. of the device. (Range: 1-158 characters)

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command specifies the device host name.

```
Console(config)# hostname HP
HP(config)#
```

show users

The **show users** User EXEC mode command displays information about the active users.

Syntax

show users

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

There is no default configuration for this command.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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 in the example.

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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the system information.

```
Console# show system

Unit            Type
----            ----------------
1               HP 6300

Unit            Main Power Supply               Redundant Power Supply
----            -----------------               ----------------------
1               OPERATI                         NOT OPERATIONAL
                ONAL

                Fan1        Fan2        Fan3        Fan4        Fan5
                ----        ----        ----        ----        ----
                OK          OK          OK          OK          OK
```

show version

The **show version** User EXEC mode command displays system version information.

Syntax

show version

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays system version information (only for demonstration purposes).

```
Console> show version

SW version 1.0.0.0                (date 23-Jul-2005 time 17:34:19)
Boot version 1.0.0.0              (date 11-Jan-2005 time 11:48:21)
HW version 1.0.0

                SW version      Boot version        HW version
                ----------      ------------        ----------
                1.0.0.0         2.178               1.0.0
                1.0.0.0         2.178               1.0.0
```

service cpu-utilization

The **service cpu-utilization** Global Configuration mode command enables measuring CPU utilization. To return to the default configuration, use the **no** form of this command.

Syntax

service cpu-utilization

no service cpu-utilization

Parameters

There are no parameters for this command.

Default Setting

Disabled.

Command Mode

Global Configuration mode

Command Usage

Use the **show cpu utilization** Privileged EXEC command to view information on CPU utilization.

Example

The following command enables measuring CPU utilization.

```
Console(config)# service cpu-utilization
```

show cpu utilization

The **show cpu utilization** Privileged EXEC mode command displays information about CPU utilization.

Syntax

show cpu utilization

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

Use the **service cpu-utilization** Global Configuration mode command to enable measuring CPU utilization.

Example

The following command displays CPU utilization information.

```
Console# show cpu utilization

CPU utilization service is on.

CPU utilization
-------------------------------------------------
five seconds: 5%; one minute: 3%; five minutes: 3%
```

26

TACACS+ Commands

tacacs-server host

The **tacacs-server host** Global Configuration mode command specifies a TACACS+ host. To delete the specified name or address, use the **no** form of this command.

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*}

Parameters

- *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 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 Setting

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

Command Usage

Multiple **tacacs-server host** commands can be used to specify multiple hosts.

Example

The following command 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. To disable the key, use the **no** form of this command.

Syntax

tacacs-server key *key-string*

no tacacs-server key

Parameters

n *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 used on the TACACS+ daemon. (Range: 0-128 characters)

Default Setting

Empty string.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command sets the authentication encryption key.

```
Console(config)# tacacs-server key hp-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. To return to the default configuration, use the **no** form of this command.

Syntax

tacacs-server timeout *timeout*

no tacacs-server timeout

Parameters

n *timeout* — Specifies the timeout value in seconds. (Range: 1-30)

Default Setting

5 seconds

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

tacacs-server source-ip *source*

no tacacs-server source-ip *source*

Parameters

n *source* — Specifies the source IP address.

Default Setting

The source IP address is the address of the outgoing IP interface.

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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*]

Parameters

n *ip-address* — Name or IP address of the TACACS+ server.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays configuration and statistical information about a TACACS+ server.

```
Console# show tacacs

Device Configuration
--------------------

IP address      Status      Port    Single Connection  TimeOut  Source IP  Priority
----------      ------      ----    ------------------ -------  ---------  --------
172.16.1.1      Connected   49      No                 Global   Global     1

Global values
-------------
TimeOut: 3
Device Configuration
--------------------
Source IP: 172.16.8.1
```

27

User Interface Commands

do

The **do** command executes an EXEC-level command from the Global Configuration mode or any configuration submode.

Syntax

do

Parameters

The EXEC command to be executed.

Default Setting

This command has no default configuration.

Command Mode

All configuration modes

Command Usage

There are no user guidelines for this command.

Example

The following command executes an EXEC-level command **show vlan** from the Global Configuration mode.

```
Console(Config)# do show vlan

Vlan     Name                Ports              Type     Authorization
---- ---------------- --------------------------- ------------ -------------
 1        1       e(1,3,5,7,9,11,13,15,17,19,  permanent     Required
                  21,23,25,27,29,31,33,35,37,
                  39,41-42,45-46)
 2        2       e(2,4,6,8,10,12,14,16,18,    permanent     Required
                  20,22,24,26,28,30,32,34,36,
                  38,40,43-44)
```

enable

The **enable** User EXEC mode command enters the Privileged EXEC mode.

Syntax

enable [*privilege-level*]

Parameters

n *privilege-level* — Privilege level to enter the system. (Range: 1-15)

Default Setting

The default privilege level is 15.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command enters the 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*]

Parameters

n *privilege-level* — Privilege level to enter the system. (Range: 1-15)

Default Setting

The default privilege level is 1.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command returns to Users EXEC mode.

```
Console# disable
Console>
```

login

The **login** User EXEC mode command changes a login username.

Syntax

login

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command enters the 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

All configuration modes

Command Usage

There are no user guidelines for this command.

Example

The following command changes the configuration mode from Interface Configuration mode to Privileged EXEC mode.

```
Console(config)#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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged and User EXEC modes

Command Usage

There are no user guidelines for this command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

All configuration modes.

Command Usage

There are no user guidelines for this command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

All command modes

Command Usage

There are no user guidelines for this command.

Example

The following command 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 data-dump

The **terminal data-dump** User EXEC mode command enables dumping all the output of a show command without prompting. To disable dumping, use the **no** form of this command.

Syntax

terminal data-dump

no terminal data-dump

Parameters

There are no parameters for this command.

Default Setting

Dumping is disabled.

Command Mode

User EXEC mode

Command Usage

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

The following command dumps all output immediately after entering a show command.

```
Console> terminal data-dump
```

show history

The **show history** User EXEC mode command lists the commands entered in the current session.

Syntax

show history

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

User EXEC mode

Command Usage

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 command displays all the commands entered while in the current Privileged EXEC mode.

```
Console# show history


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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged and User EXEC modes

Command Usage

There are no user guidelines for this command.

Example

The following command displays the current privilege level for the Privileged EXEC mode.

```
Console# show privilege
Current privilege level is 15
```

28

VLAN Commands

vlan database

The **vlan database** Global Configuration mode command enters the VLAN Configuration mode.

Syntax

vlan database

Parameters

There are no parameters for this command.

Default Setting

Two VLANs are assigned in the VLAN database:

- VLAN 1
- VLAN 2

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command enters the VLAN database mode.

```
Console(config)# vlan database
console(config-vlan)#
```

vlan

Use the **vlan** VLAN Configuration mode command to create a VLAN. To delete a VLAN, use the **no** form of this command.

Syntax

vlan *vlan-range*

no vlan *vlan-range*

Parameters

n *vlan-range* — Specifies a list of VLAN IDs to be added. Separate nonconsecutive VLAN IDs with a comma and no spaces; a hyphen designates a range of IDs.

Default Setting

This command has no default configuration.

Command Mode

VLAN Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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*

Parameters

- *vlan-id* — Specifies an existing VLAN ID.

Default Setting

Two interfaces are configured and set to DHCP:

- one on VLAN 1
- one on VLAN 2

Command Mode

Global Configuration mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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
```

interface range vlan

The **interface range vlan** Global Configuration mode command enables simultaneously configuring multiple of VLANs.

Syntax

interface range vlan {*vlan-range* | **all**}

Parameters

- *vlan-range* — Specifies a list of VLAN IDs to be added. Separate nonconsecutive VLAN IDs with a comma and no spaces; a hyphen designates a range of IDs.
- **all** — All existing static VLANs.

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

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.

Example

The following command groups VLANs 221 to 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. To remove the VLAN name, use the **no** form of this command.

Syntax

name *string*

no name

Parameters

n *string* — Unique name to be associated with this VLAN. (Range: 1-32 characters)

Default Setting

No name is defined.

Command Mode

Interface Configuration (VLAN) mode. Cannot be configured for a range of interfaces (range context).

Command Usage

There are no user guidelines for this command.

Example

The following command gives VLAN number 19 the name **Marketing**.

```
Console(config)# interface vlan 19
Console(config-if)# name Marketing
```

switchport mode

The **switchport mode** Interface Configuration mode command configures the VLAN membership mode of a port. To return to the default configuration, use the **no** form of this command.

Syntax

switchport mode {access | trunk | general}

no switchport mode

Parameters

- **access** — Indicates an untagged layer 2 VLAN port.
- **trunk** — Indicates a trunking layer 2 VLAN port.
- **general** — Indicates a full 802-1q supported VLAN port.

Default Setting

All ports are in access mode. All ports do not all belong to the default VLAN. By default, odd ports 1-41, 42, 45, and 46 are all in VLAN 1. The remaining ports are in VLAN 2.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

- When MSTP-to-RSTP is enabled (enabled by default) attempting to put any switch port into trunk or general mode will cause the following error message: **Port <Number>, extension separated-bridge exist**. This feature must be disabled before the switch can support these modes. Please see spanning-tree mst mstp-rstp for more information.

Example

The following command configures Ethernet port e42 as an untagged layer 2 VLAN port.

```
Console(config)# interface ethernet e42
Console(config-if)# switchport mode access
```

switchport access vlan

The **switchport access vlan** Interface Configuration mode command configures the VLAN ID when the interface is in access mode. To return to the default configuration, use the **no** form of this command.

Syntax

switchport access vlan {*vlan-id* **| dynamic}**

no switchport access vlan

Parameters

- *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 Setting

Odd ports 1-41, 42, 45, and 46 are all in VLAN 1. The remaining ports are in VLAN 2.

Command Mode

Interface configuration (Ethernet, port-channel) mode

Command Usage

The command automatically removes the port from the previous VLAN and adds it to the new VLAN.

- When MSTP-to-RSTP is enabled (enabled by default) attempting to put any switch port into trunk or general mode will cause the following error message: **Port <Number>, extension separated-bridge exist**. This feature must be disabled before the switch can support these modes. Please see spanning-tree mst mstp-rstp for more information.

Example

The following command configures Ethernet port e42 in access mode to be member of VLAN 23.

```
Console(config)# interface ethernet e42
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***}**

Parameters

- **add** *vlan-list* — List of VLAN IDs to be added. Separate nonconsecutive 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 nonconsecutive VLAN IDs with a comma and no spaces. A hyphen designates a range of IDs.

Default Setting

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

- When MSTP-to-RSTP is enabled (enabled by default) attempting to put any switch port into trunk or general mode will cause the following error message: **Port <Number>, extension separated-bridge exist**. This feature must be disabled before the switch can support these modes. Please see spanning-tree mst mstp-rstp for more information.

Example

The following command adds VLANs 1, 2, 5 to 6 to the allowed list of Ethernet port e42.

```
Console(config)# interface ethernet e42
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. To return to the default configuration, use the **no** form of this command.

Syntax

switchport trunk native vlan *vlan-id*

no switchport trunk native vlan

Parameters

n *vlan-id*— Specifies the ID of the native VLAN.

Default Setting

This command has no default configuration.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

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.

- When MSTP-to-RSTP is enabled (enabled by default) attempting to put any switch port into trunk or general mode will cause the following error message: **Port <Number>, extension separated-bridge exist**. This feature must be disabled before the switch can support these modes. Please see spanning-tree mst mstp-rstp for more information.

Example

The following command configures VLAN number 123 as the native VLAN when Ethernet port e42 is in trunk mode.

```
Console(config)# interface ethernet e42
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-lis*t

Parameters

- **add** *vlan-list* — Specifies the list of VLAN IDs to be added. Separate nonconsecutive 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 nonconsecutive 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 Setting

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

Command Usage

This command enables changing the egress rule (e.g., from tagged to untagged) without first removing the VLAN from the list.

- When MSTP-to-RSTP is enabled (enabled by default) attempting to put any switch port into trunk or general mode will cause the following error message: **Port <Number>, extension separated-bridge exist**. This feature must be disabled before the switch can support these modes. Please see spanning-tree mst mstp-rstp for more information.

Example

The following commands add VLANs 2, 5, and 6 to the allowed list of Ethernet port e45 .

```
Console(config)# interface ethernet e45
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. To return to the default configuration, use the **no** form of this command.

Syntax

switchport general pvid *vlan-id*

no switchport general pvid

Parameters

n *vlan-id* — Specifies the PVID (Port VLAN ID).

Default Setting

If the default VLAN is enabled, PVID = 1. Otherwise, PVID=4095.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

- When MSTP-to-RSTP is enabled (enabled by default) attempting to put any switch port into trunk or general mode will cause the following error message: **Port <Number>, extension separated-bridge exist**. This feature must be disabled before the switch can support these modes. Please see spanning-tree mst mstp-rstp for more information.

Example

The following commands configure the PVID for Ethernet port e42, when the interface is in general mode.

```
Console(config)# interface ethernet e42
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. Ingress filtering discards frames to VLAN where port does not belong. To return to the default configuration, use the **no** form of this command.

Syntax

switchport general ingress-filtering disable

no switchport general ingress-filtering disable

Parameters

There are no parameters for this command.

Default Setting

Ingress filtering is enabled.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

The following commands disable port ingress filtering on Ethernet port e42.

```
Console(config)# interface ethernet e42
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. To return to the default configuration, use the **no** form of this command.

Syntax

switchport general acceptable-frame-type tagged-only

no switchport general acceptable-frame-type tagged-only

Parameters

There are no parameters for this command.

Default Setting

All frame types are accepted at ingress.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

There are no user guidelines for this command.

Example

The following commands configure Ethernet port e42 to discard untagged frames at ingress.

```
Console(config)# interface ethernet e42
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***}**

Parameters

- **add** *vlan-list* — Specifies the list of VLAN IDs to be added. Separate nonconsecutive 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 nonconsecutive VLAN IDs with a comma and no spaces. A hyphen designates a range of IDs.

Default Setting

All VLANs are allowed.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

This command can be used to prevent GVRP from automatically making the specified VLANs active on the selected ports.

Example

The following command forbids adding VLAN IDs 234 to 256 to Ethernet port e42.

```
Console(config)# interface ethernet e42
Console(config-if)# switchport forbidden vlan add 234-256
```

ip internal-usage-vlan

The **ip internal-usage-vlan** Interface Configuration mode command reserves a VLAN as the internal usage VLAN of an interface. To return to the default configuration, use the **no** form of this command.

Syntax

ip internal-usage-vlan *vlan-id*

no ip internal-usage-vlan

Parameters

- *vlan-id* — Specifies the ID of the internal usage VLAN.

Default Setting

The software reserves a VLAN as the internal usage VLAN of an interface.

Command Mode

Interface Configuration (Ethernet, port-channel) mode

Command Usage

- 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 wants to configure an IP interface, an unused VLAN is selected by the software.
- If the software selected a VLAN for internal use and the user wants to use that VLAN as a static or dynamic VLAN, the user should do one of the following:
- Remove the IP interface.
- Use this command to explicitly configure a different VLAN as the internal usage VLAN.
- Create the VLAN and recreate the IP interface.

Example

The following command reserves an unused VLAN 1236 as the internal usage VLAN of ethernet port e41.

```
Console(config)# interface ethernet e41
Console(config-if)# ip internal-usage-vlan 1236
```

show vlan

The **show vlan** Privileged EXEC mode command displays VLAN information.

Syntax

show vlan [**id** *vlan-id* | **name** *vlan-name*]

Parameters

- *vlan-id* — specifies a VLAN ID
- *vlan-name* — Specifies a VLAN name string. (Range: 1-32 characters)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays all VLAN information.

```
Console# show vlan

VLAN  Name        Ports          Type     Authorization
----  ----------  -------------  -------  -------------
1     default     e1-e2, e1-e4   other    Required
10    VLAN0010    e3-e4          dynamic  Required
11    VLAN0011    e1-e2          static   Required
20    VLAN0020    e3-e4          static   Required
21    VLAN0021                   static   Required
30    VLAN0030                   static   Required
31    VLAN0031                   static   Required
91    VLAN0011    e1-e2          static   Not Required
3978  Guest VLAN  e17            guest    -
```

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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays VLANs used internally by the device.

```
Console# show vlan internal usage

VLAN        Usage       IP Address    Reserved
----        ---------   ----------    --------
1007        Eth e21     Active        No
1008        Eth e22     Inactive      Yes
1009        Eth 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***}**

Parameters

- *interface* — A valid Ethernet port number.
- *port-channel-number* — A valid port-channel number.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command displays the switchport configuration for Ethernet port e1.

```
Console# show interface switchport ethernet e1


Port e1:
VLAN Membership mode: General

Operating parameters:
PVID: 1 (default)
Ingress Filtering: Enabled
Acceptable Frame Type: All
GVRP status: Enabled
Protected: Enabled, Uplink is e45.

Port e1 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 e1 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** e2

Port e2:
VLAN Membership mode: General

Operating parameters:
PVID: 4095 (discard vlan)
Ingress Filtering: Enabled
Acceptable Frame Type: All

Port e1 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 e2 is statically configured to:
VLAN        Name            Egress rule
----        ------------    -----------
8           VLAN0072        untagged
91          IP Telephony    tagged

Forbidden VLANS:
VLAN        Name
----        ----
73          out

Port e19

Static configuration:
PVID: 2922
Ingress Filtering: Enabled
Acceptable Frame Type: Untagged
GVRP status: Disabled
```

29

Web Server Commands

ip http server

The **ip http server** Global Configuration mode command enables configuring the device from a browser. To disable this function, use the **no** form of this command.

Syntax

ip http server

no ip http server

Parameters

There are no parameters for this command.

Default Setting

HTTP server is enabled.

Command Mode

Global Configuration

Command Usage

Only a user with access level 15 can use the Web server.

Example

The following command enables configuring the device from a browser.

```
Console(config)#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. To return to the default configuration, use the **no** form of this command.

Syntax

ip http port *port-number*

no ip http port

Parameters

n *port-number* — Port number for use by the HTTP server. (Range: 0-65535)

Default Setting

The default port number is 80.

Command Mode

Global Configuration

Command Usage

Specifying 0 as the port number effectively disables HTTP access to the device.

Example

The following command configures the http port number to 100.

```
Console(config)# ip http port 100
```

ip https server

The **ip https server** Global Configuration mode command enables configuring the device from a secured browser. To return to the default configuration, use the **no** form of this command.

Syntax

ip https server

no ip https server

Parameters

There are no parameters for this command.

Default Setting

HTTPS server disabled.

Command Mode

Global Configuration mode

Command Usage

Use the **crypto certificate generate** Global Configuration mode command to generate an HTTPS certificate.

Example

The following command 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. To return to the default configuration, use the **no** form of this command.

Syntax

ip https port *port-number*

no ip https port

Parameters

n *port-number* — Port number to be used by the HTTP server. (Range: 0-65535)

Default Setting

The default port number is 443.

Command Mode

Global Configuration mode

Command Usage

Specifying 0 as the port number effectively disables HTTPS access to the device.

Example

The following command configures the https port number to 100.

```
Console(config)#Console(config)# ip https port 100
```

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*]] [**cn** *common- name*] [**ou** *organization-unit*] [**or** *organization*] [**loc** *location*] [**st** state] [**cu** *country*] [**duration** *days*]

Parameters

- *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)
- *common- name* — Specifies the fully qualified URL or IP address of the device. (Range: 1-64)
- *organization* — Specifies the organization name. (Range: 1-64)
- *organization-unit* — Specifies the organization-unit or department name. (Range: 1-64)
- *location* — Specifies the location or city name. (Range: 1-64)
- *state* — Specifies the state or province name. (Range: 1-64)
- *country* — Specifies the country name. (Range: 2-2)
- *days* — Specifies number of days certification is valid. (Range: 30-3650)

Default Setting

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

Command Usage

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.

Example

The following command regenerates an HTTPS certificate.

```
Console(config)#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*]

Parameters

- *number* — Specifies the certificate number. (Range: 1-2)
- *common- name* — Specifies the fully qualified URL or IP address of the device. (Range: 1-64)
- *organization-unit* — Specifies the organization-unit or department name. (Range: 1-64)
- *organization* — Specifies the organization name. (Range: 1-64)
- *location* — Specifies the location or city name. (Range: 1-64)
- *state* — Specifies the state or province name. (Range: 1-64)
- *country* — Specifies the country name. (Range: 1-2)

Default Setting

There is no default configuration for this command.

Command Mode

Privileged EXEC mode

Command Usage

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 **crypto certificate generate** 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.

Example

The following command generates and displays a certificate request for HTTPS.

```
Console# crypto certificate 1 request


-----BEGIN CERTIFICATE REQUEST-----
MIwTCCASoCAQAwYjELMAkGA1UEBhMCUFAxCzAJBgNVBAgTAkNDMQswCQYDVQQ
H
EwRDEMMAoGA1UEChMDZGxkMQwwCgYDVQQLEwNkbGQxCzAJBgNVBAMTAmxkMR
Aw
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**

Parameters

n *number* — Specifies the certificate number. (Range: 1-2)

Default Setting

This command has no default configuration.

Command Mode

Global Configuration mode

Command Usage

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).

Example

The following command imports a certificate signed by Certification Authority for HTTPS.

```
Console(config)#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: 8/9/2006 to 8/9/2007
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. To return to the default configuration, use the **no** form of this command.

Syntax

ip https certificate *number*

no ip https certificate

Parameters

n *number* — Specifies the certificate number. (Range: 1-2)

Default Setting

Certificate number 1.

Command Mode

Global Configuration mode

Command Usage

The **crypto certificate generate** command should be used to generate HTTPS certificates.

Example

The following command configures the active certificate for HTTPS.

```
Console(config)#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*]

Parameters

n *number* — Specifies the certificate number. (Range: 1- 2)

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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: 8/9/2006 to 8/9/2007
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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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

Parameters

There are no parameters for this command.

Default Setting

This command has no default configuration.

Command Mode

Privileged EXEC mode

Command Usage

There are no user guidelines for this command.

Example

The following command 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: 8/9/2004 to 8/9/2005
Subject: CN= router.gm.com, 0= General Motors, C= US
Finger print: DC789788 DC88A988 127897BC BB789788

Certificate 2 is inactive
Issued by: self-signed
Valid from: 8/9/2006 to 8/9/2007
Subject: CN= router.gm.com, 0= General Motors, C= US
Finger print: 1873B936 88DC3411 BC8932EF 782134BA
```

Index