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Reference for the Business Policy Switch 2000 Command Line Interface

Release 2.0

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Preface

The Nortel Networks* Business Policy Switch 2000* command line interface (CLI) is one tool used to configure and manage a Business Policy Switch 2000. The CLI allows you to set up, configure, and manage your BPS 2000.

You can also use the Java* Device Manager graphical user interface (GUI), the Web-based management system GUI, and the console interface (CI) menus to configure and manage the switch. For more information on these management systems, refer to *Reference for the Business Policy Switch 2000 Management Software Version 2.0, Using Web-based Management for the Business Policy Switch 2000 Software Version 2.0,* and *Using the Business Policy Switch 2000 Software Version 2.0.*

For general information on using and configuring the BPS 2000, refer to *Using the Business Policy Switch 2000 Software Version 2.0.*

About this guide

This guide provides information about using the features and capabilities of the CLI to manage switching operations in the BPS 2000, as well as a complete list of CLI commands.

Before you begin

This guide is intended for network administrators with the following background:

- Basic knowledge of networks, bridging, and IP
- Familiarity with networking concepts and terminology
- Basic knowledge of network topologies

Before using this guide, you must complete the procedures discussed in the *Business Policy Switch 2000 Installation Instructions.*

Text conventions

angle brackets (< >)

Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command.

Example: If the command syntax is
`ip default-gateway <XXX.XXX.XXX.XXX>`,
you enter
`ip default-gateway 192.32.10.12`

braces ({})

Indicate required elements in syntax descriptions where there is more than one option. You must choose only one of the options. Do not type the braces when entering the command.

Example: If the command syntax is:

`http-server {enable|disable}`
the options for are `enable` or `disable`.

brackets ([ ])

Indicate optional elements in syntax descriptions. Do not type the brackets when entering the command.

Example: If the command syntax is:

`show ip [bootp]`,
you can enter either:

`show ip` or `show ip bootp`.

`plain Courier text`

Indicates command syntax and system output.

Example:

```
TFTP Server IP Address:  192.168.100.15
```

vertical line |

Separates choices for command keywords and arguments. Enter only one of the choices. Do not type the vertical line when entering the command.

Example: If the command syntax is:

`cli password <serial|telnet>`,
you must enter either `cli password serial` or `cli password telnet`, but not both.

H.H.H.

Enter a MAC address in this format (XXXX.XXXX.XXXX).

Related publications

For more information about managing or using Business Policy Switch 2000, refer to the following publications:

- *Release Notes for the Business Policy Switch 2000 Software Version 2.0* (part number 210676-F)
- *Installing the Business Policy Switch 2000* (part number 209319-A)
- *Using the Business Policy Switch 2000 Software Version 2.0* (part number 208700-C)
- *Getting Started with the Business Policy Switch 2000 Management Software Operations* (part number 209321-A)
- *Reference for the Business Policy Switch 2000 Management Software Version 2.0* (part number 209322-C)
- *Using Web-based Management for the Business Policy Switch 2000 Software Version 2.0* (part number 209570-C)
- *Installing Media Dependent Adapters (MDAs)* (part number 302403-H)
- *Installing Gigabit Interface Converters and Small Form Factor Pluggable Interface Converters* (part number 312865-B)
- *Installing and Administering Optivity Quick2Config 2.2* (part number 207809-B)
- *Using the Optivity Quick2Config 2.2 Client Software* (part number 207810-B)
- *Configuring Business Policy Switches with Optivity Quick2Config 2.2* (part number 311208-A Rev 00)
- *Release Notes for Optivity Quick2Config 2.2 for Business Policy Switch 2000 2.2.1* (part number 310621-A)
- *Installing Optivity Policy Services* (part number 306972-E Rev 00)
- *Managing Policy Information in Optivity Policy Services* (part number 306969-F Rev 00)
- *Release Notes for Optivity Policy Services Version 2.0.1* (part number 306975-F Rev 00)
- *Task Map - Installing Optivity Policy Services Product Family* (part number 306976-E Rev 00)
- *Known Anomalies for Optivity Policy Services Version 2.0* (part number 306974-E Rev 00)

You can print selected technical manuals and release notes free, directly from the Internet. Go to the www.nortelnetworks.com/documentation URL. (The product family for the BPS 2000 is Data and Internet.) Find the product for which you need documentation. Then locate the specific category and model or version for your hardware or software product. Use Adobe* Acrobat Reader* to open the manuals and release notes, search for the sections you need, and print them on most standard printers. Go to Adobe Systems at the www.adobe.com URL to download a free copy of the Adobe Acrobat Reader.

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Asia Pacific	(61) (2) 9927-8800
China	(800) 810-5000

Additional information about the Nortel Networks Technical Solutions Centers is available from the www.nortelnetworks.com/help/contact/global URL.

An Express Routing Code (ERC) is available for many Nortel Networks products and services. When you use an ERC, your call is routed to a technical support person who specializes in supporting that product or service. To locate an ERC for your product or service, go to the http://www130.nortelnetworks.com/cgi-bin/eserv/common/essContactUs.jsp URL.

Chapter 1
CLI Basics

You can manage the BPS 2000 with a number of tools. You can use either graphical user interface (GUI), the Java Device Manager (DM) or the Web-based management system. You can use the console interface (CI menus), or you can use the command line interface (CLI). (For more information on using the DM, refer to *Reference for the Business Policy Switch 2000 Management Software Version 2.0*. For more information on using the Web-based management system, refer to *Using Web-based Management for the Business Policy Switch 2000 Software Version 2.0*. For more information on using the CI menus, refer to *Using the Business Policy Switch 2000 Software Version 2.0*.

The BPS 2000 command line interface (CLI) is a management tool that provides methods for configuring, managing, and monitoring the operational functions of the switch. You access the CLI through a direct connection to the switch console port, or remotely using Telnet. For a complete, alphabetical list of CLI commands, refer to Appendix A.

You can use the CLI interactively, or you can load and execute CLI “scripts.” CLI scripts are loaded in one of the following ways:

- By entering the `configure network` command.
- By manually loading the script in the console menu.
- By automatically loading the script at boot-up

This chapter discusses the following CLI topics:

- “Stacking compatibility,” next
- “Software version 2.0 compatibility with BayStack 450 switches” on page 27
- “CLI command modes” on page 29
- “Port numbering” on page 32
- “IP notation” on page 34

- “Accessing the CLI” on page 35
- “Setting the CLI password” on page 38
- “Getting help” on page 39
- “Basic navigation” on page 39
- “Managing basic system information” on page 46
- “Managing MAC address forwarding database table” on page 50
- “Displaying and setting stack operational mode” on page 53

Stacking compatibility

You can stack the BPS 2000 up to 8 units high. There are two types of stacks:

- Pure BPS 2000—This stack has *only* BPS 2000 switches. It is sometimes referred to as a pure stack. The stack operational mode for this type of stack is Pure BPS 2000 Mode.
- Hybrid—This stack has a combination of BPS 2000 switches *and* BayStack* 450 and/or BayStack 410 switches. It is sometimes referred to as a mixed stack. The stack operational mode for this type of stack is Hybrid Mode.

When you work with the BPS 2000 in standalone mode, you should ensure that the stack operational mode shows Pure BPS 2000 Mode, and does not show Hybrid Mode.

All BPS 2000 switches in the stack must be running the identical version of software, and all the BayStack switches must be running the identical version of software.

When you are working with a mixed stack, you *must* ensure that the Interoperability Software Version Numbers (ISVN) are identical. That is, the ISVN number for the BayStack 450 switch and BayStack 410 switch must have the same ISVN as the BPS 2000. If the ISVNs are not the same, the stack does not operate.

In sum, the stacking software compatibility requirements are as follows:

- Pure BPS 2000 stack—All units must be running the same software version.

- Pure BayStack 450 stack—All units must be running the same software version.
- Hybrid stack:
  - — All BPS 2000 units must be running the same software version.
  - — All BayStack 410 units must be running the same software version.
  - — All BayStack 450 units must be running the same software version.
  - — All software versions must have the identical ISVN.

Refer to Appendix B of *Using the Business Policy Switch 2000 Software Version 2.0* for complete information on interoperability and compatibility between the BPS 2000 and BayStack switches.

Software version 2.0 compatibility with BayStack 450 switches

The BPS 2000 software version 2.0 is compatible with BayStack 450 software version 4.1.

When you are using a local console to access the BPS 2000 software version 2.0 features with a Hybrid, or mixed, stack (BPS 2000 and BayStack 450 and 410 switches in the same stack), you must plug your local console into a BPS 2000 unit.

To find out which version of the BPS 2000 software is running, use the console interface (CI) menus or the Web-based management system:

- CI menus—From the main menu of the console, choose Systems Characteristics menu. The software currently running is displayed in sysDescr.
- Web-based management system—Open the System Information page, which is under Administration on the main menu. The software currently running is displayed in the sysDescription field.

You can use 256 port-, protocol-, and MAC SA-based VLANs for the stack with a Pure BPS 2000 stack running software version 1.2. (The maximum number of MAC SA-based VLANs available is 48). If you are working with a mixed, or hybrid, stack, you can use 64 VLANs for the entire stack. When you change from a Pure BPS 2000 Stack mode to a Hybrid Stack mode:

- If you have up to 64 VLANs on the Pure BPS 2000 Stack, they will be retained when you change to a Hybrid Stack.
- If you have more than 64 VLANs on the Pure BPS 2000 Stack, you will lose them all. The Hybrid Stack will return to the default VLAN configuration.

Also, a mixed, or hybrid, stack does not support multiple Spanning Tree Groups (STG). You have a single instance of STG when working with a mixed stack.

- If you have up to 64 VLANs on the Pure BPS 2000 Stack, they will be retained when you change to a Hybrid Stack.
- If you have more than 64 VLANs on the Pure BPS 2000 Stack, you will lose them all. The Hybrid Stack will return to the default VLAN configuration.

Also, a mixed, or hybrid, stack does not support multiple Spanning Tree Groups (STG). You have a single instance of STG when working with a mixed stack.

New features

The following new features that you can access through Web-based management have been introduced to the BPS 2000 software since version 1.2:

- Introduced with software version 2.0
  - Support for BPS 2000-1GT, BPS 2000-2GT, and BPS 2000-2GE MDAs
  - Portlist command more inclusive (refer to "Port numbering" on page 32)
  - Rate shaping for QoS networks (refer to Chapter 6)
  - Expanded COPS commands (refer to Chapter 6)
  - Port naming (refer to Chapter 2)
  - MAC destination address (DA) filtering (refer to Chapter 3)
  - IP for each unit in the stack (refer to Chapter 2)

— Configurable VID for tagged BPDU with multiple spanning tree groups (refer to Chapter 4)

— Specifying multiple VLANs for QoS in a single layer 2 filter (refer to Chapter 6)

CLI command modes

Most CLI commands are available only under a certain command mode. The BPS 2000 has the following four command modes:

- User EXEC
- Privileged EXEC
- Global Configuration
- Interface Configuration

The User EXEC mode is the default mode; it is also referred to as exec. This command mode is the initial mode of access upon first powering-up the BPS 2000. In this command mode, the user can access only a subset of the total CLI commands; however, the commands in this mode are available while the user is in any of the other four modes. The commands in this mode are those you would generally need, such as ping and logout.

Commands in the Privileged EXEC mode are available to all other modes but the User EXEC mode. The commands in this mode allow you to perform basic switch-level management tasks, such as downloading the software image, setting passwords, and booting the BPS 2000. The Privileged EXEC mode is also referred to as privExec mode.

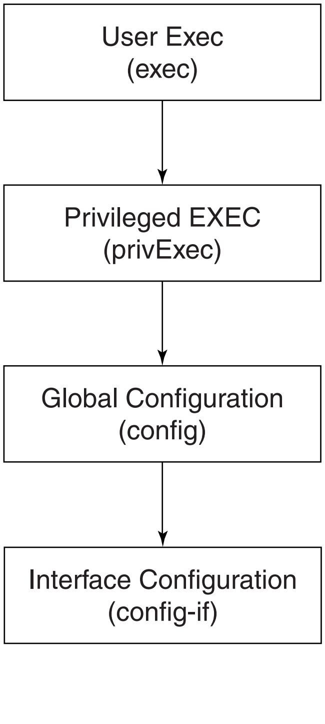
The last two command modes allow you to change the configuration of the BPS 2000. Changes made in these command modes are immediately applied to the switch configuration and saved to NVRAM.

The Global Configuration commands allow you to set and display general configurations for the switch, such as the IP address, SNMP parameters, the Telnet access, and VLANs. The Global Configuration mode is also referred to as config mode.

The Interface Configuration commands allow you to configure parameters for each port, such as speed, duplex mode, and rate-limiting. The Interface Configuration mode is also referred to as config-if mode.

Figure 1 provides an illustration of the hierarchy of BPS 2000 CLI command modes.

Figure 1 CLI command mode hierarchy



You see a specific value for each command mode at the prompt line, and you use specific commands to enter or exit each command mode (Table 1). Additionally, you can only enter command modes from specific modes and only exit to specific command modes.

Table 1 Command mode prompts and entrance/exit commands

Command mode	Prompt	Enter/exit command
User EXEC (exec)	`BPS2000>`	• Default mode, automatically enter • `logout` or `exit` to quit CLI
Privileged EXEC (privExec)	`BPS2000#`	• `enable` to enter from User EXEC mode • `logout` or `exit` to quit CLI
Global Configuration (config)	`BPS2000(config)#`	• `configure` to enter from Privileged EXEC mode • `logout` to quit CLI; `end` or `exit` to exit to Privileged EXEC mode
Interface Configuration (config-if)	`BPS2000(config-if)#`	• `interface Fast Ethernet {<portnum>|all}` to enter from Global Configuration mode • `logout` to quit CLI; `end` to exit to Privileged EXEC mode; `exit` to exit to Global Configuration mode

The prompt displays the switch name, `BPS2000`, and the current CLI command mode:

- User EXEC—`BPS2000>`
- Privileged EXEC—`BPS2000#`
- Global Configuration—`BPS2000(config)#`
- Interface Configuration—`BPS2000(config-if)#`

Refer to Appendix A, for a complete, alphabetical list of all CLI commands and where they are explained.

The initial command mode in CLI depends on your access level when you logged into the BPS 2000 CI menus:

- With no password protection, you enter the CLI in userExec mode, and use the `enable` command to move to the privExec command mode.
- If you logged into the CI menus with read-only access, you enter the CLI in userExec mode and cannot access any other CLI command modes.

- If you logged into the CI menus with read-write access, you enter the CLI in privExec mode and use the commands to move to the other command modes.

Port numbering

The BPS 2000 operates either in standalone mode or in stack mode. The BPS 2000 has 24 10/100 Mb/s ports on the front, as well as an uplink slot that allows you to attach a media dependent adapter (MDA). The MDAs available for the uplink can have up to 4 ports. Thus, you have a maximum of 28 ports on one BPS 2000.

In stack mode, the BPS 2000 operates either in Pure BPS 2000 Stack mode or in Hybrid Stack mode. The Hybrid Stack mode is when you are working with a combination of the BayStack 450 or 410 switches and BPS 2000 switches in one stack. When you are working with a standalone BPS 2000, ensure that the operational mode is set for Pure BPS 2000 Stack. (Refer to "show stack-oper-mode command" on page 54 and "stack oper-mode command" on page 54 for information on operational mode commands.)

Note: Beginning with software version 2.0, the variable *portlist* replaces the use the variable *portnum*, or *port-num,* and *all* for ports. The CLI is backward-compatible, so all commands in the previous release continue to function properly.

The CLI uses the variable `<portlist>` when a command specifies one or more ports for the command. The format of the variable `<portlist>` is different if you are working with a standalone BPS 2000 or with a stack (either Pure BPS 2000 Stack or Hybrid Stack).

Port numbering in standalone mode

Ensure that the operational mode is set for the Pure BPS 2000 Stack mode when you are working with a standalone BPS 2000.

In standalone mode, use the `<portlist>` variable in the following formats:

- A single port number—an integer between 1 through 28
  - Example: `7` means port 7
- A range of port numbers—a pair of port numbers between 1 and 28 separated by a dash
  - Example: `1-3` means ports 1, 2, and 3
  - Example: `5-27` means all ports from port 5 through port 27
- A list of port numbers and/or port ranges, separated by commas
  - Example: `1,3,7` means ports 1, 3, and 7
  - Example: `1-3,9-11` means ports 1, 2, 3, 9, 10, and 11
  - Example: `1,3-5,9-11,15` means ports 1, 3, 4, 5, 9, 10, 11, and 15
- `none` means no ports (not case-sensitive)
- `all` means all the ports on the standalone BPS 2000, including any MDA ports (not case-sensitive)

You can also use the unit/port convention discussed in "Port numbering in stacked mode," next, with a standalone BPS 2000 as long as the unit number is always 1.

Port numbering in stacked mode

In stacked mode, either Pure BPS 2000 Stack mode or Hybrid Stack Mode, use the `<portlist>` variable to represent the number of the unit within the stack, followed by a forward slash (/), followed by port number(s). The unit numbers will always be integers between 1 and 8, and the port numbers will always be integers between 1 and 28. You can also use `none` to indicate none of the ports in the stack or all to indicate `all` of the ports in the stack.

In stacked mode, use the `<portlist>` variable in the following formats:

- A single port number—an integer for the unit, followed by /, and an integer for the port number
  - Example: `1/7` means unit 1 port 7
  - Example: `3/24` means unit 3, port 24
- A range of port numbers—an integer for the unit, followed by /, and integers for the port number between 1 and 28 separated by a dash
  - Example: `1/1-3` means unit 1, ports 1, 2, and 3
  - Example: `3/5-27` means unit 3, port 5 through port 27

- A unit with no ports specified—an integer for the unit, followed by /, and the word none (not case-sensitive)
  - `3/none` means unit 3 with no ports
- A unit with all ports specified—an integer for the unit, followed by /, and the word all (not case-sensitive)
  - `3/all` means unit 3 with all ports
- A list of port numbers, port ranges, and/or units with all ports or no ports—using the unit/port format—separated by commas
  - Example: `1/1,2/3,3/7` means unit 1 port 1; unit 2, port 3; and unit 3, port 7
  - Example: `1/1-3,3/9-11` means unit 1, ports 1, 2, 3; and unit 3, ports 9, 10, and 11
  - Example: `1/1,4/3-5,5/9-11,7/15` means unit 1, port 1; unit 4, ports 3, 4, 5; unit 5, ports 9, 10, 11; and unit 7, port 15
  - Example: `1/3,3/ALL,4/NONE` means unit 1, port 3; unit 3, all ports; and unit 4, no ports
- `none` means no ports in the stack (not case-sensitive)
- `all` means all the ports in the stack, including all MDA ports (not case-sensitive)

To view the unit numbers in the stack, issue the `show stack-info` command ("show stack-info command" on page 49). You must be in the Privileged EXEC (privExec) mode to issue this command.

Refer to *Using the Business Policy Switch 2000 Software Version 2.0* guide, for more information on numbering units within the stack.

IP notation

You enter IP addresses and subnet masks in one of the following two ways in the CLI. You can always enter an IP address in dotted decimal notation (XXX.XXX.XXX.XXX), specifying both the IP address and the subnet mask in dotted-decimal notation.

Or, when you are specifying both an IP address and a netmask, you may alternatively enter XXX.XXX.XXX.XXX/0-32, where XXX.XXX.XXX.XXX is the IP address in dotted-decimal notation and the value 0-32 specifies the number of bits starting from the left in the mask (for example, a value of 8 is 255.0.0.0).

Accessing the CLI

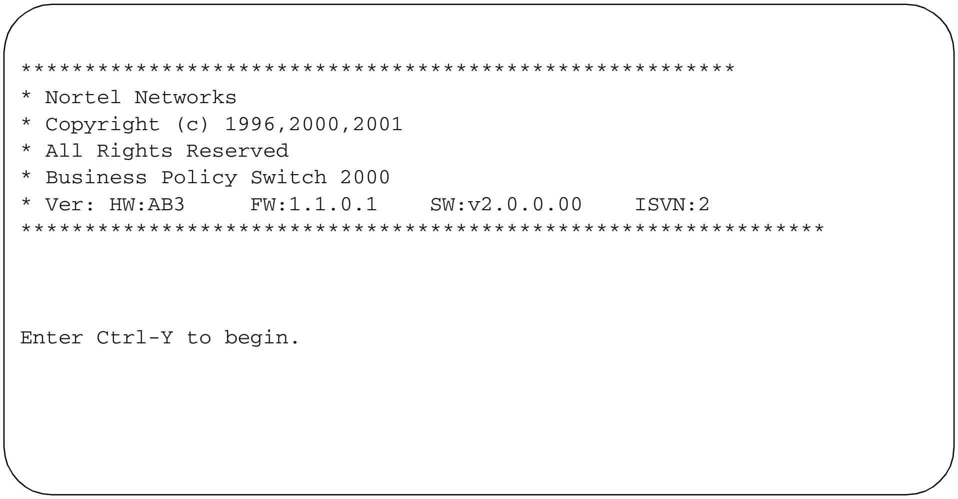
You access the CI menus using Telnet or a a direct connection to the switch from a terminal or personal computer (PC). You can use any terminal or PC with a terminal emulator as the CLI command station. Be sure the terminal has the following features:

- 9600 bits per second (b/s), 8 data bits, 1 stop bit, no parity, no flow control
- Serial terminal-emulation program such as Terminal or Hyperterm for Windows NT* or Hyperterm for Windows* 95 or Windows 98
- Cable and connector to match the male DTE connector (DB-9) on the BPS 2000 console port, with the DCE/DTE switch on the switch management module set to DTE
- VT100 Arrows checked in the Terminal Preferences window under Terminal Options, and Block Cursor unchecked; VT-100/ANSI checked under Emulation

To access the CLI:

1. When you access the BPS 2000, the banner appears (Figure 2).

Figure 2 BPS 2000 banner



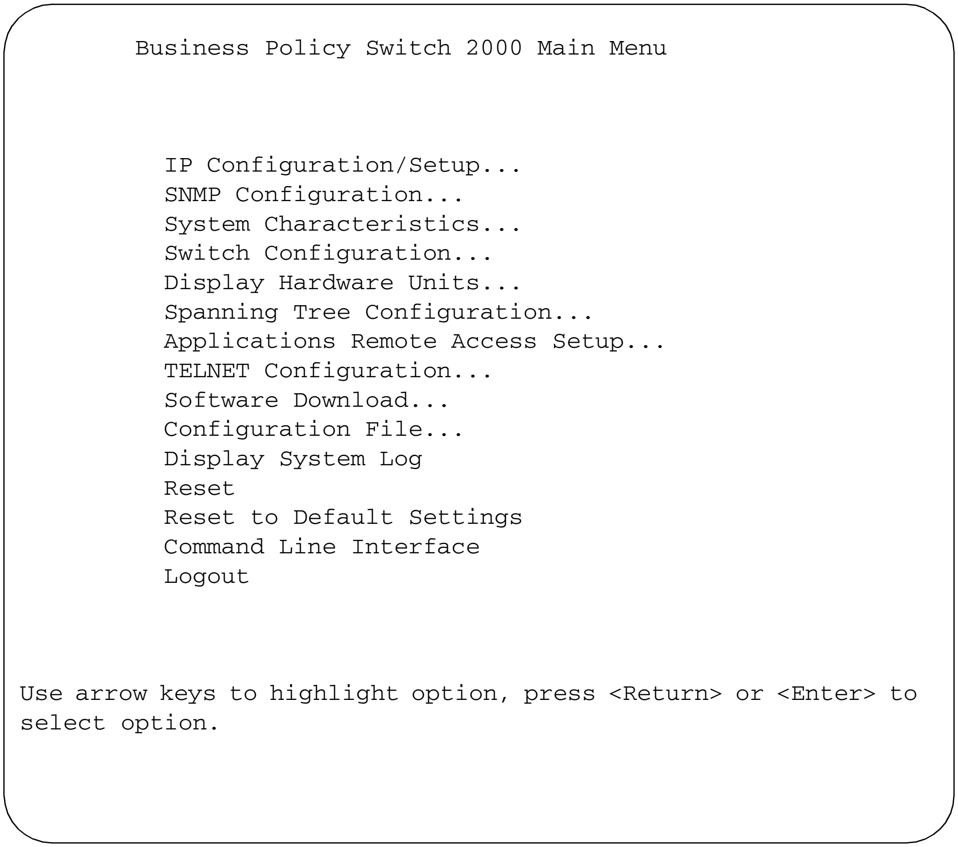
```
********************************************************
* Nortel Networks
* Copyright (c) 1996,2000,2001
* All Rights Reserved
* Business Policy Switch 2000
* Ver: HW:AB3     FW:1.1.0.1    SW:v2.0.0.00     ISVN:2
***************************************************************



Enter Ctrl-Y to begin.
```

2 Press [Ctrl]+Y, and the Main Menu appears on the console screen (Figure 3) with the top line highlighted.

Figure 3 Main Menu for BPS 2000 console interface



```
         Business Policy Switch 2000 Main Menu



           IP Configuration/Setup...
           SNMP Configuration...
           System Characteristics...
           Switch Configuration...
           Display Hardware Units...
           Spanning Tree Configuration...
           Applications Remote Access Setup...
           TELNET Configuration...
           Software Download...
           Configuration File...
           Display System Log
           Reset
           Reset to Default Settings
           Command Line Interface
           Logout



Use arrow keys to highlight option, press <Return> or <Enter> to
select option.
```

3 Using the Down Arrow key, scroll down to Command Line Interface, and press [Enter]. The CLI cursor appears:

```
BPS2000>
```

The > sign at the end of the name of the switch indicates that the CLI opens in User EXEC mode. Refer to "CLI command modes" on page 29, to select the command mode you want to use (and are authorized to use).

Setting the CLI password

You can set passwords using the `cli password` command for selected types of access using the CLI, Telnet, or RADIUS security.

For more information on Telnet access, refer to Chapter 3. For more information on using RADIUS security with the CLI, refer to Chapter 3.

cli password command

The `cli password` is in two forms and performs the following functions for either the switch of the entire stack:

- Changes the password for access through the serial console port and Telnet
- Specifies changing the password for serial console port or Telnet access and whether to authenticate password locally or with the RADIUS server

The syntax for the `cli password` commands are:

```
cli password {switch|stack} {ro|rw} <WORD> <WORD>

cli password {switch|stack} {serial|telnet}
{none|local|radius}
```

The `cli password` command is in the config command mode.

Table 2 describes the parameters and variables for the `cli password` command.

Table 2 cli password command parameters and variables

Parameters and variables	Description
switch|stack	Specifies you are modifying the settings on the switch or on the stack. Note: If you omit this parameter, the system modifies the information for the current mode.
ro|rw	Specifies you are modifying the read-only (ro) password or the read-write (rw) password.
<WORD> <WORD>	Enter your username for the first variable, and your password for the second variable.
serial|telnet	Specifies you are modifying the password for serial console access or for Telnet access.
none|local|radius	Specifies the password you are modifying: • none—disables the password • local—use the locally defined password for serial console or Telnet access • radius—use RADIUS authentication for serial console or Telnet access

Getting help

When you navigate through the CLI, online help is available at all levels. Entering a portion of the command, space, and a question mark (**?**) at the prompt results in a list of all options for that command.

Refer to "help command" on page 42 for more information about the specific types of online help.

Basic navigation

This section discusses basic navigation around the CLI and between the command modes. As you see, the CLI incorporates various shortcut commands and keystrokes to simplify its use. The following topics are covered in this section:

- "General navigation commands," next
- "Keystroke navigation" on page 41
- "help command" on page 42
- "no command" on page 42
- "default command" on page 43
- "logout command" on page 43
- "enable command" on page 43
- "configure command" on page 44
- "interface command" on page 44
- "disable command" on page 45
- "end command" on page 45
- "exit command" on page 45

General navigation commands

When you enter `?` at any point in the CLI session, the system retrieves help information for whatever portion of the command you entered thus far. Refer to "help command" on page 42 for more information.

The system records the last command in a CLI session. However, the last command is not saved across reboots.

Add the word `no` to the beginning of most CLI configuration commands to clear or remove the parameters of the actual command. For example, when you enter the command `ip stack address 192.32.154.126`, you set the IP stack address. However, when you enter `no ip stack address`, the system returns the IP address to zero. Refer to Appendix A for an alphabetical list of `no` commands.

Add the word `default` to the beginning of most CLI configuration commands returns the parameters of the actual command to the factory default values. Refer to Appendix A for an alphabetical list of `default` commands.

When you enter a portion of the command and the [Tab] key, the system finds the first unambiguous match of a command and displays that command. For example, if you enter `down`+[Tab], the system displays `download`.

Keystroke navigation

You change the location of the cursor using the key combinations shown in Table 3.

Table 3 Keystroke navigation

Key combination	**Function**
[Ctrl]+A	Start of line
[Ctrl]+B	Back 1 character
[Ctrl]+C	Abort command
[Ctrl]+D	Delete the character indicated by the cursor
[Ctrl]+E	End of line
[Ctrl]+F	Forward 1 character
[Ctrl]+H	Delete character left of cursor (Backspace key)
[Ctrl]+I &	Command/parameter completion
[Ctrl]+K & [Ctrl]+R	Redisplay line
[Ctrl]+N or [Down arrow]	Next history command
[Ctrl]+P or [Up arrow]	Previous history command
[Ctrl]+T	Transpose characters
[Ctrl]+U	Delete entire line
[Ctrl]+W	Delete word left of cursor
[Ctrl]+X	Delete all characters to left of cursor
[Ctrl]+z	Exit Global Configuration mode (to Privileged EXEC mode)
?	Context-sensitive help
[Esc]+c & [Esc]+u	Capitalize character at cursor
[Esc]+l	Change character at cursor to lowercase
[Esc]+b	Move back 1 word
[Esc]+d	Delete 1 word to the right
[Esc]+f	Move 1 word forward

help command

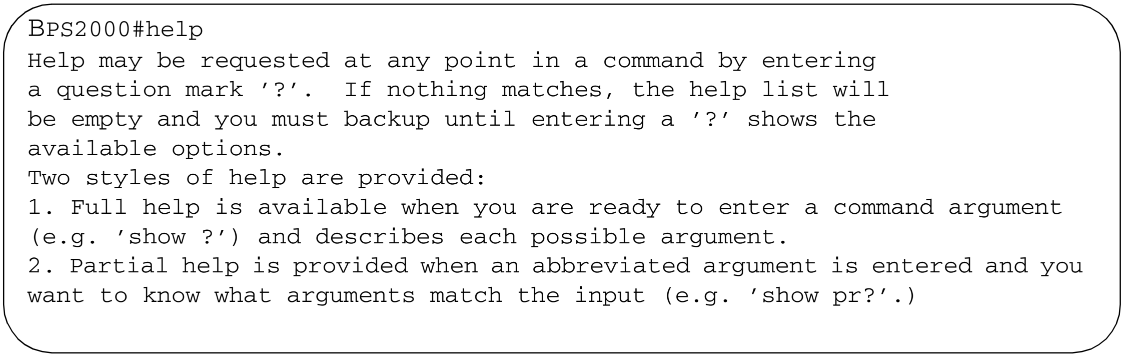
The help command is in all command modes and displays a brief message about using the CLI help system. The syntax for the help command is:

```
help
```

The help command has no parameters or variables.

Figure 4 shows the output from the help command.

Figure 4 help command output in privExec mode



```
BPS2000#help
Help may be requested at any point in a command by entering
a question mark '?'.  If nothing matches, the help list will
be empty and you must backup until entering a '?' shows the
available options.
Two styles of help are provided:
1. Full help is available when you are ready to enter a command argument
(e.g. 'show ?') and describes each possible argument.
2. Partial help is provided when an abbreviated argument is entered and you
want to know what arguments match the input (e.g. 'show pr?'.)
```

no command

The no command is always used as a prefix to a configuration command, and it negates the action performed by that command. The effect of the no command is to remove or to clear the configuration controlled by the specified command. Various no commands are in the config and config-if command modes.

Refer to Appendix A for an alphabetical listing of all no commands.

Note: Not all configuration commands support the no prefix command.

default command

The `default` command is always used as a prefix to a configuration command, and it restores the configuration parameters to default values. The default values are specified by each command.

Refer to Appendix A for an alphabetical listing of all `default` commands.

Note: Not all commands support the `default` prefix command.

logout command

The `logout` command logs you out of the CLI session and returns you to the Main Menu of the console interface (CI) menus (Figure 3). The syntax for the `logout` command is:

```
logout
```

The `logout` command is in all command modes.

The `logout` command has no parameters or variables.

enable command

The `enable` command changes the command mode from User EXEC to privExec mode. The syntax for the `enable` command is:

```
enable
```

The `enable` command is in the exec command mode.

The `enable` command has no parameters or variables.

Note: You must have read-write access to the BPS 2000 switch to be able to use the `enable` command.

configure command

The `configure` command moves you to the Global Configuration (config) command mode and identifies the source for the configuration commands. The syntax for the `configure` command is:

```
configure {terminal|network|memory}
```

The `configure` command is in the privExec command mode.

Table 4 describes the parameters and variables for the `configure` command.

Table 4 configure command parameters and variables

Parameters and variables	Description
terminal|network|memory	Specifies the source for the configuration commands for the BPS 2000: • terminal—allows you to enter config mode to enter configuration commands • network—allows you to set up parameters for auto-loading a script at boot-up or for loading and executing a script immediately • memory—not supported on BPS 2000

interface command

The `interface` command moves you to the Interface Configuration (config-if) command mode. The syntax for the `interface` command is:

```
interface FastEthernet {<portlist>}
```

The `interface` command is in the config command mode.

Table 5 describes the parameters and variables for the `interface` command.

Table 5 interface command parameters and variables

Parameters and variables	Description
<portlist>	Specifies the portlist you want to be affected by all the commands issued in the config-if command mode.

disable command

The `disable` command returns you to the User EXEC (exec) command mode. The syntax for the `disable` command is:

```
disable
```

The `disable` command is in the privExec command mode.

The `disable` command has no parameters or variables.

end command

The `end` command moves you to the priv Exec mode from either the Global Configuration (config) mode or the Interface Configuration (config-if) mode.

The syntax for the `end` command is:

```
end
```

The `end` command has no parameters or variables.

exit command

The `exit` command moves you around the command modes:

- In User EXEC (exec) and Privileged EXEC (privExec) command modes, `exit` allows you to quit the CLI session.

- In Global Configuration (config) mode, `exit` moves you back to the privExec command mode.
- In Interface Configuration (config-if) command mode, `exit` moves you back to the config mode.

The syntax for the `exit` command is:

```
exit
```

The `exit` command has no parameters or variables.

Managing basic system information

This section shows you how to view basic system information, such as the current software version and the stack mode; you can renumber the units within a stack. The following topics are covered:

- "show sys-info command," next
- "show cpu-utilization command" on page 47
- "show memory-utilization command" on page 48
- "show stack-info command" on page 49
- "renumber unit command" on page 49

Refer to *Using the Business Policy Switch 2000 Software Version 2.0*, for more information on the operation of the stack mode, including unit numbering.

show sys-info command

The `show sys-info` command displays the current system characteristics. The syntax for the `show sys-info` command is:

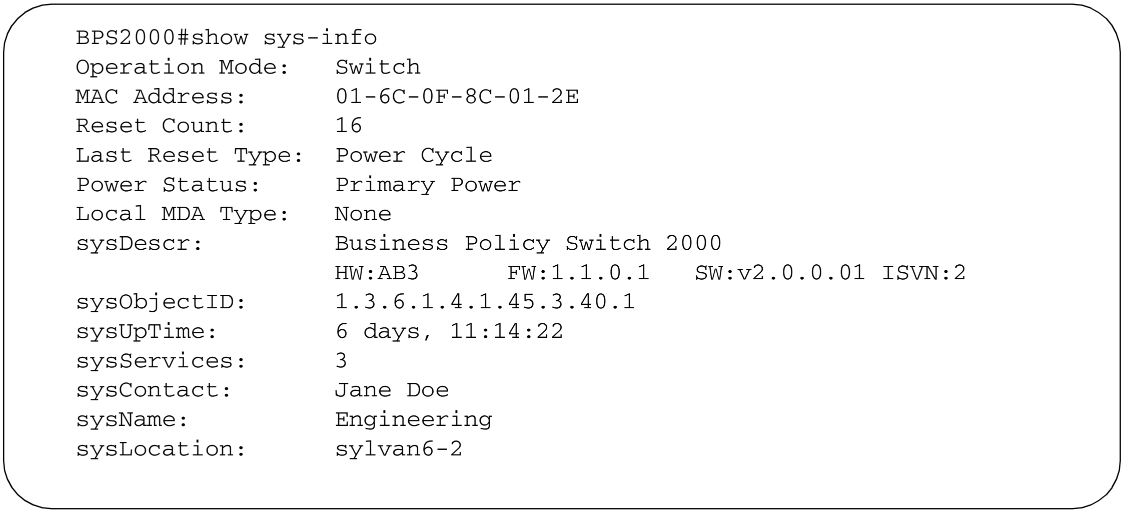
```
show sys-info
```

The `show sys-info` command is in the privExec command mode.

The `show sys-info` command has no parameters or variables.

Figure 5 displays sample output from the `show sys-info` command.

Figure 5   show sys-info command output



```
BPS2000#show sys-info
Operation Mode:    Switch
MAC Address:       01-6C-0F-8C-01-2E
Reset Count:       16
Last Reset Type:   Power Cycle
Power Status:      Primary Power
Local MDA Type:    None
sysDescr:          Business Policy Switch 2000
                   HW:AB3      FW:1.1.0.1   SW:v2.0.0.01 ISVN:2
sysObjectID:       1.3.6.1.4.1.45.3.40.1
sysUpTime:         6 days, 11:14:22
sysServices:       3
sysContact:        Jane Doe
sysName:           Engineering
sysLocation:       sylvan6-2
```

To change the system contact, name, or location, refer to the `snmp-server` command in Chapter 2.

show cpu-utilization command

The `show cpu-utilization` command displays the percentage of the CPU utilized from system boot-up and in the last 10 seconds, 1 minute, 10, minutes, 60 minutes, and 24 hours. The syntax for the `show cpu-utilization` command is:

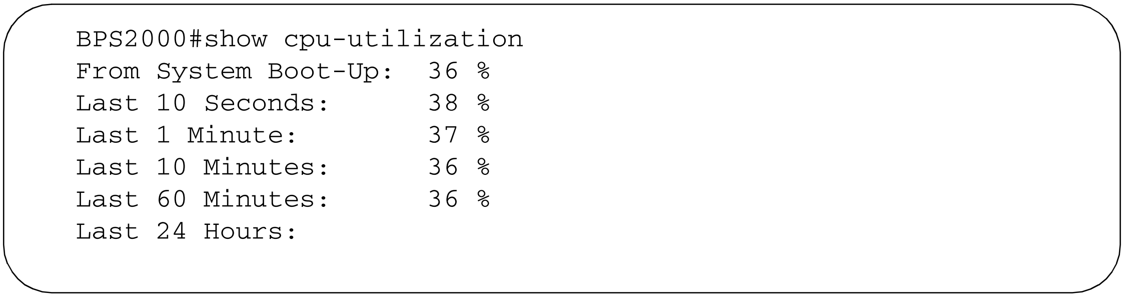
```
show cpu-utilization
```

The `show cpu-utilization` command is in the privExec command mode.

The `show cpu-utilization` command has no parameters or variables.

Figure 6 displays sample output from the `show cpu-utilization` command.

Figure 6 show cpu-utilization command output



```
BPS2000#show cpu-utilization
From System Boot-Up:  36 %
Last 10 Seconds:      38 %
Last 1 Minute:        37 %
Last 10 Minutes:      36 %
Last 60 Minutes:      36 %
Last 24 Hours:
```

show memory-utilization command

The `show memory-utilization` command displays the percentage of available memory, as well as the lowest memory available at any time since the last boot-up. The syntax for the `show memory-utilization` command is:

```
show memory-utilization
```

The `show memory-utilization` command is in the privExec command mode.

The `show memory-utilization` command has no parameters or variables.

Figure 6 displays sample output from the `show memory-utilization` command.

Figure 7 show memory-utilization command output

```
BPS2000#show memory-utilization
Available:  71 %
Low Mark:   68 %
```

show stack-info command

The `show stack-info` command displays the current stack information, which includes unit numbers, MDA and cascade attachments, and software version for all units. The syntax for the `show stack-info` command is:

```
show stack-info
```

The `show stack-info` command is in the privExec command mode.

The `show stack-info` command has no parameters or variables.

Figure 8 displays sample output from the `show stack-info` command.

Figure 8 show stack-info command output

```
BPS2000#show stack-info
Unit #  Switch Model     MDA Model Cascade MDA  SW Version
----------------------------------------------------------
1       BPS 2000          None      None        v2.0.0.01
```

renumber unit command

The `renumber unit` command changes the unit number of each switch in the stack. The syntax for the `renumber unit` command is:

```
renumber unit
```

The `renumber unit` command is in the config command mode.

The `renumber unit` command has no parameters or variables.

Note: This command does not take effect until you reset the stack.

Managing MAC address forwarding database table

This section shows you how to view the contents of the MAC address forwarding database table, as well as setting the age-out time for the addresses. The following topics are covered:

- "show mac-address-table command," next
- "mac-address-table aging-time command" on page 52
- "default mac-address-table aging-time command" on page 53

show mac-address-table command

The `show mac-address-table` command displays the current contents of the MAC address forwarding database table. The syntax for the `show mac-address-table` command is:

```
show mac-address-table [vid <1-4094>] [aging-time] [address
<H.H.H>]
```

The `show mac-address-table` command is in the privExec command mode.

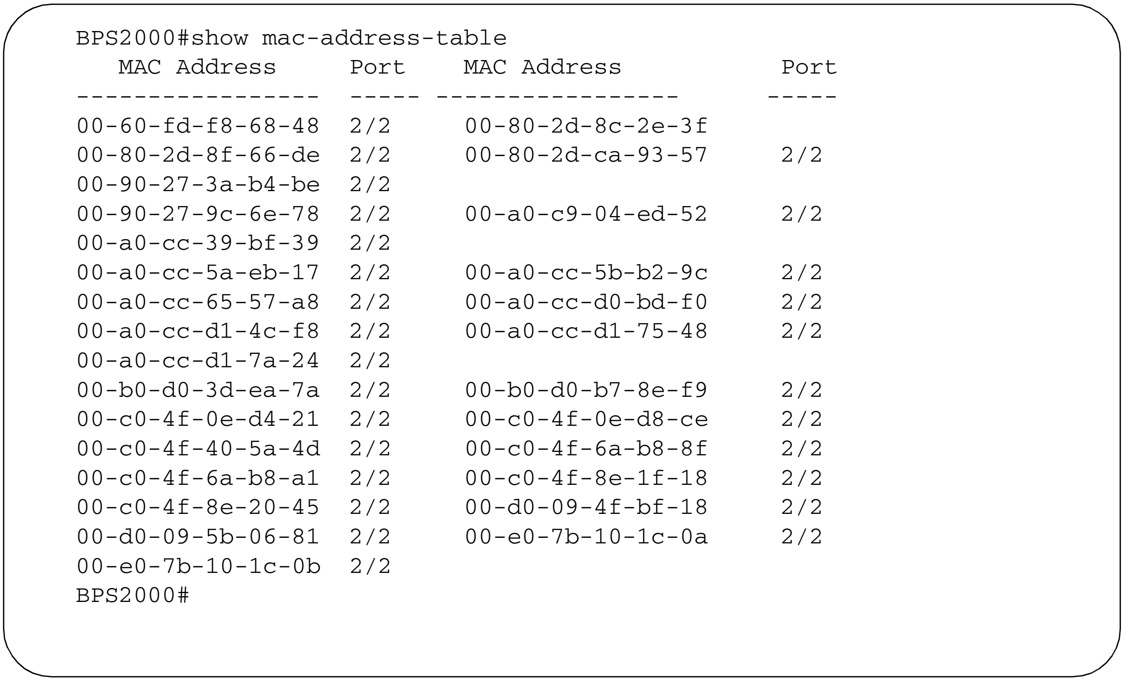
Table 6 describes the parameters and variables for the `show mac-address-table` command.

Table 6 show mac-address-table command parameters and variables

Parameters and variables	Description
vid <1-4094>	Enter the number of the VLAN you want to display the forwarding database of. Default is to display the management VLAN's database.
aging-time	Displays the time in seconds after which an unused entry is removed from the forwarding database.
address <H.H.H>	Displays a specific MAC address if it exists in the database. Enter the MAC address you want displayed.

Figure 9 displays sample output from the `show mac-address-table` command.

Figure 9 show mac-address-table command output



```
BPS2000#show mac-address-table
   MAC Address      Port    MAC Address           Port
-----------------  ----- -----------------      -----
00-60-fd-f8-68-48  2/2     00-80-2d-8c-2e-3f
00-80-2d-8f-66-de  2/2     00-80-2d-ca-93-57     2/2
00-90-27-3a-b4-be  2/2
00-90-27-9c-6e-78  2/2     00-a0-c9-04-ed-52     2/2
00-a0-cc-39-bf-39  2/2
00-a0-cc-5a-eb-17  2/2     00-a0-cc-5b-b2-9c     2/2
00-a0-cc-65-57-a8  2/2     00-a0-cc-d0-bd-f0     2/2
00-a0-cc-d1-4c-f8  2/2     00-a0-cc-d1-75-48     2/2
00-a0-cc-d1-7a-24  2/2
00-b0-d0-3d-ea-7a  2/2     00-b0-d0-b7-8e-f9     2/2
00-c0-4f-0e-d4-21  2/2     00-c0-4f-0e-d8-ce     2/2
00-c0-4f-40-5a-4d  2/2     00-c0-4f-6a-b8-8f     2/2
00-c0-4f-6a-b8-a1  2/2     00-c0-4f-8e-1f-18     2/2
00-c0-4f-8e-20-45  2/2     00-d0-09-4f-bf-18     2/2
00-d0-09-5b-06-81  2/2     00-e0-7b-10-1c-0a     2/2
00-e0-7b-10-1c-0b  2/2
BPS2000#
```

mac-address-table aging-time command

The `mac-address-table aging-time` command sets the time that the switch retains unseen MAC addresses. The syntax for the `mac-address-table aging-time` command is:

```
mac-address-table aging-time <time>
```

The `mac-address-table aging-time` command is in the config command mode.

Table 7 describes the parameters and variables for the `mac-address-table aging-time` command.

Table 7 mac-address-table aging-time command parameters and variables

Parameters and variables	Description
time	Enter the aging time in seconds that you want for MAC addresses before they are flushed.

default mac-address-table aging-time command

The `default mac-address-table aging-time` command sets the time that the switch retains unseen MAC addresses to 300 seconds. The syntax for the `default mac-address-table aging-time` command is:

```
default mac-address aging-time
```

The `default mac-address-table aging-time` command is in the config command mode.

The `default mac-address-table aging-time` command has no parameters or variables.

Displaying and setting stack operational mode

This section shows you how to view and set the stack operational mode. The following topics are covered:

- "show stack-oper-mode command," next
- "stack oper-mode command" on page 54

Refer to *Using the Business Policy Switch 2000 Software Version 2.0* for more information on the stack operation, including features requiring specific operational modes and adding switches to the stack.

show stack-oper-mode command

The `show stack-oper-mode` command displays the current operational mode of the stack and the mode set for the next switch reboot. The display shows either:

- Pure BPS 2000 Stack

or

- Hybrid Stack

The syntax for the `show stack-oper-mode` command is:

```
show stack-oper-mode
```

The `show stack-oper-mode` command is in the privExec command mode.

The `show stack-oper-mode` command has no parameters or variables.

Figure 10 displays sample output from the `show stack-oper-mode` command.

Figure 10 show stack-oper-mode command output

```
BPS2000#show stack-oper-mode
Current Operational Mode:  Pure BPS 2000 Stack
Next Boot Operational Mode:  Pure BPS 2000 Stack
```

stack oper-mode command

The `stack oper-mode` command allows you to set the stack operational mode, which becomes active at the next reboot of the switch or stack. The syntax for the `stack oper-mode` command is:

```
stack oper-mode {bps2000|hybrid}
```

The `stack oper-mode` command is in the config command mode.

Table 8 describes the parameters and variables for the `stack oper-mode` command.

Table 8 stack oper-mode command parameters and variables

Parameters and variables	Description
bps2000|hybrid	Sets the stack operational mode for the next boot: • bps2000—Pure BPS 2000 Stack mode. This means *only* BPS 2000 switches either standalone or in a stack. • hybrid—Hybrid Stack mode. This means a mixture of BPS 2000 and BayStack 450 or 410 switches in a stack.

Note: You must reboot the system for the stack operation mode you entered in the CLI to take effect.

Chapter 2
General CLI commands

In the BPS 2000, the Command Line Interface (CLI) commands allows you to display and modify the switch configuration while the switch is operating.

This chapter includes information about general switch maintenance, such as setting up access parameters, upgrading the software, and setting the speed. This chapter covers the following topics:

- "Setting the terminal," next
- "Pinging" on page 60
- "Assigning and clearing IP addresses" on page 63
- "Assigning and clearing IP addresses for specific units" on page 68
- "Setting Telnet access" on page 71
- "Setting server for Web-based management" on page 74
- "Setting boot parameters" on page 75
- "Setting TFTP parameters" on page 79
- "Upgrading software" on page 82
- "Displaying interfaces" on page 88
- "Setting SNMP parameters" on page 90
- "Setting the system event log" on page 95
- "Displaying port statistics" on page 98
- "Enabling or disabling a port" on page 100
- "Naming ports" on page 102
- "Setting port speed" on page 103
- "Enabling Autopology" on page 107
- "Enabling flow control" on page 109
- "Enabling rate-limiting" on page 111

Setting the terminal

You can view the terminal settings, set them to default settings, or customize the terminal settings.This sections covers:

- "show terminal command," next
- "default terminal command" on page 58
- "terminal command" on page 59

show terminal command

The `show terminal` command displays the current serial port information, which includes connection speed, as well as the terminal width and length in number of characters. The syntax for the `show terminal` command is:

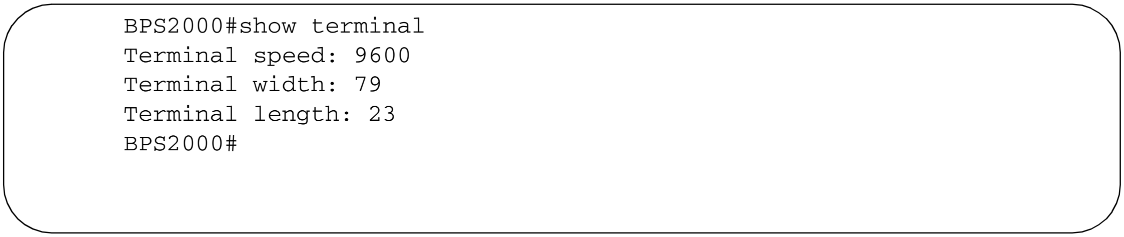
```
show terminal
```

The `show terminal` command is in the exec command mode.

The `show terminal` command has no parameters or variables.

Figure 11 displays the output from the `show terminal` command.

Figure 11 show terminal command output



```
BPS2000#show terminal
Terminal speed: 9600
Terminal width: 79
Terminal length: 23
BPS2000#
```

default terminal command

The `default terminal` command configures default settings for the terminal. These settings are transmit and receive speeds, terminal length, and terminal width. The syntax for the `default terminal` command is:

```
default terminal {speed|width|length}
```

The `default terminal` command is in the exec mode.

Table 9 describes the parameters and variables for the `default terminal` command.

Table 9 default terminal command parameters and variables

Parameters and variables	Description
speed|width|length	Sets the defaults • speed—transmit and receive baud rates for the terminal; default is 9600 baud • width—width of the terminal display; default is 79 characters • length—Length of the terminal display; default is 24 characters

terminal command

The `terminal` command configures the settings for the terminal. These settings are transmit and receive speeds, terminal length, and terminal width. The syntax of the `terminal` command is:

```
terminal speed {2400|4800|9600|19200|38400}|length
<1-132>|width <1-132>
```

The `terminal` command is in the exec mode.

Table 10 describes the parameters and variables for the `terminal` command.

Table 10 terminal command parameters and variables

Parameters and variables	**Description**
speed {2400|4800|9600|19200|38400}	Sets the transmit and receive baud rates for the terminal. You can set the speed at one of the five options shown; default is 9600.
length	Sets the length of the terminal display in characters; default is 24.
width	Sets the width of the terminal displaying characters; default 79.

Pinging

To ensure that the BPS 2000 has connectivity to the network, ping a device you know is connected to this network.

ping command

The `ping` command tests the network connection to another network device. The command sends an Internet Control Message Protocol (ICMP) packet from the switch to the target device. The local IP address must be set before issuing the `ping` command.

Note: Refer to "Assigning and clearing IP addresses" on page 63 for information on setting IP addresses.

The syntax for the `ping` command is:

```
ping <XXX.XXX.XXX.XXX>
```

The `ping` command is in the exec command mode.

Table 11 describes the parameters and variables for the `ping` command.

Table 11 ping command parameters and variables

Parameters and variables	Description
XXX.XXX.XXX.XXX	Specify the IP address of the target device in dotted-decimal notation.

If the device receives the packet, it sends a ping reply. When the switch receives the reply, it displays a message indicating that the specified IP address is alive. If no reply is received, a message indicates that the address is not responding. Figure 12 displays sample `ping` responses.

Figure 12 ping command responses

```
BPS2000#ping 10.10.40.29
Host is reachable
BPS2000#ping 10.10.41.29
Host is not reachable
```

Automatically loading configuration file

This section discusses how to download a configuration file when the system boots. You use standard CLI commands to modify the configuration file you want to download. This section covers these commands:

- "configure network command," next
- "show config-network command" on page 63

configure network command

The `configure network` command allows you to load and execute a script immediately and to configure parameters to automatically download a configuration file when you reboot the switch or stack. The syntax for the `configure network` command is:

```
configure network [load-on-boot
{disable|use-bootp|use-config}] [filename <WORD>] [address
<XXX.XXX.XXX.XXX>]
```

The `configure network` command is in the exec mode.

Note: When you enter `configure network` with no parameters, the system prompts you for the script file name and TFTP server address and then downloads the script.

Table 12 describes the parameters and variables for the `configure network` command.

Table 12 configure network command parameters and variables

Parameters and variables	**Description**
load-on-boot {disable|use-bootp|use-config	Specifies the settings for automatically loading a configuration file when the system boots: • disable—disables the automatic loading of config file • use-boot—specifies using the BootP file as the automatically loaded config file • use-config—specifies using the ASCII configuration file as the automatically loaded config file Note: If you omit this parameter, the system immediately downloads and runs the ASCII config file.
filename <WORD>	Specifies the file name**.** Note: If you omit this parameter and do not specify BootP, the system uses the configured file name.
address <XXX.XXX.XXX.XXX>	Specifies the TFTP server from which to load the file. Enter the IP address in dotted-decimal notation. Note: If you omit this parameter and do not specify BootP, the system uses the configured address.

Note: When you specify the file name or address, these parameters will be changed at the next reboot, even if you do not specify load-on-boot.

show config-network command

The `show config-network` command displays information regarding the automatic loading of the configuration file, including the current status of this feature, the file name, the TFTP server address, and the status of the previous automatic configuration command. The syntax for the `show config-network` command is:

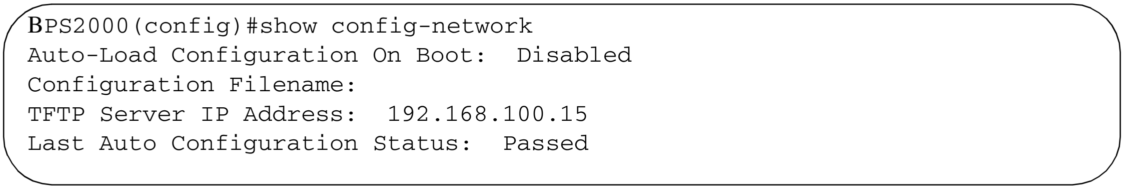
```
show config-network
```

The `show config-network` command is in the privExec mode.

The `show config-network` command has no parameters or values.

The output for the `show config-network` command is shown in Figure 13,

Figure 13 show config-network command



```
BPS2000(config)#show config-network
Auto-Load Configuration On Boot:  Disabled
Configuration Filename:
TFTP Server IP Address:  192.168.100.15
Last Auto Configuration Status:  Passed
```

Assigning and clearing IP addresses

Using the CLI, you can assign IP addresses and gateway addresses, clear these addresses, and view configured IP addresses. This section covers these topics:

- "ip address command," next
- "no ip address command" on page 65
- "ip default-gateway command" on page 65

- "no ip default-gateway command" on page 66
- "show ip command" on page 67

ip address command

The `ip address` command sets the IP address and subnet mask for the switch or a stack. The syntax for the `ip address` command is:

```
ip address [stack|switch] <XXX.XXX.XXX.XXX> [netmask
<XXX.XXX.XXX.XXX>]
```

The `ip address` command is in the config command mode.

If you do not enter either the stack or switch parameter, the system automatically modifies the stack IP address when in stack mode and modifies the switch IP address when in standalone mode.

Table 13 describes the parameters and variables for the `ip address` command.

Table 13 ip address command parameters and variables

Parameters and variables	Description
stack|switch	Sets the stack the IP address and netmask or the switch IP address and netmask.
XXX.XXX.XXX.XXX	Enter IP address in dotted decimal notation; netmask is optional.
netmask	Set the IP subnet mask for the stack or switch.

➡ **Note:** When you change the IP address or subnet mask, you may lose connection to Telnet and the Web.

no ip address command

The `no ip address` command clears the IP address and subnet mask. This command sets the IP address and subnet mask for a switch or a stack to all zeros (0). The syntax for the `no ip address` command is:

```
no ip address {stack|switch}
```

The `no ip address` command is in the config command mode.

Table 14 describes the parameters and variables for the `no ip address` command.

Table 14 no ip address command parameters and variables

Parameters and variables	Description
stack|switch	Zeroes out the stack IP address and subnet mask for the switch IP address and subnet mask.

Note: When you change the IP address or subnet mask, you may lose connection to Telnet and the Web.You also disable any new Telnet connection, and you must connect to the serial console port to configure a new IP address.

ip default-gateway command

The `ip default-gateway` command sets the IP default gateway address for a switch or a stack to use. The syntax for the `ip default-gateway` command is:

```
ip default-gateway <XXX.XXX.XXX.XXX>
```

The `ip default-gateway` command is in the config command mode.

Table 15 describes the parameters and variables for the `ip default-gateway` command.

Table 15 ip default-gateway command parameters and variables

Parameters and variables	Description
XXX.XXX.XXX.XXX	Enter the dotted-decimal IP address of the default IP gateway.

➡ **Note:** When you change the IP gateway, you may lose connection to Telnet and the Web.

no ip default-gateway command

The `no ip default-gateway` command sets the IP default gateway address to zeros (0). The syntax for the `no ip default-gateway` command is:

```
no ip default-gateway
```

The `no ip default-gateway` command is in the config command mode.

The `no ip default-gateway` command has no parameters or variables.

➡ **Note:** When you change the IP gateway address, you may lose connection to Telnet and the Web.You also may disable any new Telnet connection be required to connect to the serial console port to configure a new IP gateway address.

show ip command

The `show ip` command displays the IP configurations, specifically BootP mode, stack address, switch address, subnet mask, and gateway address.This command displays the these parameters for what is configured, what is in use, and the last BootP. The syntax for the `show ip` command is:

```
show ip [bootp] [default-gateway] [address [stack|switch]]
```

The `show ip` command is in the exec command mode. If you do not enter any parameters, this command displays all the IP-related configuration information.

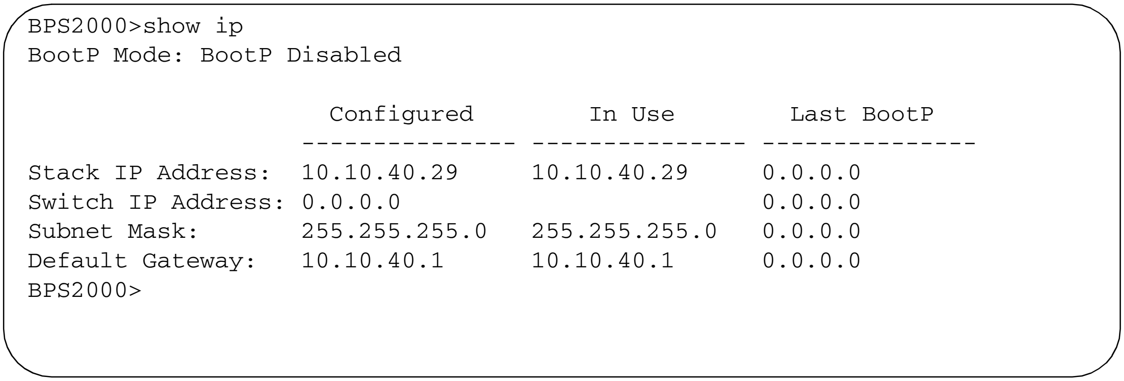
Table 16 describes the parameters and variables for the `show ip` command.

Table 16 show ip command parameters and variables

Parameters and variables	Description
bootp	Displays BootP-related IP information.
default-gateway	Displays the IP address of the default gateway.
address	Displays the current IP address.
stack|switch	Specifies current IP address of the stack or the switch.

Figure 14 displays a sample output of the `show ip` command.

Figure 14 show ip command output



```
BPS2000>show ip
BootP Mode: BootP Disabled

                    Configured          In Use          Last BootP
                   --------------- --------------- ---------------
Stack IP Address:  10.10.40.29     10.10.40.29     0.0.0.0
Switch IP Address: 0.0.0.0                         0.0.0.0
Subnet Mask:       255.255.255.0   255.255.255.0   0.0.0.0
Default Gateway:   10.10.40.1      10.10.40.1      0.0.0.0
BPS2000>
```

Assigning and clearing IP addresses for specific units

Beginning with software version 2.0, you can assign IP addresses for specific units within a stack. This section covers these topics:

- “ip address unit command,” next
- “no ip address unit command” on page 69
- “default ip address unit command” on page 70

ip address unit command

The `ip address unit` command sets the IP address and subnet mask for a specific unit in the stack. The syntax for the `ip address unit` command is:

```
ip address unit <1-8> A.B.C.D]
```

The `ip address unit` command is in the config command mode.

Table 17 describes the parameters and variables for the `ip address unit` command.

Table 17 ip address unit command parameters and variables

Parameters and variables	Description
unit <1-8>	Sets the unit you are assigning an IP address.
A.B.C.D	Enter IP address in dotted decimal notation.

Note: When you change the IP address or subnet mask, you may lose connection to Telnet and the Web.

no ip address unit command

The `no ip address unit` command sets the IP address for the specified unit in a stack to all zeros (0). The syntax for the `no ip address unit` command is:

```
no ip address unit <1-8>
```

The `no ip address unit` command is in the config command mode.

Table 18 describes the parameters and variables for the `no ip address unit` command.

Table 18 no ip address command parameters and variables

Parameters and variables	Description
unit <1-8>	Zeroes out the IP address for the specified unit.

Note: When you change the IP address or subnet mask, you may lose connection to Telnet and the Web.You also disable any new Telnet connection, and you must connect to the serial console port to configure a new IP address.

default ip address unit command

The `default ip address unit` command sets the IP address for the specified unit in a stack to all zeros (0). The syntax for the `default ip address unit` command is:

```
default ip address unit <1-8>
```

The `default ip address unit` command is in the config command mode.

Table 19 describes the parameters and variables for the `default ip address unit` command.

Table 19 default ip address unit command parameters and variables

Parameters and variables	Description
unit <1-8>	Zeroes out the IP address for the specified unit.

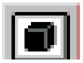
Note: When you change the IP gateway, you may lose connection to Telnet and the Web.

Setting Telnet access

You can also access the CLI through a Telnet session. To access the CLI remotely, the management port must have an assigned IP address and remote access must be enabled. You can log on to the switch using Telnet from a terminal that has access to the BPS 2000.

To open a Telnet session from Device Manager, click on the Telnet icon on the toolbar (Figure 15) or click Action > Telnet on the Device Manager toolbar.

Figure 15 Telnet icon on Device Manager toolbar



Note: Multiple users can access the CLI system simultaneously, through the serial port, Telnet, and modems. The maximum number of simultaneous users is four plus one each at the serial port for a total of 12 users on the stack. All users can configure simultaneously.

You can view the Telnet allowed IP addresses and settings, change the settings, or disable the Telnet connection. This section covers the following topics:

- "show telnet-access command," next
- "telnet-access command" on page 72
- "no telnet-access command" on page 73
- "default telnet-access command" on page 74

show telnet-access command

The `show telnet-access` command displays the current settings for Telnet access. The syntax for the `show telnet-access` command is:

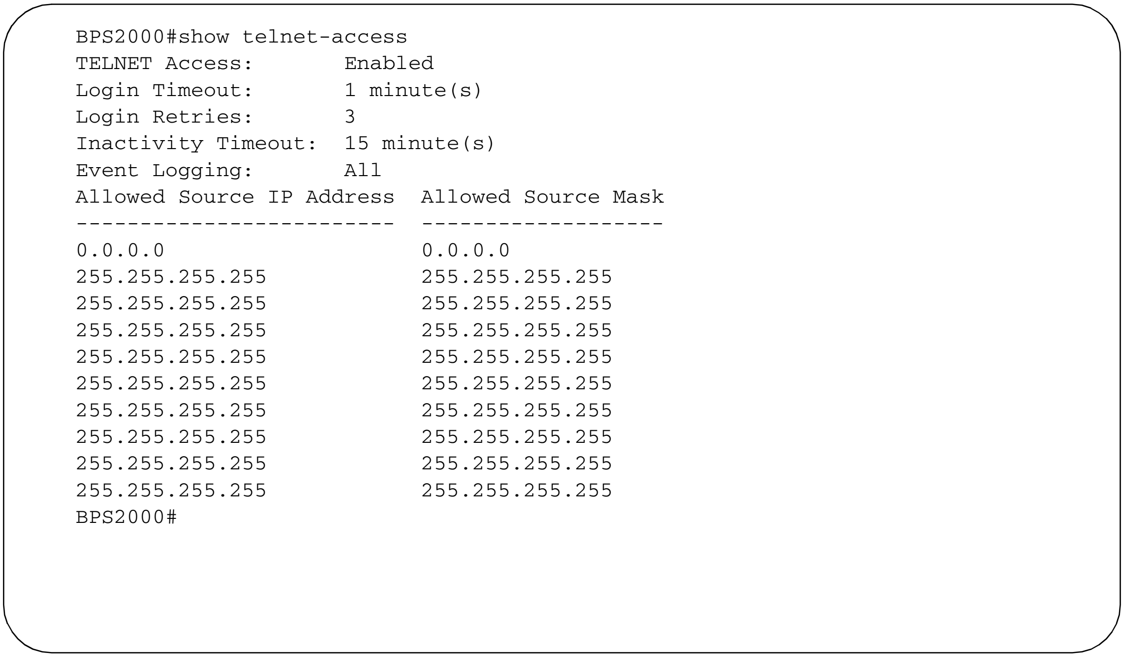
```
show telnet-access
```

The `show telnet-access` command is in the privExec command mode.

The `show telnet-access` command has no parameters or variables.

Figure 16 displays sample output from the `show telnet-access` command.

Figure 16 show telnet-access command output



```
BPS2000#show telnet-access
TELNET Access:        Enabled
Login Timeout:        1 minute(s)
Login Retries:        3
Inactivity Timeout:   15 minute(s)
Event Logging:        All
Allowed Source IP Address  Allowed Source Mask
-------------------------  -------------------
0.0.0.0                    0.0.0.0
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
BPS2000#
```

telnet-access command

The `telnet-access` command allows you to configure the Telnet connection used to manage the switch. The syntax for the `telnet-access` command is:

```
telnet-access [enable|disable] [login-timeout <1-10>] [retry
<1-100>] [inactive-timeout <0-60>] [logging
{none|access|failures|all}] [source-ip <1-10>
<XXX.XXX.XXX.XXX>[mask <XXX.XXX.XXX.XXX>]]
```

The `telnet-access` command is in the config command mode.

Table 20 describes the parameters and variables for the `telnet-access` command.

Table 20 telnet-access command parameters and variables

Parameters and variables	Description
enable|disable	Enables or disables Telnet connections.
login-timeout <1-10>	Specifies the time in minutes you want to wait between initial Telnet connection and accepted password before closing the Telnet connection; enter an integer between 1 and 10.
retry <1-100>	Specifies the number of times the user can enter an incorrect password before closing the connection; enter an integer between 1 and 100.
inactive timeout <0-60>	Specifies in minutes how long to wait before closing an inactive session; enter an integer between 0 and 60.
logging {none|access|failures|all}	Specifies what types of events you want to save in the event log: • none—do not save access events in the log • access—save access events in the log • failure—save failed access events in the log • all—save all access events in the log
[source-ip <1-10> <XXX.XXX.XXX.XXX>[mask <XXX.XXX.XXX.XXX>]	Specifies the source IP address from which connections are allowed. Enter the IP address either as an integer or in dotted-decimal notation. Specifies the subnet mask from which connections are allowed; enter IP mask in dotted-decimal notation. Note: These are the same source IP addresses as in the IP Manager list. For more information on the IP Manager list, refer to Chapter 3.

no telnet-access command

The `no telnet-access` command allows you to disable the Telnet connection. The syntax for the `no telnet-access` command is:

```
no telnet-access [source-ip [<1-10>]]
```

The `no telnet-access` command is in the config mode.

Table 21 describes the parameters and variables for the `no telnet-access` command.

Table 21 no telnet-access command parameters and variables

Parameters and variables	Description
source-ip [<1-10>]	Disables the Telnet access. When you do *not* use the optional parameter, the source-ip list is cleared, meaning the 1st index is set to 0.0.0.0./0.0.0.0. and the 2nd to 10th indexes are set to 255.255.255.255/255.255.255.255. When you *do* specify a source-ip value, the specified pair is set to 255.255.255.255/255.255.255.255. Note: These are the same source IP addresses as in the IP Manager list. For more information on the IP Manager list, refer to Chapter 3.

default telnet-access command

The `default telnet-access` command sets the Telnet settings to the default values. The syntax for the `default telnet-access` command is:

```
default telnet-access
```

The `default telnet-access` command is in the config command mode.

The `default telnet-access` command has no parameters or values.

Setting server for Web-based management

You can enable or disable the Web server to use for the Web-based management system. Refer to *Using Web-based Management for the Business Policy Switch 2000 Software Version 2.0* for information on the Web-based management system. This section discusses the following commands:

- "web-server," next
- "no web-server" on page 75

web-server

The web-server command enables or disables the Web server that you use for Web-based management. The syntax for the web-server command is:

```
web-server {enable|disable}
```

The web-server command is in the config mode

Table 22 describes the parameters and variables for the web-server command.

Table 22 web-server command parameters and variables

Parameters and variables	Description
enable|disable	Enables or disables the Web server.

no web-server

The no web-server command disables the Web server that you use for Web-based management. The syntax for the no web-server command is:

```
no web-server
```

The no web-server command is in the config mode.

The no web-server command has no parameters or values.

Setting boot parameters

You can reboot the switch or stack and configure BootP. The topics covered in this section are:

- "boot command," next
- "ip bootp server command" on page 77

- "stack bootp-mac-addr-type command" on page 77
- "no ip bootp server command" on page 78
- "default ip bootp server command" on page 78

boot command

The boot command performs a soft-boot of the switch or stack. The syntax for the boot command is:

```
boot [default] [unit <unitno>]
```

The boot command is in the privExec command mode.

Table 23 describes the parameters and variables for the boot command.

Table 23 boot command parameters and variables

Parameters and variables	Description
default	Restores switch or stack to factory-default settings after rebooting.
unit <unitno>	Specifies which unit of the stack will be rebooted. This command is available only in stack mode. Enter the unit number of the switch you want to reboot.

Note: When you reset to factory defaults, the switch or stack retains the stack operational mode, last reset count, and reason for last reset; these three parameters are not defaulted to factory defaults.

ip bootp server command

The `ip bootp server` command configures BootP on the current instance of the switch or server. The syntax for the `ip bootp server` command is:

```
ip bootp server {last|needed|disable|always}
```

The `ip bootp server` command is in the config command mode.

Table 24 describes the parameters and variables for the `ip bootp server` command.

Table 24 ip bootp server command parameters and variables

Parameters and variables	Description
last|needed|disable|always	Specifies when to use BootP: • last—use BootP or the last known address • needed—use BootP only when needed • disable—never use BootP • always—Always use BootP

stack bootp-mac-addr-type command

The `stack bootp-mac-addr-type` command allows you to choose which MAC address is used for BootP operation when running in a stack. This option is available only on a stack consisting of all BPS 2000 that is set for stack operational mode of Pure BPS 2000 Stack. The syntax for the `stack bootp-mac-address-type` command is:

```
stack bootp-mac-addr-type {base-unit|stack}
```

The `stack bootp-mac-addr-type` command is in the config command mode.

Table 25 describes the parameters and variables for the `stack boot-mac-addr-type` command.

Table 25 stack boot-mac-addr-type command parameters and variables

Parameters and variables	**Description**
base-unit|stack	Specifies location of BootP MAC address: • base-unit—use the base unit MAC address for BootP • stack—use the stack MAC address for BootP

no ip bootp server command

The `no ip bootp server` command disables the BootP server. The syntax for the `no ip bootp server` command is:

```
no ip bootp server
```

The `no ip bootp server` command is in the config command mode.

The `no ip bootp server` command has no parameters or values.

default ip bootp server command

The `default ip bootp server` command disables the BootP server. The syntax for the `default ip bootp server` command is:

```
default ip bootp server
```

The `default ip bootp server` command is in the config command mode.

The `default ip bootp server` command has no parameters or values.

Setting TFTP parameters

You can display the IP address of the TFTP server, assign an IP address you want to use for a TFTP server, copy a configuration file to the TFTP server, or copy a configuration file from the TFTP server to the switch to use to configure the switch. This section covers:

- "show tftp-server command," next
- "tftp-server command" on page 80
- "no tftp-server command" on page 80
- "copy config tftp command" on page 80
- "copy tftp config command" on page 81

show tftp-server command

The `show tftp-server` command displays the IP address of the server used for all TFTP-related transfers. The syntax for the `show tftp-server` command is:

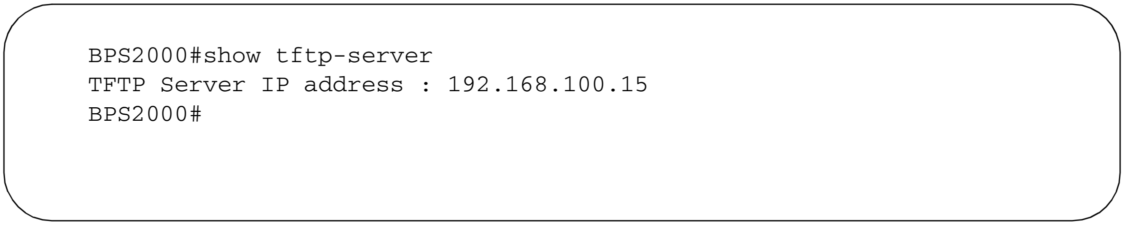
```
show tftp-server
```

The `show tftp-server` command is in the privExec command mode.

The `show tftp-server` command has no parameters or variables.

Figure 17 displays a sample output of the `show tftp-server` command.

Figure 17 show tftp-server command output



```
BPS2000#show tftp-server
TFTP Server IP address : 192.168.100.15
BPS2000#
```

tftp-server command

The tftp-server command assigns the address for the stack or switch to use for TFTP services. The syntax of the tftp-server command is:

```
tftp-server <XXX.XXX.XXX.XXX>
```

The tftp-server command is in the config command mode.

Table 26 describes the parameters and variables for the tftp-server command.

Table 26 tftp-server command parameters and variables

Parameters and variables	Description
XXX.XXX.XXX.XXX	Enter the dotted-decimal IP address of the server you want to use for TFTP services.

no tftp-server command

The no tftp-server command clears the TFTP server IP address to 0.0.0.0. The syntax of the no tftp-server command is:

```
no tftp-server
```

The no tftp-server command is in the config command mode.

The no tftp-server command has no parameters or values.

copy config tftp command

The copy config tftp command copies the current configuration file onto the TFTP server. The syntax for the copy config tftp command is:

```
copy config tftp [address <XXX.XXX.XXX.XXX>] filename <WORD>
```

The copy config tftp command is in the privExec command mode.

Table 27 describes the parameters and variables for the `copy config tftp` command.

Table 27 copy config tftp command parameters and variables

Parameters and variables	Description
address	Specifies the TFTP server IP address; enter in dotted-decimal notation.
filename <WORD>	Specifies that you want to copy the configuration file onto the TFTP server. Enter the name you want the configuration file to have on the TFTP server.

copy tftp config command

The `copy tftp config` command retrieves the system configuration file from the TFTP server and uses the retrieved information as the current configuration on the system.The syntax for the `copy tftp config` command is:

```
copy tftp config [address <XXX.XXX.XXX.XXX>] filename <WORD>
```

The `copy tftp config` command is in the privExec command mode.

Table 28 describes the parameters and variables for the `copy tftp config` command.

Table 28 copy tftp config command parameters and variables

Parameters and variables	Description
address <XXX.XXX.XXX.XXX>	Specifies the TFTP server IP address; enter in dotted-decimal notation.
filename <WORD>	Enter the name of the configuration file you want to copy from the TFTP server.

Upgrading software

You can download the BPS 2000 software image that is located in non-volatile flash memory. To download the BPS 2000 software image, a properly configured Trivial File Transfer Protocol (TFTP) server must be present in your network, and the policy switch must have an IP address. To learn how to configure the switch or stack IP address, refer to "Assigning and clearing IP addresses" on page 63.

Caution: Do not interrupt power to the device during the software download process. A power interruption can corrupt the firmware image.

This section covers the following topics:

- "download command," next
- "Observing LED indications" on page 84
- "Upgrading software images" on page 85

download command

The `download` command upgrades the software for the BPS 2000. You can upgrade both the software image and the diagnostics image. If you upgrade to a stack configuration, the entire stack will be upgraded, and the new image is loaded onto every unit of the stack.

Note: The system resets after downloading a new image.

The syntax for the `download` command is:

```
download [address <ip>] {image <image-name> [bs450-image
<image-name>]|diag <filename>}
```

The `download` command is in the privExec command mode.

Note: Beginning with software version 2.0, you can use the `download` command without parameters. The system displays the most recently used TFTP serve IP address and file name; if you still want to use these, press `[Enter]` You can also change these.

Table 29 describes the parameters and variables for the `download` command.

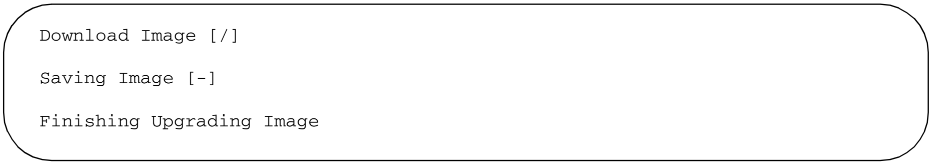
Table 29 download command parameters and variables

Parameters and variables	Description
address <ip>	Specifies the TFTP server you want to use. Note: If this parameter is omitted, the system goes to the server specified by the `tftp-server` command.
image <image-name>	Enter the name of the BPS 2000 software image you want to download.
bs450-image <image-name>	Enter the name of the BayStack 450 software image you want to download.
diag <filename>	Enter the name of the BPS 2000 diagnostics image you want to download.

The software download process automatically completes without user intervention. The process erases the contents of flash memory and replaces it with a new software image. Take care not to interrupt the download process until after it runs to completion (the process can take up to 10 minutes, depending on network conditions).

When the download process is complete, the switch automatically resets and the new software image initiates a self-test. The system returns a message after successfully downloading a new image. Figure 18 displays a sample output of the download command.

Figure 18 download message



```
Download Image [/]

Saving Image [-]

Finishing Upgrading Image
```

During the download process, the Business Policy Switch is not operational. You can monitor the progress of the download process by observing the LED indications.

Observing LED indications

Table 30 describes the LED indications during the software download process.

Note: When you upgrade the software in a mixed stack, or Hybrid Stack operational mode, all the BU LEDs on all BPS 2000 units may light or blink. you may disregard these lights at this time.

Table 30 LED Indications during the software download process

Phase	Description	LED Indications
1	The switch downloads the new software image.	**100 Mb/s port status LEDs (ports 18 to 24 only):** The LEDs begin to turn on in succession beginning with port 24, which indicates the progress of the download process. When LEDs 18 to 24 are all on, the switch has received the new software image successfully.
2	The switch erases the flash memory.	**100 Mb/s port status LEDs (ports 1 to 12 only):** The LEDs begin to turn on in succession beginning with port 1, which indicates that various sectors of the switch’s flash memory are being erased. When LEDs 1 to 12 are all on, the switch’s flash memory has been erased.

Table 30 LED Indications during the software download process (continued)

Phase	Description	LED Indications
3	The switch programs the new software image into the flash memory.	**100 Mb/s port status LEDs (ports 1 to 8 only):** The LEDs begin to turn on in succession beginning with port 1, which indicates that the new software image is being programmed into the switch's flash memory. When LEDs 1 to 8 are all on, the new software image has been programmed successfully into the switch's flash memory.
4	The switch resets automatically.	After the reset completes, the new software image initiates the switch self-test, which comprises various diagnostic routines and subtests. The LEDs display various patterns to indicate that the subtests are in progress.

Upgrading software images

You follow a different procedure depending if you are using a Pure BPS 2000 stack or a Hybrid stack.

The stacking software compatibility requirements are as follows:

- Pure BPS 2000 stack—All units must be running the same software version.
- Pure BayStack 450 stack—All units must be running the same software version.
- Hybrid stack:
  - — All BPS 2000 units must be running the same software version.
  - — All BayStack 410 units must be running the same software version.
  - — All BayStack 450 units must be running the same software version.
  - — All software versions must have the identical ISVN.

This section discusses the following topics:

- "Upgrading software in a Pure BPS 2000 stack," next
- "Upgrading software in a Hybrid stack" on page 86

Upgrading software in a Pure BPS 2000 stack

To download, or upgrade, software in a Pure BPS 2000 stack:

1 Enter `download [address <ip>] image bps2000.img`.

The system resets and opens to the BPS2000 banner. Refer to "Accessing the CLI" on page 35 to return to the CLI.

2 Enter `download [address <ip>] diag bps2000diags.bin.`

The system resets and opens to the BPS2000 banner. Refer to "Accessing the CLI" on page 35 to return to the CLI.

However, if you are currently using software version 1.0, 1.0.1, or 1.1, you must upgrade to software version 1.1.1 before upgrading to version 2.0.

Upgrading software in a Hybrid stack

The physical order of the units and the unit numbering in the Hybrid stack does not affect the upgrading process at all. In addition, the cabling order regarding upstream/downstream neighbors does not affect the process.

Before you attempt to download new software (or upgrade software) to a Hybrid (mixed) stack, you *must* ensure that the Interoperability Software Version Numbers (ISVN) are identical. That is, the ISVN number for the BayStack 450 switch and BayStack 410 switch must have the same ISVN as the BPS 2000. If the ISVNs are not the same, the stack does not operate. The ISVNs and the accompanying software release are:

- ISVN 1
  - BayStack 410 or Bay Stack 450—version 3.1
  - BPS 2000—versions 1.0 and 1.0.1
- ISVN 2
  - BayStack 410 or BayStack 450—versions 4.0 and 4.1
  - BPS 2000—versions 1.1, 1.1.1, 1.2, and 2.0

This section describe the steps for the following software upgrades:

- "Upgrading software when ISVN is 2," next
- "Upgrading software when ISVN is 1" on page 87

Upgrading software when ISVN is 2

To upgrade a Hybrid stack to BPS 2000 software version 2.0 when the ISVN numbers of the units are 2:

1 Enter `download [address <ip>] image bps2000.img`.

The system resets and opens to the BPS2000 banner. Refer to "Accessing the CLI" on page 35 to return to the CLI.

2 Enter `download [address <ip>] diag bps2000diags.bin`.

The system resets and opens to the BPS2000 banner. Refer to "Accessing the CLI" on page 35 to return to the CLI.

However, if you are currently using software version 1.0, 1.0.1, or 1.1, you must upgrade to software version 1.1.1 before upgrading to version 2.0.

Upgrading software when ISVN is 1

To upgrade a Hybrid stack to BPS 2000 software version 2.0 when the ISVN numbers of the units are 1:

1 Enter `download [address <ip>] image bps2000.img bs450-image bs450.img`.

Note: If you do not download both the BPS 2000 and BayStack 410/450 images simultaneously, the stack may not form.

The system resets and opens to the BPS2000 banner. Refer to "Accessing the CLI" on page 35 to return to the CLI.

2 Enter `download [address <ip>] bs450-image bs450.img`.

The system resets and opens to the BPS2000 banner. Refer to "Accessing the CLI" on page 35 to return to the CLI.

3 Enter `download [address <ip>] diag bps2000diags.bin`.

The system resets and opens to the BPS2000 banner. Refer to "Accessing the CLI" on page 35 to return to the CLI.

4 Validate that the ISVN on both the BPS 2000 and the BayStack are 2.

Displaying interfaces

You can view the status of all interfaces on the switch or stack, including MultiLink Trunk membership, link status, autonegotiation, and speed.

show interfaces command

The `show interfaces` command displays the current configuration and status of all interfaces. The syntax for the `show interfaces` command is:

```
show interfaces [names] [<portlist>]
```

The `show interfaces` command is in the exec command mode.

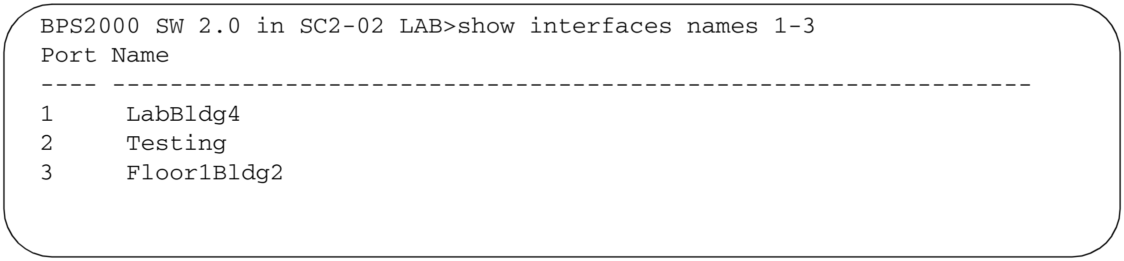
Table 31 describes the parameters and variables for the `show interfaces` command.

Table 31 show interfaces command parameters and variables

Parameters and variables	Description
names <portlist>	Displays the interface names; enter specific ports if you want to see only those.

Figure 19 displays a sample output of the `show interfaces names` command.

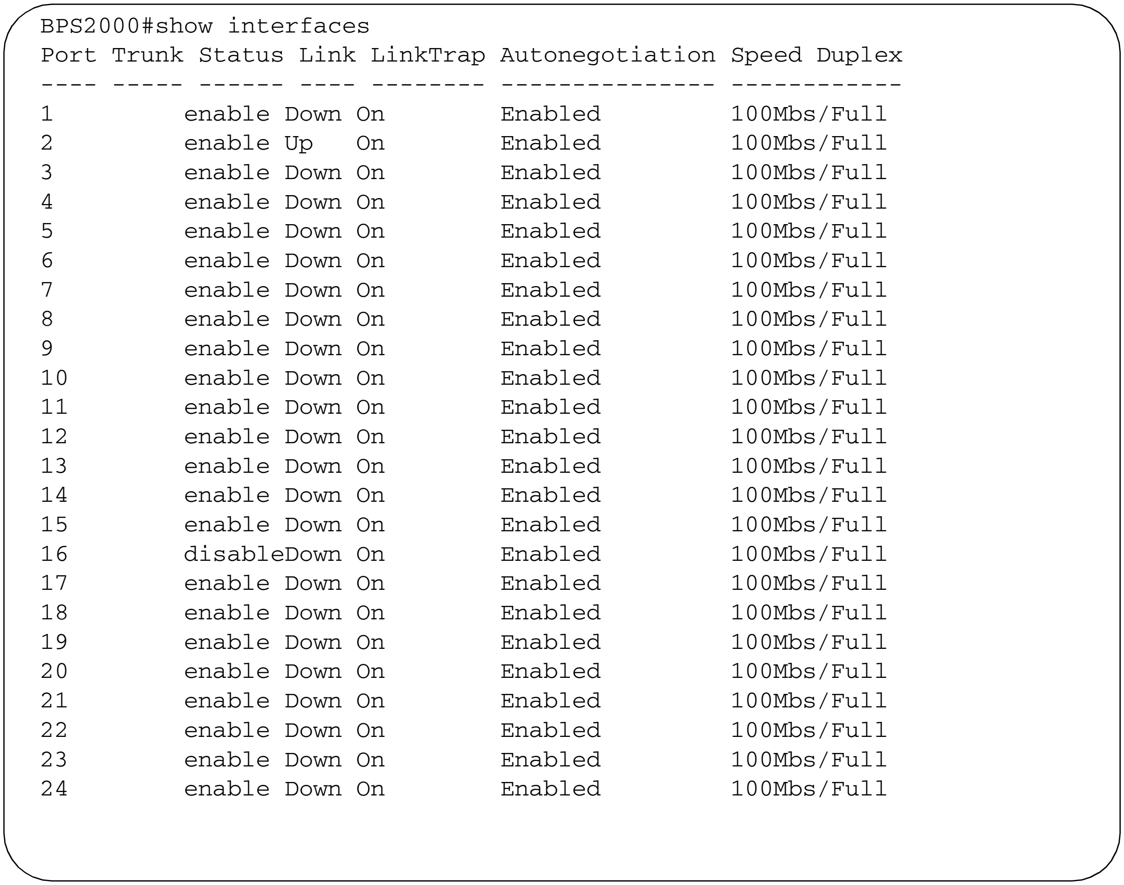
Figure 19   show interfaces names command output



```
BPS2000 SW 2.0 in SC2-02 LAB>show interfaces names 1-3
Port Name
---- -----------------------------------------------------------------
1     LabBldg4
2     Testing
3     Floor1Bldg2
```

Figure 20 displays a sample output of the `show interfaces` command without the names variable.

Figure 20 show interfaces command output



```
BPS2000#show interfaces
Port Trunk Status Link LinkTrap Autonegotiation Speed Duplex
---- ----- ------ ---- --------- --------------- ------------
1         enable Down On        Enabled         100Mbs/Full
2         enable Up   On        Enabled         100Mbs/Full
3         enable Down On        Enabled         100Mbs/Full
4         enable Down On        Enabled         100Mbs/Full
5         enable Down On        Enabled         100Mbs/Full
6         enable Down On        Enabled         100Mbs/Full
7         enable Down On        Enabled         100Mbs/Full
8         enable Down On        Enabled         100Mbs/Full
9         enable Down On        Enabled         100Mbs/Full
10        enable Down On        Enabled         100Mbs/Full
11        enable Down On        Enabled         100Mbs/Full
12        enable Down On        Enabled         100Mbs/Full
13        enable Down On        Enabled         100Mbs/Full
14        enable Down On        Enabled         100Mbs/Full
15        enable Down On        Enabled         100Mbs/Full
16        disableDown On        Enabled         100Mbs/Full
17        enable Down On        Enabled         100Mbs/Full
18        enable Down On        Enabled         100Mbs/Full
19        enable Down On        Enabled         100Mbs/Full
20        enable Down On        Enabled         100Mbs/Full
21        enable Down On        Enabled         100Mbs/Full
22        enable Down On        Enabled         100Mbs/Full
23        enable Down On        Enabled         100Mbs/Full
24        enable Down On        Enabled         100Mbs/Full
```

Setting SNMP parameters

You can set various SNMP parameters and traps, as well as disable SNMP traps. This section covers:

- "snmp-server command," next
- "no snmp-server command" on page 92
- "snmp trap link-status command" on page 93
- "no snmp trap link-status command" on page 93
- "default snmp trap link-status command" on page 94

snmp-server command

The `snmp-server` command configures various SNMP parameters. The syntax for the `snmp-server` command is:

```
snmp-server {{enable|disable}|authentication-trap|community
<community-string> [ro|rw] contact <text>|host <host-ip>
<community-string>|location <text>|name <text>}
```

The `snmp-server` command is in the config command mode.

Table 32 describes the parameters and variables for the `snmp-server` command.

Table 32 snmp-server command parameters and variables

Parameters and variables	Description
authentication-trap	Enables generation of SNMP authentication failure traps.
community <community-string>	Changes the read-only (ro) or read-write (rw) community strings for SNMP v1 and SNMPv2c access. Enter a community string that works as a password and permits access to the SNMP protocol.
ro|rw	Specifies read-only or read-write access. Stations with ro access can only retrieve MIB objects, and stations with rw access can retrieve and modify MIB objects. Note: If neither ro nor rw is specified, ro is assumed (default).
contact <text>	Specifies the SNMP sysContact value; enter an alphanumeric string.
host <host-ip> <community-string>	Configures an SNMP trap destination: • host-ip—enter a dotted-decimal IP address of a host that will be the trap destination • community-string—enter a community string that works as a password and permits access to the SNMP protocol
location <text>	Specifies the SNMP sysLocation value; enter an alphanumeric string.
name <text>	Specifies the SNMP sysName value; enter an alphanumeric string.

no snmp-server command

The `no snmp-server` command disables SNMP or clears the configuration. If you omit the parameters, this command disables SNMP access. The syntax for the `no snmp-server` command is:

```
no snmp-server [authentication-trap|community [ro|rw]
contact|host [<host-ip> <community-string>]|location |name]
```

The `no snmp-server` command is in the config command mode.

Table 33 describes the parameters and variables for the `snmp-server` command.

Table 33 no snmp-server command parameters and variables

Parameters and variables	Description
enable|disable	With no parameters, disables SNMP access.
authentication-trap	Disables authentication failure traps.
community	Disables the community string.
ro|rw	Disables either read-only or read-write access.
contact <text>	Clears the SNMP sysContact value.
host <host-ip> <community-string>	Removes an SNMP trap destination or all destinations.
location	Clears the SNMP sysLocation value.
name	Clears the SNMP sysName value

Note: Disabling SNMP access will also lock you out of the DM management system.

snmp trap link-status command

The `snmp trap link-status` command enables the linkUp/linkDown traps for the port. The syntax of the command is:

```
snmp trap link-status [port <portlist>]
```

The `snmp trap link-status` command is in the config-if command mode.

Table 34 describes the parameters and variables for the `snmp trap link-status` command.

Table 34 snmp trap link-status command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to enable the linkUp/linkDown traps on. Enter the port numbers or all. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

no snmp trap link-status command

The `no snmp trap link-status` command disables the linkUp/linkDown traps for the port. The syntax of the command is:

```
no snmp trap link-status [port <portlist>]
```

The `no snmp trap link-status` command is in the config-if command mode.

Table 35 describes the parameters and variables for the `no snmp trap link-status` command.

Table 35 no snmp trap link-status command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to disable the linkUp/linkDown traps on. Enter the port numbers or all. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

default snmp trap link-status command

The `default snmp trap link-status` command disables the linkUp/ linkDown traps for the port. The syntax of the command is:

```
default snmp trap link-status [port <portlist>]
```

The `default snmp trap link-status` command is in the config-if command mode.

Table 36 describes the parameters and variables for the default `snmp trap link-status` command.

Table 36 default snmp trap link-status command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to disable the linkUp/linkDown traps on. Enter the port numbers or all. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

Setting the system event log

You can set the system event log to log different levels of events. This section covers:

- "show logging," next
- "set logging" on page 96
- "no set logging" on page 97
- "default set logging" on page 97
- "clear logging command" on page 97

show logging

The `show logging` command displays the current contents of the system event log. The syntax for the `show logging` command is:

```
show logging [critical] [serious] [informational]
```

The `show logging` command is in the privExec command mode.

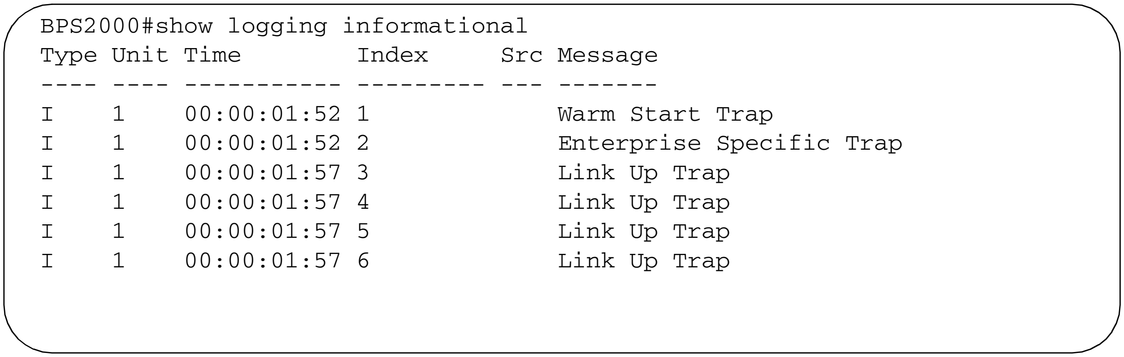
Table 37 describes the parameters and variables for the `show logging` command.

Table 37 show logging command parameters and variables

Parameters and variables	**Description**
critical	Displays critical log messages.
serious	Displays serious log messages.
informational	Displays informational log messages.

Figure 21 shows the output of the `show logging informational` command.

Figure 21 show logging command output



```
BPS2000#show logging informational
Type Unit Time        Index     Src Message
---- ---- ----------- --------- --- -------
I    1    00:00:01:52 1             Warm Start Trap
I    1    00:00:01:52 2             Enterprise Specific Trap
I    1    00:00:01:57 3             Link Up Trap
I    1    00:00:01:57 4             Link Up Trap
I    1    00:00:01:57 5             Link Up Trap
I    1    00:00:01:57 6             Link Up Trap
```

set logging

The `set logging` command configures the system settings for the system event log. The syntax for the `set logging` command is:

```
set logging [enable|disable] [level
critical|serious|informational] [nv-level
critical|serious|informational|none]
```

The `set logging` command is in the config command mode.

Table 38 describes the parameters and variables for the `set logging` command.

Table 38 set logging command parameters and values

Parameters and variables	Description
enable|disable	Enables or disables the event log (default is enabled).
level critical|serious|informational	Specifies the level of logging stored in DRAM.
nv-level critical|serious|informational|none	Specifies the level of logging stored in NVRAM.

no set logging

The no set logging command disables the system event log. The syntax for the no set logging command is:

```
no set logging
```

The no set logging command is in the config command mode.

The no set logging command has no parameters or values.

default set logging

The default set logging command configures the system settings as the factory default settings for the system event log. The syntax for the default set logging command is:

```
default set logging
```

The default set logging command is in the config command mode.

The default set logging command has no parameters or values.

clear logging command

The clear logging command clears all log messages in DRAM. The syntax for the clear logging command is:

```
clear logging [nv]
```

The clear logging command is in the privExec command mode.

Table 39 shows the parameters and values for the clear logging command.

Table 39 clear logging command parameters and values

Parameters and values	**Description**
nv	Clears all log messages in both DRAM and NVRAM.

Displaying port statistics

You can display the statistics for a port for both received and transmitted traffic. This section covers:

- "show port-statistics command," next
- "clear-stats command" on page 100

show port-statistics command

The `show port-statistics` command displays the statistics for the port on both received and transmitted traffic. The syntax for the `show port-statistics` command is:

```
show port-statistics [port <portlist>]
```

The `show port-statistics` command is in the config-if command mode.

Table 40 describes the parameters and variables for the `show port-statistics` command.

Table 40 show port-statistics command parameters and variables

Parameters and variables	**Description**
port <portlist>	Specifies the port numbers to configure to display statistics on; enter the port numbers. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

Figure 22 displays sample output from the `show port-statistics` command.

Figure 22 show port-statistics command output

```
BPS2000(config-if)#show port-statistics
Received
    Packets:                 0
    Multicasts:              0
    Broadcasts:              0
    TotalOctets:             0
    Lost Packets:            0
    Packets 64 bytes:        0
            65-127 bytes:    0
            128-255 bytes:   0
            256-511 bytes:   0
            512-1023 bytes:  0
            1024-1518 bytes: 0
    FCS Errors:              0
    Undersized Packets:      0
    Oversized Packets:       0
    Filtered Packets:        0
    Flooded PAckets:         0
    Frame Errors:            0
Transmitted
    Packets:                 0
    Multicasts:              0
    Broadcasts:              0
    TotalOctets:             0
    Packets 64 bytes:        0
            65-127 bytes:    0
            128-255 bytes:   0
            256-511 bytes:   0
            512-1023 bytes:  0
            1024-1518 bytes: 0
    Collisions:              0
    Single Collisions:       0
    Multiple Collisions:     0
    Excessive Collisions:    0
    Deferred Packets:        0
    Late Collisions:         0
```

clear-stats command

The clear-stats command clears all statistical information for the specified port. All counters are set to zero (0). The syntax for the clear-stats command is:

```
clear-stats [port <portlist>]
```

The clear-stats command is in the config-if command mode.

Table 41 describes the parameters and variables for the clear-stats command.

Table 41 clear-stats command parameters and variables

Parameters and variables	**Description**
port <portlist>	Specifies the port numbers to clear of statistical information; enter the port numbers. Note: If you omit this parameter, the system uses the port number you specified in the interface command.

Enabling or disabling a port

You can enable or disable a port using the CLI. This section covers the following commands:

- "shutdown command," next
- "no shutdown command" on page 101

shutdown command

The shutdown command disables the port. The syntax for the shutdown command is:

```
shutdown [port <portlist>]
```

The `shutdown` command is in the config-if command mode.

Table 42 describes the parameters and variables for the `shutdown` command.

Table 42 shutdown command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to shut down or disable. Enter the port numbers you want to disable. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

no shutdown command

The `no shutdown` command enables the port. The syntax for the `no shutdown` command is:

```
no shutdown [port <portlist>]
```

The `no shutdown` command is in the config-if command mode.

Table 42 describes the parameters and variables for the `no shutdown` command.

Table 43 no shutdown command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to enable. Enter the port numbers you want to disable. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

Naming ports

You can name a port using the CLI. This section covers the following commands:

- "name command," next
- "no name command" on page 102
- "default name command" on page 103

name command

The name command allows you to name ports or to change the name. The syntax for the name command is:

```
name [port <portlist>] <LINE>
```

The name command is in the config-if command mode.

Table 44 describes the parameters and variables for the name command.

Table 44 name command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to name. Note: If you omit this parameter, the system uses the port number you specified in the interface command.
<LINE>	Enter up to 26 alphanumeric characters.

no name command

The no name command clears the port names; it resets the field to an empty string. The syntax for the no name command is:

```
no name [port <portlist>]
```

The no name command is in the config-if command mode.

Table 45 describes the parameters and variables for the `no name` command.

Table 45 no name command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to clear of names. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

default name command

The `default name` command clears the port names; it resets the field to an empty string. The syntax for the `default name` command is:

```
default name [port <portlist>]
```

The `default name` command is in the config-if command mode.

Table 46 describes the parameters and variables for the `default name` command.

Table 46 default name command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to clear of names. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

Setting port speed

You can set the speed and duplex mode for a port. This section covers:

- "speed command," next
- "default speed command" on page 105
- "duplex command" on page 105
- "default duplex command" on page 106

speed command

The `speed` command sets the speed of the port. The syntax for the `speed` command is:

```
speed [port <portlist>] {10|100|1000|auto}
```

The `speed` command is in the config-if command mode.

Note: You cannot *enable* autonegotiation on fiber optic ports. You cannot *disable* autonegotiation on the BPS2000 1-GT and BPS2000 2-GT MDA ports.

Table 47 describes the parameters and variables for the `speed` command.

Table 47 speed command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to configure the speed. Enter the port numbers you want to configure. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.
10|100|1000|auto	Sets speed to: • 10—10 Mb/s • 100—100 Mb/s • 1000—1000 Mb/s or 1 GB/s • auto—autonegotiation

Note: When you set the port speed for autonegotiation, ensure that the other side of the link is also set for autonegotiation.

default speed command

The `default speed` command sets the speed of the port to the factory default speed. The syntax for the `default speed` command is:

```
default speed [port <portlist>]
```

The `default speed` command is in the config-if command mode.

Table 47 describes the parameters and variables for the `default speed` command.

Table 48 default speed command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to set the speed to factory default. Enter the port numbers you want to set. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

duplex command

The `duplex` command specifies the duplex operation for a port. The syntax for the `duplex` command is:

```
duplex [port <portlist>] {full|half|auto}
```

The `duplex` command is in the config-if command mode.

Note: You cannot *enable* autonegotiation on fiber optic ports. You cannot *disable* autonegotiation on the BPS2000 1-GT and BPS2000 2-GT MDA ports.

Table 49 describes the parameters and variables for the `duplex` command.

Table 49 duplex command parameters and variables

Parameters and variables	**Description**
port <portlist>	Specifies the port number to configure the duplex mode. Enter the port number you want to configure, or all to configure all ports simultaneously. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.
full|half|auto	Sets duplex to: • full—full-duplex mode • half—half-duplex mode • auto—autonegotiation

Note: When you set the duplex mode for autonegotiation, ensure that the other side of the link is also set for autonegotiation.

default duplex command

The `default duplex` command sets the duplex operation for a port to the factory default duplex value. The syntax for the `default duplex` command is:

```
default duplex [port <portlist>]
```

The `default duplex` command is in the config-if command mode.

Table 49 describes the parameters and variables for the `default duplex` command.

Table 50 default duplex command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to reset the duplex mode to factory default values. Enter the port numbers you want to configure, or all to configure all ports simultaneously. The default value is autonegotiation. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

Note: You cannot *enable* autonegotiation on fiber optic ports. You cannot *disable* autonegotiation on the BPS2000 1-GT and BPS2000 2-GT MDA ports.

Enabling Autopology

You can enable the Optivity* Autopology* protocol using the CLI. Refer to the www.nortelnetworks.com/documentation URL for information on Autopology. (The product family for Optivity and Autotopology is Data and Internet.). This section covers the following commands:

- "autotopology command," next
- "no autotopology command" on page 108
- "default autotopology command" on page 108

autotopology command

The `autotopology` command enables the Autotopology protocol. The syntax for the `autotopology` command is:

```
autotopology
```

The `autotopology` command is in the config command mode.

The `autotopology` command has no parameters or values.

no autotopology command

The `no autotopology` command disables the Autotopology protocol. The syntax for the `no autotopology` command is:

```
no autotopology
```

The `no autotopology` command is in the config command mode.

The `no autotopology` command has no parameters or values.

default autotopology command

The `default autotopology` command enables the Autotopology protocol. The syntax for the `default autotopology` command is:

```
default autotopology
```

The `default autotopology` command is in the config command mode.

The `default autotopology` command has no parameters or values.

Enabling flow control

If you use a Gigabit Ethernet MDA with the BPS 2000, you control traffic on this port using the `flowcontrol` command. This section covers the following commands:

- "flowcontrol command," next
- "no flowcontrol command" on page 110
- "default flowcontrol command" on page 110

flowcontrol command

The `flowcontrol` command is used only on Gigabit Ethernet ports and controls the traffic rates during congestion. The syntax for the `flowcontrol` command is:

```
flowcontrol [port <portlist>]
{asymmetric|symmetric|auto|disable}
```

The `flowcontrol` command is in the config-if mode.

Table 51 describes the parameters and variables for the `flowcontrol` command.

Table 51 flowcontrol command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to configure for flow control. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.
asymmetric|symmetric|auto|disable	Sets the mode for flow control: • asymmetric—enables the local port to perform flow control on the remote port • symmetric—enables the local port to perform flow control • auto—sets the port to automatically determine the flow control mode (default) • disable—disables flow control on the port

no flowcontrol command

The no flowcontrol command is used only on Gigabit Ethernet ports and disables flow control. The syntax for the no flowcontrol command is:

```
no flowcontrol [port <portlist>]
```

The no flowcontrol command is in the config-if mode.

Table 52 describes the parameters and variables for the no flowcontrol command.

Table 52 no flowcontrol command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to disable flow control. Note: If you omit this parameter, the system uses the port number you specified in the interface command.

default flowcontrol command

The default flowcontrol command is used only on Gigabit Ethernet ports and sets the flow control to auto, which automatically detects the flow control. The syntax for the default flowcontrol command is:

```
default flowcontrol [port <portlist>]
```

The default flowcontrol command is in the config-if mode.

Table 52 describes the parameters and variables for the default flowcontrol command.

Table 53 default flowcontrol command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to default to auto flow control. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

Enabling rate-limiting

You can limit the percentage of multicast traffic, or broadcast traffic, or both using the CLI. For more information on rate-limiting, refer to *Using the Business Policy Switch 2000 Software Version 2.0*.

This section covers:

- "show rate-limit command," next
- "rate-limit command" on page 112
- "no rate-limit command" on page 113
- "default rate-limit command" on page 114

show rate-limit command

The `show rate-limit` command displays the rate-limiting settings and statistics. The syntax for the `show rate-limit` command is:

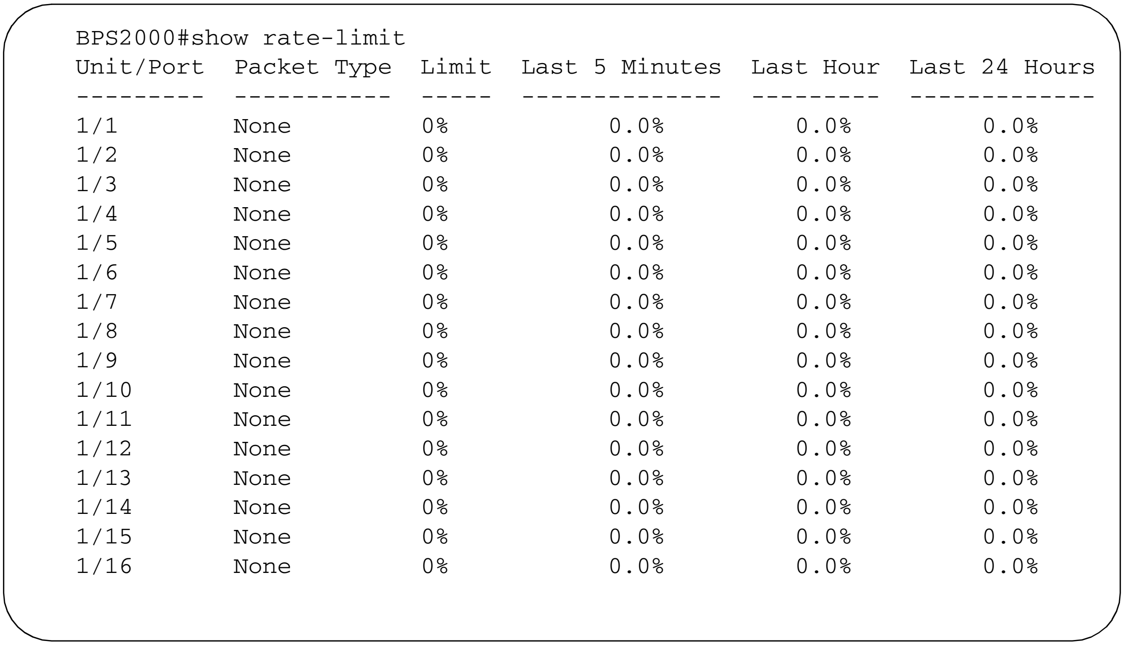
```
show rate-limit
```

The `show rate-limit` command is in the privExec command mode.

The `show rate-limit` command has no parameters or variables.

Figure 23 displays sample output from the `show rate-limit` command.

Figure 23 show rate-limit command output



```
BPS2000#show rate-limit
Unit/Port  Packet Type  Limit  Last 5 Minutes  Last Hour  Last 24 Hours
---------  -----------  -----  --------------  ---------  -------------
1/1        None         0%          0.0%          0.0%         0.0%
1/2        None         0%          0.0%          0.0%         0.0%
1/3        None         0%          0.0%          0.0%         0.0%
1/4        None         0%          0.0%          0.0%         0.0%
1/5        None         0%          0.0%          0.0%         0.0%
1/6        None         0%          0.0%          0.0%         0.0%
1/7        None         0%          0.0%          0.0%         0.0%
1/8        None         0%          0.0%          0.0%         0.0%
1/9        None         0%          0.0%          0.0%         0.0%
1/10       None         0%          0.0%          0.0%         0.0%
1/11       None         0%          0.0%          0.0%         0.0%
1/12       None         0%          0.0%          0.0%         0.0%
1/13       None         0%          0.0%          0.0%         0.0%
1/14       None         0%          0.0%          0.0%         0.0%
1/15       None         0%          0.0%          0.0%         0.0%
1/16       None         0%          0.0%          0.0%         0.0%
```

rate-limit command

The `rate-limit` command configures rate-limiting on the port. The syntax for the `rate-limit` command is:

```
rate-limit [port <portlist>] {multicast <pct>|broadcast
<pct>|both <pct>}
```

The `rate-limit` command is in the config-if command mode.

Table 54 describes the parameters and variables for the `rate-limit` command.

Table 54 rate-limit command parameters and variables

Parameters and values	Description
port <portlist>	Specifies the port numbers to configure for rate-limiting. Enter the port numbers you want to configure. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.
multicast <pct>|broadcast <pct>|both <pct>	Applies rate-limiting to the type of traffic. Enter an integer between 1 and 10 to set the rate-limiting percentage: • multicast—applies rate-limiting to multicast packets • broadcast—applies rate-limiting to broadcast packets • both—applies rate-limiting to both multicast and broadcast packets

no rate-limit command

The `no rate-limit` command disables rate-limiting on the port. The syntax for the `no rate-limit` command is:

```
no rate-limit [port <portlist>]
```

The `no rate-limit` command is in the config-if command mode.

Table 55 describes the parameters and variables for the `no rate-limit` command.

Table 55 no rate-limit command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers to disable for rate-limiting. Enter the port numbers you want to disable. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

default rate-limit command

The `default rate-limit` command restores the rate-limiting value for the specified port to the default setting. The syntax for the `default rate-limit` command is:

```
default rate-limit [port <portlist>]
```

The `default rate-limit` command is in the config-if command mode.

Table 56 describes the parameters and variables for the `default rate-limit` command.

Table 56 default rate-limit command parameters and variables

Parameters and variables	**Description**
port <portlist>	Specifies the port numbers to reset rate-limiting to factory default. Enter the port numbers you want to set rate-limiting to default on. Note: If you omit this parameter, the system uses the port number you specified in the `interface` command.

Chapter 3
Security

This chapter describes the security commands available with the CLI. There are four types of security available on the BPS 2000:

- "Using the IP manager list," next
- "Using MAC address security" on page 120
- "Using EAPOL-based security" on page 128
- "Using RADIUS authentication" on page 131

Refer to *Using the Business Policy Switch 2000 Software Version 2.0* for more information on these security features, as well as using the console interface (CI) menus. Refer to *Using Web-based Management for the Business Policy Switch 2000 Software Version 2.0* for information on configuring these features using the Web-based management system, and refer to *Reference for the Business Policy Switch 2000 Management Software Version 2.0* for information on configuring with the DM.

Using the IP manager list

When enabled, the IP manager list determines which source IP addresses are allowed access to the BPS 2000. No other source IP addresses have access to the switch. You configure the IP manager list using the following commands:

- "show ipmgr command," next
- "ipmgr command for management system" on page 117
- "no ipmgr command for management system" on page 118
- "ipmgr command for source IP address" on page 119
- "no ipmgr command for source IP address" on page 119

show ipmgr command

The `show ipmgr` command displays whether Telnet, SNMP, and Web access are enabled; whether the IP manager list is being used to control access to Telnet, SNMP, and the Web-based management system; and the current IP manager list configuration. The syntax for the `show ipmgr` command is:

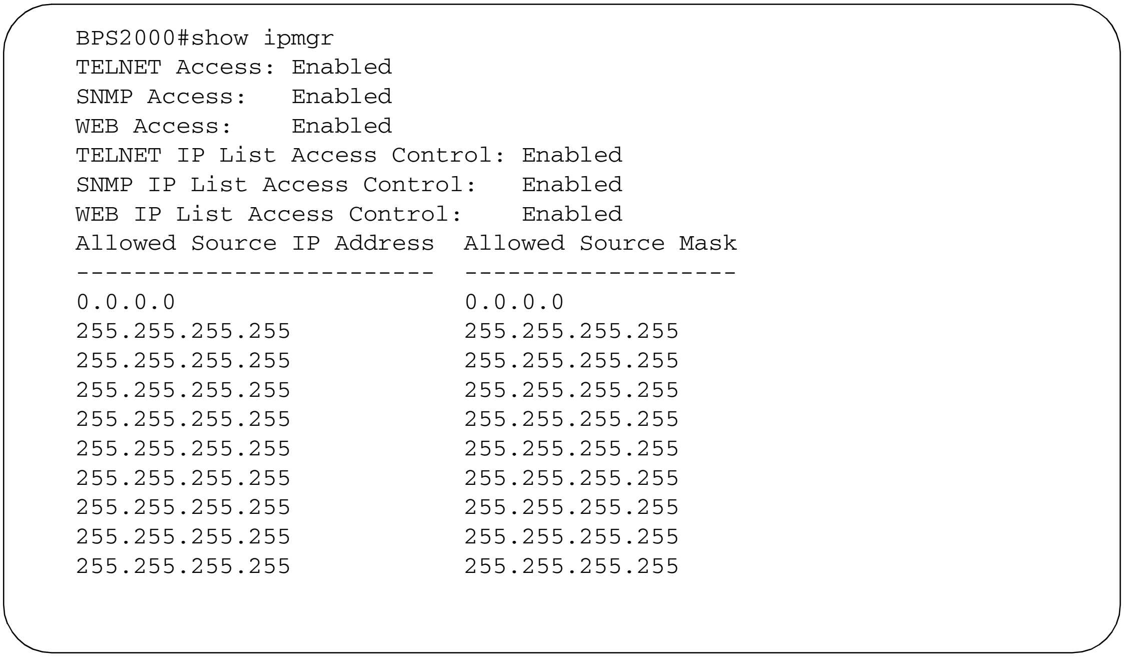
```
show ipmgr
```

The `show ipmgr` command is in the privExec command mode.

The `show ipmgr` command has no parameters or variables.

Figure 24 displays sample output from the `show ipmgr` command.

Figure 24 show ipmgr command output



```
BPS2000#show ipmgr
TELNET Access: Enabled
SNMP Access:   Enabled
WEB Access:    Enabled
TELNET IP List Access Control: Enabled
SNMP IP List Access Control:   Enabled
WEB IP List Access Control:    Enabled
Allowed Source IP Address  Allowed Source Mask
-------------------------  -------------------
0.0.0.0                    0.0.0.0
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
255.255.255.255            255.255.255.255
```

ipmgr command for management system

The `ipmgr` command for the management systems enables the IP manager list for Telnet, SNMP, or HTTP access. The syntax for the `ipmgr` command for the management systems is:

```
ipmgr {telnet|snmp|http}
```

The `ipmgr` command for the management systems is in the config mode.

Table 57 describes the parameters and variables for the `ipmgr` command.

Table 57 ipmgr command for system management parameters and variables

Parameters and variables	Description
telnet|snmp|web	Enables IP manager list checking for access to various management systems: • telnet—provides list access using Telnet access • snmp—provides list access using SNMP, including the DM • web—provides list access using the Web-based management system

no ipmgr command for management system

The `no ipmgr` command disables the IP manager list for Telnet, SNMP, or HTTP access. The syntax for the `no ipmgr` command for the management systems is:

```
no ipmgr {telnet|snmp|http}
```

The `no ipmgr` command is in the config mode.

Table 58 describes the parameters and variables for the `no ipmgr` command.

Table 58 no ipmgr command for management system parameters and variables

Parameters and variables	Description
telnet|snmp|web	Disables IP manager list checking for access to various management systems: • telnet—disables list check for Telnet access • snmp—disables list check for SNMP, including the DM • web—disables list check for the Web-based management system

ipmgr command for source IP address

The ipmgr command for source IP addresses allows you to enter the source IP addresses or address ranges that you allow to access the switch or the stack. The syntax for the ipmgr command for source IP addresses is:

```
ipmgr {source-ip <1-10> <XXX.XXX.XXX.XXX> [mask
<XXX.XXX.XXX.XXX>]}
```

The ipmgr command for the source IP addresses is in the config mode

Table 57 describes the parameters and variables for the ipmgr command for the source IP addresses

Table 59 ipmgr command for source IP addresses parameters and variables

Parameters and variables	Description
source-ip <1-10> <XXX.XXX.XXX.XXX>[mask <XXX.XXX.XXX.XXX>]	Specifies the source IP address from which access is allowed. Enter the IP address either as an integer or in dotted-decimal notation. Specifies the subnet mask from which access is allowed; enter IP mask in dotted-decimal notation.

no ipmgr command for source IP address

The no ipmgr command for source IP addresses disables access for the specified source IP addresses or address ranges and denies them access to the switch or the stack. The syntax for the no ipmgr command for source IP addresses is:

```
no ipmgr {source-ip [<1-10>]}
```

The no ipmgr command for the source IP addresses is in the config mode

Table 60 describes the parameters and variables for the no ipmgr command for the source IP addresses.

Table 60 no ipmgr command for source IP addresses parameters and variables

Parameters and variables	Description
source-ip [<1-10>]	When you specify an option, it sets the IP address and mask for the specified entry to 255.255.255.255 and 255.255.255.255. When you omit the optional parameter, it resets the list to factory defaults.

Using MAC address security

You configure the BaySecure* application using MAC addresses with the following commands:

- "show mac-security command," next
- "show mac-security mac-da-filter command" on page 121
- "mac-security command" on page 122
- "mac-security mac-address-table address command" on page 123
- "mac-security security-list command" on page 124
- "no mac-security command" on page 125
- "no mac-security mac-address-table command" on page 125
- "no mac-security security-list command" on page 126
- "mac-security command for specific ports" on page 126
- "mac-security mac-da-filter command" on page 127

show mac-security command

The `show mac-security` command displays configuration information for the BaySecure application. The syntax for the `show mac-security` command is:

```
show mac-security {config|mac-address-table [address
<macaddr>]|port|security-lists}
```

The `show mac-security` command is in the privExec command mode.

Table 61 describes the parameters and variables for the `show mac-security` command.

Table 61 show mac-security command parameters and variables

Parameters and variables	Description
config	Displays general BaySecure configuration.
mac-address-table [address <macaddr>]	Displays contents of BaySecure table of allowed MAC addresses: • address—specifies a single MAC address to display; enter the MAC address
port	Displays the BaySecure status of all ports.
security-lists	Displays port membership of all security lists.

Figure 25 displays sample output from the `show mac-security` command.

Figure 25 show mac-security command output

```
BPS2000#show mac-security config
MAC Address Security: Disabled
MAC Address Security SNMP-Locked: Disabled
Partition Port on Intrusion Detected: Disabled
DA Filtering on Intrusion Detected: Disabled
Generate SNMP Trap on Intrusion: Disabled
Current Learning Mode: Disabled
Learn by Ports:
```

show mac-security mac-da-filter command

The `show mac-security mac-da-filter` command displays configuration information for filtering MAC destination addresses (DAs). You can filter packets from up to 10 MAC DAs. The syntax for the `show mac-security mac-da-filter` command is:

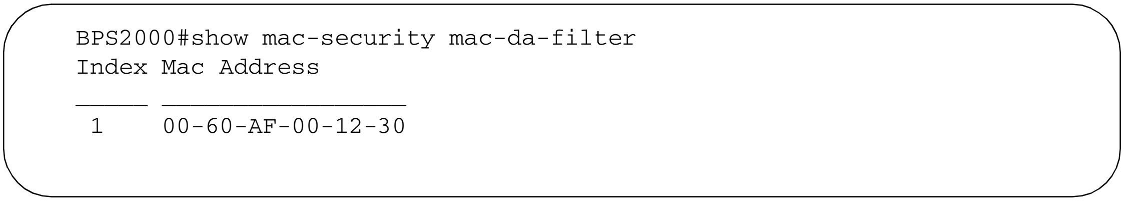
```
show mac-security mac-da-filter
```

The `show mac-security mac-da-filter` command is in the privExec command mode.

The `show mac-security mac-da-filter` command has no parameters or variables.

Figure 25 displays sample output from the `show mac-security mac-da-filter` command.

Figure 26 show mac-security mac-da-filter command output



```
BPS2000#show mac-security mac-da-filter
Index Mac Address
_____ _________________
 1    00-60-AF-00-12-30
```

mac-security command

The `mac-security` command modifies the BaySecure configuration. The syntax for the `mac-security` command is:

```
mac-security [disable|enable] [filtering {enable|disable}]
[intrusion-detect {enable|disable|forever}] [intrusion-timer
<1-65535>] [learning-ports <portlist>] [learning
{enable|disable}] [snmp-lock {enable|disable}] [snmp-trap
{enable|disable}]
```

The `mac-security` command is in the config command mode.

Table 62 describes the parameters and variables for the `mac-security` command.

Table 62 mac-security command parameters and values

Parameters and variables	Description
disable|enable	Disables or enables MAC address-based security.
filtering {enable|disable}	Enables or disables destination address (DA) filtering on intrusion detected.
intrusion-detect {enable|disable|forever}	Specifies partitioning of a port when an intrusion is detected: • enable—port is partitioned for a period of time • disabled—port is not partitioned on detection • forever—port is partitioned until manually changed
intrusion-timer <1-65535>	Specifies, in seconds, length of time a port is partitioned when an intrusion is detected; enter the number of you want.
learning-ports <portlist>	Specifies MAC address learning. Learned addresses are added to the table of allowed MAC addresses. Enter the ports you want to learn; it can be a single port, a range of ports, several ranges, all, or none.
learning {enable|disable}	Specifies MAC address learning: • enable—enables learning by ports • disable—disables learning by ports
snmp-lock {enable|disable}	Enables or disables a lock on SNMP write-access to the BaySecure MIBs.
snmp-trap {enable|disable}	Enables or disables trap generation upon intrusion detection.

mac-security mac-address-table address command

The `mac-security mac-address-table address` command assigns either a specific port or a security list to the MAC address. This removes any previous assignment to the specified MAC address and creates an entry in the BaySecure table of allowed MAC addresses. The syntax for the `mac-security mac-address-table address` command is:

```
mac-security mac-address-table address <H.H.H.> {port
<portlist>|security-list <1-32>}
```

Note: In this command, `portlist` must specify only a single port

The `mac-security mac-address-table address` command is in the config command mode.

Table 63 describes the parameters and variables for the `mac-security mac-address-table address` command.

Table 63 mac-security mac-address-table address command parameters and values

Parameters and variables	Description
<H.H.H>	Enter the MAC address in the form of H.H.H.
port <portlist>|security-list <1-32>	Enter the port number or the security list number.

mac-security security-list command

The `mac-security security-list` command assigns a list of ports to a security list. The syntax for the `mac-security security-list` command is:

```
mac-security security-list <1-32> <portlist>
```

The `mac-security security-list` command is in the config command mode.

Table 63 describes the parameters and variables for the `mac-security security-list` command.

Table 64 mac-security security-list command parameters and values

Parameters and variables	Description
<1-32>	Enter the number of the security list you want to use.
<portlist>	Enter a list or range of port numbers.

no mac-security command

The `no mac-security` command disables MAC source address-based security. The syntax for the `no mac-security` command is:

```
no mac-security
```

The `no mac-security` command is in the config command mode.

The `no mac-security` command has no parameters or values.

no mac-security mac-address-table command

The `no mac-security mac-address-table` command clears entries from the MAC address security table. The syntax for the `no mac-security mac-address-table` command is:

```
no mac-security mac-address-table {address <H.H.H.> |port
<portlist>|security-list <1-32>}
```

The `no mac-security mac-address-table` command is in the config command mode.

Table 63 describes the parameters and variables for the `no mac-security mac-address-table` command.

Table 65 no mac-security mac-address-table command parameters and values

Parameters and variables	Description
address <H.H.H>	Enter the MAC address in the form of H.H.H.
port <portlist>	Enter a list or range of port numbers.
security-list <1-32>	Enter the security list number.

no mac-security security-list command

The `no mac-security security-list` command clears the port membership of a security list. The syntax for the `no mac-security security-list` command is:

```
no mac-security security-list <1-32>
```

The `no mac-security security-list` command is in the config command mode.

Table 66 describes the parameters and variables for the `no mac-security security-list` command.

Table 66 no mac-security security-list command parameters and values

Parameters and variables	Description
<1-32>	Enter the number of the security list you want to clear.

mac-security command for specific ports

The `mac-security` command for specific ports configures the BaySecure status of specific ports. The syntax for the `mac-security` command for specific ports is:

```
mac-security [port <portlist>] {disable|enable|learning}
```

The `mac-security` command for specific ports is in the config-if command mode

Table 67 describes the parameters and variables for the `mac-security` command for specific ports.

Table 67 mac-security command for a single port parameters and variables

Parameters and variables	Description
port <portlist>	Enter the port numbers.
disable|enable|learning	Directs the specific port: • disable—disables BaySecure on the specified port and removes the port from the list of ports for which MAC address learning is being performed • enable—enables BaySecure on the specified port and removes the port from the list of ports for which MAC address learning is being performed • learning—disables BaySecure on the specified port and adds these port to the list of ports for which MAC address learning is being performed

mac-security mac-da-filter command

The `mac-security mac-da-filter` command allows you to filter packets from up to 10 specified MAC DAs. You also use this command to delete such a filter and then receive packets from the specified MAC DA**.** The syntax for the `mac-security mac-da-filter` command is:

```
mac-security mac-da-filter {add|delete}<H.H.H.>
```

The `mac-security mac-da-filter` command is in the config command mode.

Table 68 describes the parameters and variables for the `mac-security mac-da-filter` command.

Table 68 mac-security mac-da-filter command parameters and values

Parameters and variables	Description
{add|delete} <H.H.H>	Add or delete the specified MAC address; enter the MAC address in the form of H.H.H.

Note: Ensure that you do not enter the MAC address of the management unit.

Using EAPOL-based security

You configure the security based on the Extensible Authentication Protocol over LAN (EAPOL) using the following CLI commands:

- "show eapol command," next
- "eapol command" on page 129
- "eapol command for modifying parameters" on page 129

show eapol command

The `show eapol` command displays the status of the EAPOL-based security. The syntax for the `show eapol` command is:

```
show eapol
```

The `show eapol` command is in the privExec command mode.

The `show eapol` command has no parameters or variables.

The `show eapol` command displays the current status of the EAPOL parameters.

eapol command

The eapol command enables or disables EAPOL-based security. The syntax of the eapol command is:

```
eapol {disable|enable}
```

The eapol command is in the config command mode.

Table 69 describes the parameters and variables for the eapol command.

Table 69 eapol command parameters and variables

Parameters and variables	Description
disable|enable	Disables or enables EAPOL-based security.

eapol command for modifying parameters

The eapol command for modifying parameters modifies EAPOL-based security parameters for a specific port. The syntax of the eapol command for modifying parameters is:

```
eapol [port <portlist>] [init] [status
authorized|unauthorized|auto] [traffic-control in-out|in]
[re-authentication enable|disable]
[re-authentication-interval <num>]
[re-authentication-period <1-604800>] [re-authenticate]
[quiet-interval <num>] [transmit-interval <num>]
[supplicant-timeout <num>] [server-timeout
<num>][max-request <num>]
```

The eapol command for modifying parameters is in the config-if command mode.

Table 70 describes the parameters and variables for the `eapol` command for modifying parameters

Table 70 eapol command for modifying parameters and variables

Parameters and variables	Description
port <portllist>	Specifies the ports to configure for EAPOL; enter the port numbers you want. Note: If you omit this parameter, the system uses the port number specified when you issued the `interface` command.
init	Re-initiates EAP authentication.
status authorized|unauthorized|auto	Specifies the EAP status of the port: • authorized—port is always authorized • unauthorized—port is always unauthorized • auto—port authorization status depends on the result of the EAP authentication
traffic-control in-out|in	Sets the level of traffic control: • in-out—if EAP authentication fails, both ingressing and egressing traffic are blocked • in—if EAP authentication fails, only ingressing traffic is blocked
re-authentication enable|disable	Enables or disables re-authentication.
re-authentication-interval <num>	Enter the number of seconds you want between re-authentication attempts; range is 1 to 604800. Use either this variable or the re-authentication-period variable; do not use both variables because the two variables control the same setting.
re-authentication-period <1-604800>	Enter the number of seconds you want between re-authentication attempts. Use either this variable or the re-authentication-interval variable; do not use both variables because the two variables control the same setting.
re-authenticate	Specifies an immediate re-authentication.
quiet-interval <num>	Enter the number of seconds you want between an authentication failure and the start of a new authentication attempt; range is 1 to 65535.
transmit-interval <num>	Specifies a waiting period for response from supplicant for EAP Request/Identity packets. Enter the number of seconds you want to wait; range is 1-65535.
supplicant-timeout <num>	Specifies a waiting period for response from supplicant for all EAP packets except EAP Request/Identity packets. Enter the number of seconds you want to wait; range is 1-65535.

Table 70 eapol command for modifying parameters and variables

Parameters and variables	Description
server-timeout <num>	Specifies a waiting period for response from the server. Enter the number of seconds you want to wait; range is 1-65535
max-request <num>	Enter the number of times to retry sending packets to supplicant.

Using RADIUS authentication

Using a the RADIUS protocol and a server, you can configure the BPS 2000 for authentication. With the CLI system, you use the following commands:

- "show radius-server command," next
- "radius-server command" on page 132
- "no radius-server command" on page 133

show radius-server command

The `show radius-server` command displays the RADIUS server configuration. The syntax for the `show radius-server` command is:

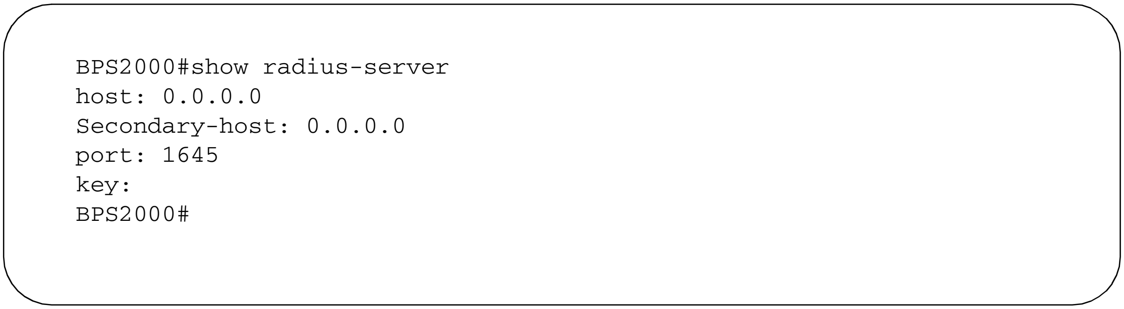
```
show radius-server
```

The `show radius-server` command is in the privExec command mode.

The `show radius-server` command has no parameters or variables.

Figure 27 displays sample output from the `show radius-server` command.

Figure 27 show radius-server command output



```
BPS2000#show radius-server
host: 0.0.0.0
Secondary-host: 0.0.0.0
port: 1645
key:
BPS2000#
```

radius-server command

The `radius-server` command changes the RADIUS server settings. The syntax for the `radius-server` command is:

```
radius-server host <address> [secondary-host <address>] port
<num> key <string>
```

The `radius-server` command is in the config command mode.

Table 71 describes the parameters and variables for the `radius-server` command.

Table 71 radius-server command parameters and variables

Parameters and variables	Description
host <address>	Specifies the primary RADIUS server. Enter the IP address of the RADIUS server.
secondary-host <address>	Specifies the secondary RADIUS server Enter the IP address of the secondary RADIUS server.
port <num>	Enter the port number of the RADIUS server.
key <string>	Specifies a secret text string that is shared between the switch and the RADIUS server. Enter the secret string, which is an alphanumeric string up to 16 characters.

no radius-server command

The no radius-server command clears the RADIUS server settings. The syntax for the no radius-server command is:

```
no radius-server
```

The no radius-server command is in the config command mode.

The no radius-server command has no parameters or values.

Chapter 4
Spanning Tree, MLT, and Port-Mirroring

This chapter describes how to configure the Spanning Tree Protocol, spanning tree groups, Multi-Link Trunking (MLT), and port-mirroring. This chapter covers the following topics:

- "Using spanning tree," next
- "Using MLT" on page 148
- "Using port-mirroring" on page 151

Refer to the *Using the Business Policy Switch 2000 Software Version 2.0* for more information on multiple spanning tree groups, spanning tree, MLT, and port-mirroring, as well as configuration directions using the console interface (CI) menus. Refer to *Using Web-based Management for the Business Policy Switch 2000 Software Version 2.0* for information on configuring these features using the Web-based management system, and refer to *Reference for the Business Policy Switch 2000 Management Software Version 2.0* for configuration information for the DM.

Using spanning tree

Note: For detailed information on spanning tree parameters, spanning tree groups, and configuration guidelines, refer to *Using the Business Policy Switch 2000 Software Version 2.0.*

With the BPS 2000 with software version 1.2, you can configure multiple spanning tree groups (STGs). (Multiple spanning tree groups are available only when the Stack Operational Mode is set to Pure BPS 2000 Stack.) The CLI allows you to configure spanning tree groups, to add or remove VLANs to the spanning tree groups, and to configure the usual spanning tree parameters and FastLearn. This section covers the following topics:

- "show spanning-tree command," next
- "spanning-tree stp create command by STG" on page 139
- "spanning-tree stp delete command by STG" on page 140
- "spanning-tree stp enable command by STG" on page 140
- "spanning-tree stp disable command by STG" on page 141
- "spanning-tree command by STG" on page 142
- "default spanning-tree command by STG" on page 143
- "spanning-tree add-vlan command" on page 143
- "spanning-tree remove-vlan command" on page 144
- "spanning-tree command by port" on page 145
- "default spanning-tree command by port" on page 146
- "no spanning-tree command by port" on page 147

Note: When you omit the spanning tree group parameter (stp <1-8>) in the any of the spanning tree commands, the commands operate on the default spanning tree group (spanning tree group 1).

show spanning-tree command

The `show spanning-tree` command displays spanning tree configuration information that is specific to either the spanning tree group or to the port. The syntax for the `show spanning-tree` command is:

```
show spanning-tree [stp <1-8>] {config|port}
```

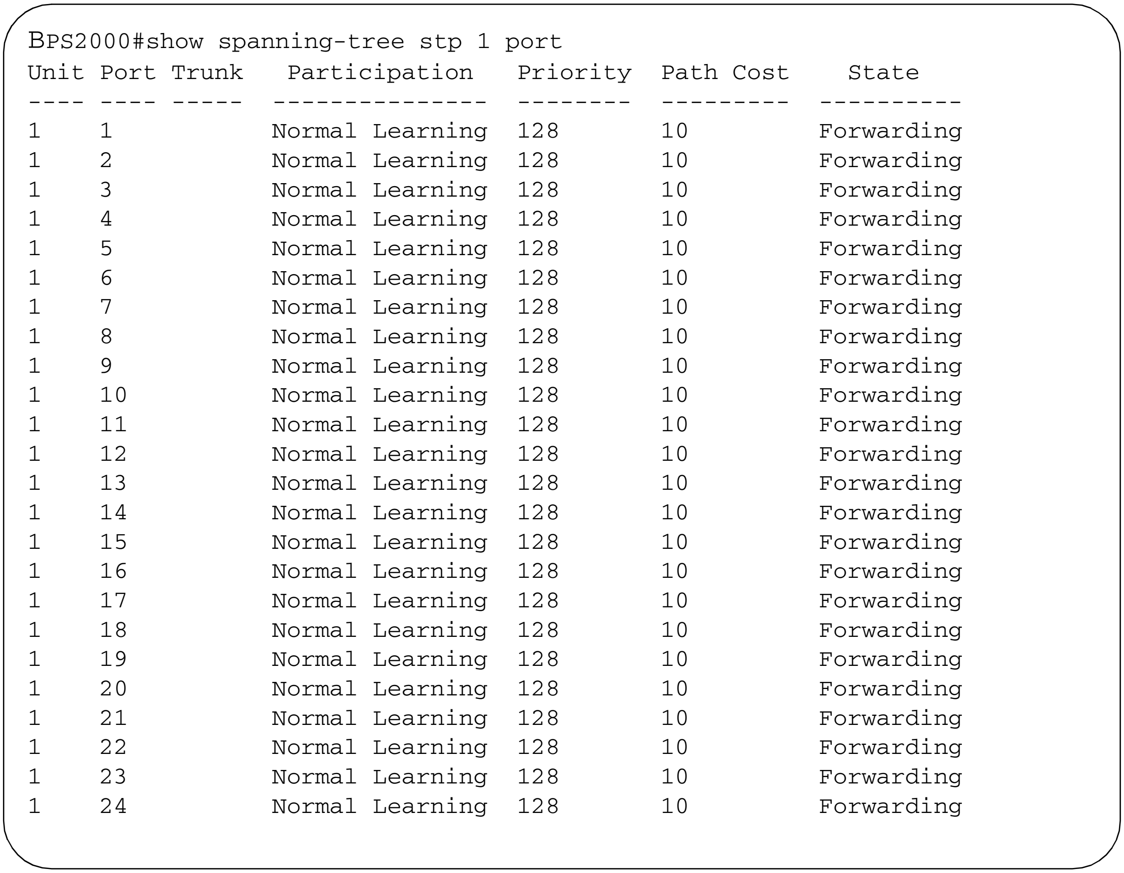
The `show spanning-tree` command is in the privExec command mode, Table 72 describes the parameters and variables for the `show spanning-tree` command.

Table 72 show spanning-tree command parameters and variables

Parameters and variables	Description
stp <1-8>	Displays specified spanning tree group configuration; enter the number of the group you want displayed.
config|port	Displays spanning tree configuration for: • config—the specified (or default) spanning tree group • port—the ports within the spanning tree group

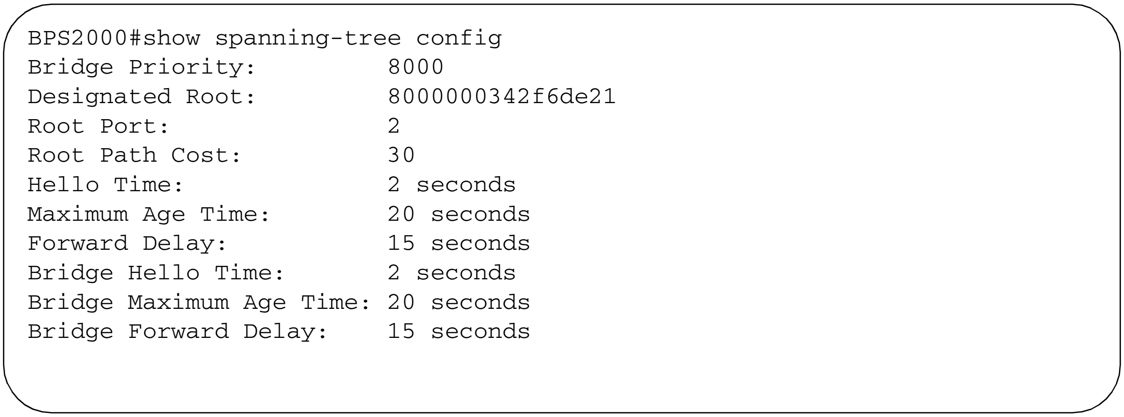
Figure 28 displays sample output from the `show spanning-tree` command for the default spanning tree group (STP1). Figure 29 shows the spanning tree parameters by port.

Figure 28 show spanning-tree command output by port



```
BPS2000#show spanning-tree stp 1 port
Unit Port Trunk   Participation   Priority  Path Cost    State
---- ---- -----  ---------------  --------  ---------  ----------
1    1           Normal Learning  128       10         Forwarding
1    2           Normal Learning  128       10         Forwarding
1    3           Normal Learning  128       10         Forwarding
1    4           Normal Learning  128       10         Forwarding
1    5           Normal Learning  128       10         Forwarding
1    6           Normal Learning  128       10         Forwarding
1    7           Normal Learning  128       10         Forwarding
1    8           Normal Learning  128       10         Forwarding
1    9           Normal Learning  128       10         Forwarding
1    10          Normal Learning  128       10         Forwarding
1    11          Normal Learning  128       10         Forwarding
1    12          Normal Learning  128       10         Forwarding
1    13          Normal Learning  128       10         Forwarding
1    14          Normal Learning  128       10         Forwarding
1    15          Normal Learning  128       10         Forwarding
1    16          Normal Learning  128       10         Forwarding
1    17          Normal Learning  128       10         Forwarding
1    18          Normal Learning  128       10         Forwarding
1    19          Normal Learning  128       10         Forwarding
1    20          Normal Learning  128       10         Forwarding
1    21          Normal Learning  128       10         Forwarding
1    22          Normal Learning  128       10         Forwarding
1    23          Normal Learning  128       10         Forwarding
1    24          Normal Learning  128       10         Forwarding
```

Figure 29 show spanning-tree command output for spanning tree group



```
BPS2000#show spanning-tree config
Bridge Priority:            8000
Designated Root:            8000000342f6de21
Root Port:                  2
Root Path Cost:             30
Hello Time:                 2 seconds
Maximum Age Time:           20 seconds
Forward Delay:              15 seconds
Bridge Hello Time:          2 seconds
Bridge Maximum Age Time:    20 seconds
Bridge Forward Delay:       15 seconds
```

spanning-tree stp create command by STG

Note: For guidelines for configuring STGs, VLANs, and MLTs, refer to Chapter 1 of the *Using the Business Policy Switch 2000 Software Version 2.0*.

The `spanning-tree stp create` command allows you to create a spanning tree group. The syntax for the `spanning-tree stp create` command is:

```
spanning-tree stp <1-8> create
```

The `spanning-tree stp create` command is in the config command mode.

Table 73 describes the parameters and variables for the `spanning-tree stp create` command.

Table 73 spanning-tree stp create command parameters and variables

Parameters and variables	Description
<1-8>	Enter the number of the spanning tree group you are creating (STG ID). You cannot create the default spanning tree group, which is number 1.

spanning-tree stp delete command by STG

The `spanning-tree stp delete` command allows you to delete a spanning tree group. The syntax for the `spanning-tree stp delete` command is:

```
spanning-tree stp <1-8> delete
```

The `spanning-tree stp delete` command is in the config command mode.

Table 74 describes the parameters and variables for the `spanning-tree stp delete` command.

Table 74 spanning-tree stp delete command parameters and variables

Parameters and variables	Description
<1-8>	Enter the number of the spanning tree group you are deleting (STG ID). You cannot delete the default spanning tree group, which is number 1.

spanning-tree stp enable command by STG

The `spanning-tree stp enable` command allows you to enable a spanning tree group. The syntax for the `spanning-tree stp enable` command is:

```
spanning-tree stp <1-8> enable
```

The `spanning-tree stp enable` command is in the config command mode.

Table 75 describes the parameters and variables for the `spanning-tree stp enable` command.

Table 75 spanning-tree stp enable command parameters and variables

Parameters and variables	Description
<1-8>	Enter the number of the spanning tree group you want to enable (STG ID). You cannot enable the default spanning tree group, which is number 1; it is always enabled.

spanning-tree stp disable command by STG

The `spanning-tree stp disable` command allows you to disable a spanning tree group. The syntax for the `spanning-tree stp disable` command is:

```
spanning-tree stp <1-8> disable
```

The `spanning-tree stp disable` command is in the config command mode.

Table 76 describes the parameters and variables for the `spanning-tree stp disable` command.

Table 76 spanning-tree stp disable command parameters and variables

Parameters and variables	Description
<1-8>	Enter the number of the spanning tree group you want to disable (STG ID). You cannot disable the default spanning tree group, which is number 1d.

spanning-tree command by STG

The `spanning-tree` command by STG sets STP values by STG. The syntax for the `spanning-tree` command by STG is:

```
spanning-tree [stp <1-8>] [forward-time <4-30>] [hello-time
<1-10>] [max-age <6-40>] [priority <0-65535>] [tagged-bpdu
{enable|disable}] [tagged-bpdu-vid <1-4094]
```

The `spanning-tree` command by STG is in the config command mode.

Table 77 describes the parameters and variables for the `spanning-tree` command by STG.

Table 77 spanning-tree command by STG parameters and variables

Parameters and variables	Description
stp <1-8>	Specifies the spanning tree group you want; enter the STG ID.
forward-time <4-30>	Enter the forward time of the STG in seconds; range is 4-30. Default value is 15.
hello-time <1-10>	Enter the hello time of the STG in seconds; range is 1-10. Default value is 2.
max-age <6-40>	Enter the max-age of the STG in seconds; range is 6-40. Default value is 20.
priority <0-65535>	Enter the priority of the STG in seconds; range is 0-65535. Default value is 0x8000.
tagged-bpdu {enableldisable}	Allows you to set the BPDU as tagged or untagged. Default value for spanning tree group 1 (default group) is untagged; the default for the other groups is tagged.
tagged-bpdu-vid <1-4094>	Allows you to set the VLAN ID (VID) for the tagged BPDU. Default value is 4001-4008 for STG 1-8, respectively.

default spanning-tree command by STG

The `default spanning-tree` command by STG restores the default spanning tree values for the spanning tree group. The syntax for the `default spanning-tree` command by STG is:

```
default spanning-tree [stp <1-8>] [forward-time]
[hello-time] [max-age] [priority] [tagged-bpdu]
```

The `default spanning-tree` command by STG is in the config command mode.

Table 78 describes the parameters and variables for the `default spanning-tree` command by STG.

Table 78 default spanning-tree command by STG parameters and variables

Parameters and variables	**Description**
stp <1-8>	Disables the spanning tree group; enter the STG ID.
forward-time	Sets the forward time to default value—15 seconds.
hello-time	Sets the hello time to default value—2 seconds.
max-age	Sets the maximum age time to default value—20 seconds.
priority	Sets the priority to default value—0x8000.
tagged-bpdu	Sets the tagging to default value. Default value for spanning tree group 1 (default group) is untagged; the default for the other groups is tagged.

spanning-tree add-vlan command

➡ **Note:** Beginning with software version 2.0, you use the `spanning-tree add-vlan` command to move and VLAN from one spanning tree group to another group. You no longer must remove the VLAN from the first group.

The `spanning-tree add-vlan` command allows you to add a VLAN to a specified spanning tree group. The syntax for the `spanning-tree add-vlan` command is:

```
spanning-tree [stp <1-8>] add-vlan <1-4094>
```

The `spanning-tree add-vlan` command by port is in the config command mode.

Table 79 describes the parameters and variables for the `spanning-tree add-vlan` command.

Table 79 spanning-tree add-vlan command parameters and variables

Parameters and variables	Description
stp <1-8>	Specifies the spanning tree group you want to add the VLAN to; enter the STG ID. Note: If you omit this parameter, the system uses the default spanning tree group, 1.
add-vlan <1-4094>	Enter the VLAN you want to add to the spanning tree group.

Note: VLAN 1 is always in spanning tree group 1.

spanning-tree remove-vlan command

The `spanning-tree remove-vlan` command allows you to remove a VLAN from a specified spanning tree group. The syntax for the `spanning-tree remove-vlan` command is:

```
spanning-tree [stp <1-8>] remove-vlan <1-4094>
```

The `spanning-tree remove-vlan` command by port is in the config command mode.

Table 80 describes the parameters and variables for the `spanning-tree remove-vlan` command.

Table 80 spanning-tree remove-vlan command parameters and variables

Parameters and variables	Description
stp <1-8>	Specifies the spanning tree group you want to remove the VLAN from; enter the STG ID. Note: If you omit this parameter, the system uses the default spanning tree group, 1.
remove-vlan <1-4094>	Enter the VLAN you want to remove from the spanning tree group.

Note: You cannot remove VLAN 1 from spanning tree group 1.

spanning-tree command by port

Note: For guidelines for configuring STGs, VLANs, and MLTs, refer to Chapter 1 of the *Using the Business Policy Switch 2000 Software Version 2.0*.

The `spanning-tree` command by port sets Spanning Tree Protocol (STP) and multiple spanning tree group (STG) participation for the ports within the specified spanning tree group. The syntax for the `spanning-tree` command by port is:

```
spanning-tree [port <portlist>] [stp <1-8>] [learning
{disable|normal|fast}] [cost <1-65535>] [priority <0-255>]
```

The `spanning-tree` command by port is in the config-if command mode.

Table 81 describes the parameters and variables for the `spanning-tree` command by port.

Table 81 spanning-tree command by port parameters and variables

Parameters and variables	**Description**
port <portlist>	Enables spanning tree for the specified port or ports; enter port or ports you want enabled for spanning tree. Note: If you omit this parameter, the system uses the port number you specified when you issued the `interface` command.
stp <1-8>	Specifies the spanning tree group you want; enter the STG ID.
learning {disable|normal|fast}	Specifies the STP learning mode: • disable—disables FastLearn mode • normal—changes to normal learning mode • fast—enables FastLearn mode
cost <1-65535>	Enter the path cost of the spanning tree; range is 1-.65535.
priority <0-255>	Enter the priority value of the spanning tree; range is 0-255.

default spanning-tree command by port

The `default spanning-tree` command by port sets the spanning tree values for the ports within the specified spanning tree group to the factory default settings. The syntax for the `default spanning-tree` command by port is:

```
default spanning-tree [port <portlist>] [stp <1-8>]
[learning] [cost] [priority]
```

The `default spanning-tree` command by port is in the config-if command mode.

Table 82 describes the parameters and variables for the `default spanning-tree` command by port.

Table 82 default spanning-tree command by port parameters and variables

Parameters and variables	Description
port <portlist>	Enables spanning tree for the specified port or ports; enter port or ports you want set to factory spanning tree default values. Note: If you omit this parameter, the system uses the port number you specified when you issued the `interface` command.
stp <1-8>	Specifies the spanning tree group you want to set to factory default value; enter the STG ID. This command places the port into the default STG. Default value for STG is 1.
learning	Sets the spanning tree learning mode to factory default value. Default value for learning is normal mode.
cost	Sets the path cost to factory default value. Default value for path cost depends on the type of port.
priority	Sets the priority to factory default value. Default value for the priority is 0x8000.

no spanning-tree command by port

The `no spanning-tree` command by port disables spanning tree for a port in a specific spanning tree group. The syntax for the `no spanning-tree` command by port is:

```
no spanning-tree [port <portlist>] [stp <1-8>]
```

The `no spanning-tree` command by port is in the config-if command mode.

Table 83 describes the parameters and variables for the `no spanning-tree` command by port.

Table 83 no spanning-tree command by port parameters and variables

Parameters and variables	Description
port <portlist>	Disables spanning tree for the specified port or ports; enter port or ports you want enabled for STP. Note: If you omit this parameter, the system uses the port number you specified when you issued the `interface` command.
stp <1-8>	Disables the port in the specified spanning tree group; enter the STG ID.

Using MLT

Note: For guidelines for configuring STGs, VLANs, and MLTs, refer to Chapter 1 of the *Using the Business Policy Switch 2000 Software Version 2.0*.

You configure Multi-Link Trunking (MLT) using the following commands:

- "show mlt command," next
- "mlt command" on page 149
- "no mlt command" on page 150

show mlt command

The `show mlt` command displays the Multi-Link Trunking (MLT) configuration and utilization. The syntax for the `show mlt` command is:

```
show mlt [utilization <1-6>]
```

The `show mlt` command is in the privExec command mode.

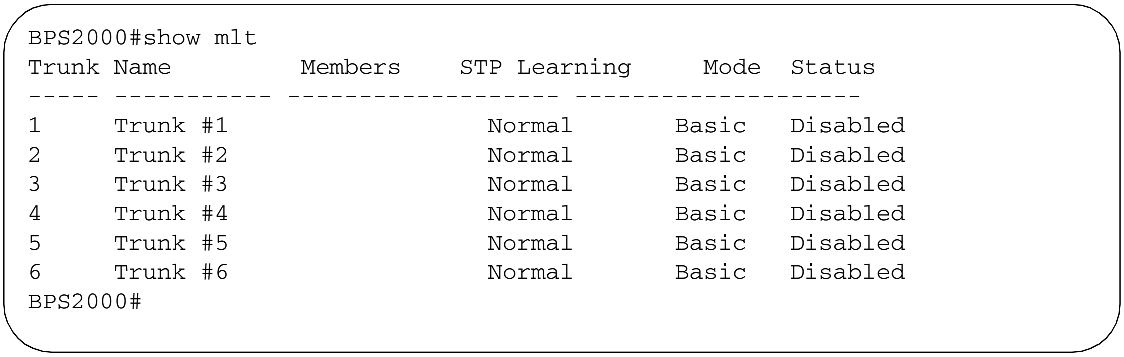
Table 84 describes the parameters and variables for the `show mlt` command.

Table 84 show mlt command parameters and variables

Parameters and variables	Description
utilization <1-6>	Displays the utilization of the specified enabled MLT(s) in percentages.

Figure 30 displays sample output from the `show mlt` command.

Figure 30 show mlt command output



```
BPS2000#show mlt
Trunk Name         Members    STP Learning     Mode  Status
----- ----------- ------------------- --------------------
1     Trunk #1                  Normal       Basic   Disabled
2     Trunk #2                  Normal       Basic   Disabled
3     Trunk #3                  Normal       Basic   Disabled
4     Trunk #4                  Normal       Basic   Disabled
5     Trunk #5                  Normal       Basic   Disabled
6     Trunk #6                  Normal       Basic   Disabled
BPS2000#
```

mlt command

The `mlt` command configures a Multi-Link Trunk (MLT). The syntax for the `mlt` command is:

```
mlt <id> [name <trunkname>] [enable|disable] [member
<portlist>]
```

The `mlt` command is in the config command mode.

Table 85 describes the parameters and variables for the `mlt` command.

Table 85 mlt command parameters and variables

Parameters and variables	**Description**
id	Enter the trunk ID; range is 1 to 6.
name <trunkname>	Specifies a text name for the trunk; enter up to 16 alphanumeric characters.
enable|disable	Enables or disables the trunk.
member <portlist>	Enter the ports that you want as members of the trunk.

Note: You can modify an MLT when it is enabled or disabled.

no mlt command

The `no mlt` command disables a Multi-Link Trunk (MLT), clearing all the port members. The syntax for the `no mlt` command is:

```
no mlt [<id>]
```

The `no mlt` command is in the config command mode.

Table 86 describes the parameters and variables for the `no mlt` command.

Table 86 no mlt command parameters and variables

Parameters and variables	**Description**
<id>	Enter the trunk ID to disable the trunk and to clear the port members of the specified trunk.

Using port-mirroring

You use port-mirroring to monitor traffic. Refer to *Using the Business Policy Switch 2000 Software Version 2.0* for configuration guidelines for port-mirroring. This section covers the following commands:

- "show port-mirroring command," next
- "port-mirroring command" on page 151
- "no port-mirroring command" on page 153

show port-mirroring command

The `show port-mirroring` command displays the port-mirroring configuration. The syntax for the `show port-mirroring` command is:

```
show port-mirroring
```

The `show port-mirroring` command is in the privExec command mode.

The `show port-mirroring` command has no parameters or variables.

Figure 31 displays sample output from the `show port-mirroring` command.

Figure 31 show port-mirroring command output

```
BPS2000(config)#show port-mirroring
Monitoring Mode: Xrx ( -> Port X )
Monitor Port:    1/3
Port X:          1/1
```

port-mirroring command

The `port-mirroring` command sets the port-mirroring configuration. The syntax of the `port-mirroring` command is:

```
port-mirroring mode
{disable |
Xrx monitor-port <portlist> mirror-port-X <portlist>|
Xtx monitor-port <portlist> mirror-port-X <portlist>|
XrxOrXtx monitor-port <portlist> mirror-port-X <portlist>
mirror-port-Y <portlist>|
XrxOrYtx monitor-port <portlist> mirror-port-X <portlist>
mirror-port-Y <portlist>|
XrxYtx monitor-port <portlist> mirror-port-X <portlist>
mirror-port-Y <portlist>|
XrxYtxOrYrxXtx monitor-port <portlist> mirror-port-X
<portlist> mirror-port-Y <portlist>|
Asrc monitor-port <portlist> mirror-MAC-A <macaddr>|
Adst monitor-port <portlist> mirror-MAC-A <macaddr>|
AsrcOrAdst monitor-port <portlist> mirror-MAC-A <macaddr>|
AsrcBdst monitor-port <portlist> mirror-MAC-A <macaddr>
mirror-MAC-B <macaddr>|
AsrcBdstOrBsrcAdst monitor-port <portlist> mirror-MAC-A
<macaddr> mirror-MAC-B <macaddr>}
```

Note: In this command, `portlist` must specify only a single port

The `port-mirroring` command is in the config command mode.

Table 87 describes the parameters and variables for the `port-mirroring` command.

Table 87 port-mirroring command parameters and variables

Parameters and variables	Description
disable	Disables port-mirroring.
monitor-port	Specifies the monitor port.
mirror-port-X	Specifies the mirroring port X.
mirror-port-Y	Specifies the mirroring port Y.
mirror-MAC-A	Specifies the mirroring MAC address A.
mirror-MAC-B	Specifies the mirroring MAC address B.

Table 87 port-mirroring command parameters and variables (continued)

Parameters and variables	**Description**
portlist	Enter the port numbers.
Xrx	Mirror packets received on port X.
Xtx	Mirror packets transmitted on port X.
XrxOrXtx	Mirror packets received or transmitted on port X.
XrxYtx	Mirror packets received on port X and transmitted on port Y. Note: Do not use this mode for mirroring broadcast and multicast traffic.
XrxYtxOrXtxYrx	Mirror packets received on port X and transmitted on port Y or packets received on port Y and transmitted on port X. Note: Do not use this mode for mirroring broadcast and multicast traffic.
macaddr	Enter the MAC address in format H.H.H.
Asrc	Mirror packets with source MAC address A.
Adst	Mirror packets with destination MAC address A.
AsrcOrAdst	Mirror packets with source or destination MAC address A.
AsrcBdst	Mirror packets with source MAC address A and destination MAC address B.
AsrcBdstOrBsrcAdst	Mirror packets with source MAC address A and destination MAC address B or packets with source MAC address B and destination MAC address A.

no port-mirroring command

The `no port-mirroring` command disables port-mirroring. The syntax of the `no port-mirroring command` is:

```
no port-mirroring
```

The `no port-mirroring` command is in the config command mode.

The `no port-mirroring` command has no parameters or variables.

Chapter 5
VLANs and IGMP

This chapter describes how to configure virtual LANs and IGMP snooping parameters. This chapter covers the following topics:

- "Increased VLAN support," next
- "Configuring and displaying VLANs" on page 156
- "Displaying multicast membership" on page 168
- "Using IGMP snooping" on page 170

Refer to the *Using the Business Policy Switch 2000 Software Version 2.0* for more information on VLANs, IGMP snooping, and multicast groups, as well as configuration directions using the console interface (CI) menus. Refer to *Using Web-based Management for the Business Policy Switch 2000 Software Version 2.0* for information on configuring these features using the Web-based management system, and refer to *Reference for the Business Policy Switch 2000 Management Software Version 2.0* for configuration information for the DM.

Increased VLAN support

With software version 1.2, the BPS 2000 supports up to 256 VLANs. You can configure as many as 255 protocol-based VLANs, with up to 14 different protocols. To find out which version of the BPS 2000 software is running, use the `show sys-info` command in the privExec command mode The software currently running is displayed in the sysDescr field.

You can use 256 port-, protocol-, and MAC SA-based VLANs for the stack with a Pure BPS 2000 stack running software version 1.2. (The maximum number of MAC SA-based VLANs available is 48). If you are working with a mixed, or hybrid, stack, you can use 64 VLANs for the entire stack. When you change from a Pure BPS 2000 Stack mode to a Hybrid Stack mode:

- If you have up to 64 VLANs on the Pure BPS 2000 Stack, they will be retained when you change to a Hybrid Stack.
- If you have more than 64 VLANs on the Pure BPS 2000 Stack, you will lose them all. The Hybrid Stack will return to the default VLAN configuration.

Also, a mixed, or hybrid, stack does not support multiple Spanning Tree Groups (STG). You have a single instance of STG when working with a mixed stack.

➡ **Note:** Ensure that stack operational mode is set to Pure BPS 2000, and not Hybrid. The standalone or stack of BPS 2000 switches must be operating in Pure BPS 2000 Stack mode. Refer to Chapter 1 for information on displaying and setting the stack operational mode.

Configuring and displaying VLANs

You configure and display VLANs using a variety of command modes, depending on whether you are working with ports, protocol-based VLANs, or MAC source address-based VLANs. You can also enable or disable the automatic PVID feature. This section covers the following topics:

- "show vlan interface info command," next
- "show vlan interface vids command" on page 158
- "vlan mgmt command" on page 159
- "default vlan mgmt command" on page 160
- "vlan create command" on page 160
- "vlan delete command" on page 162
- "no vlan command" on page 163v
- "vlan name command" on page 163
- "auto-pvid command" on page 164
- "no auto-pvid command" on page 164
- "vlan ports command" on page 165
- "vlan members command" on page 166
- "show vlan mac-address command" on page 166

- "vlan mac-address command" on page 167
- "no vlan mac-address command" on page 168

Refer to Appendix A for an alphabetical list of the VLAN commands.

Note: For guidelines for configuring VLANs, spanning tree groups, and MLTs, refer to Chapter 1 of the *Using the Business Policy Switch 2000 Software Version 2.0.*

show vlan interface info command

The `show vlan interface info` command displays VLAN settings associated with a port, including tagging information, PVID number, priority, and filtering information for tagged, untagged, and unregistered frames. The syntax for the `show vlan interface info` command is:

```
show vlan interface info [<portlist>]
```

The `show vlan interface info` command is in the privExec command mode.

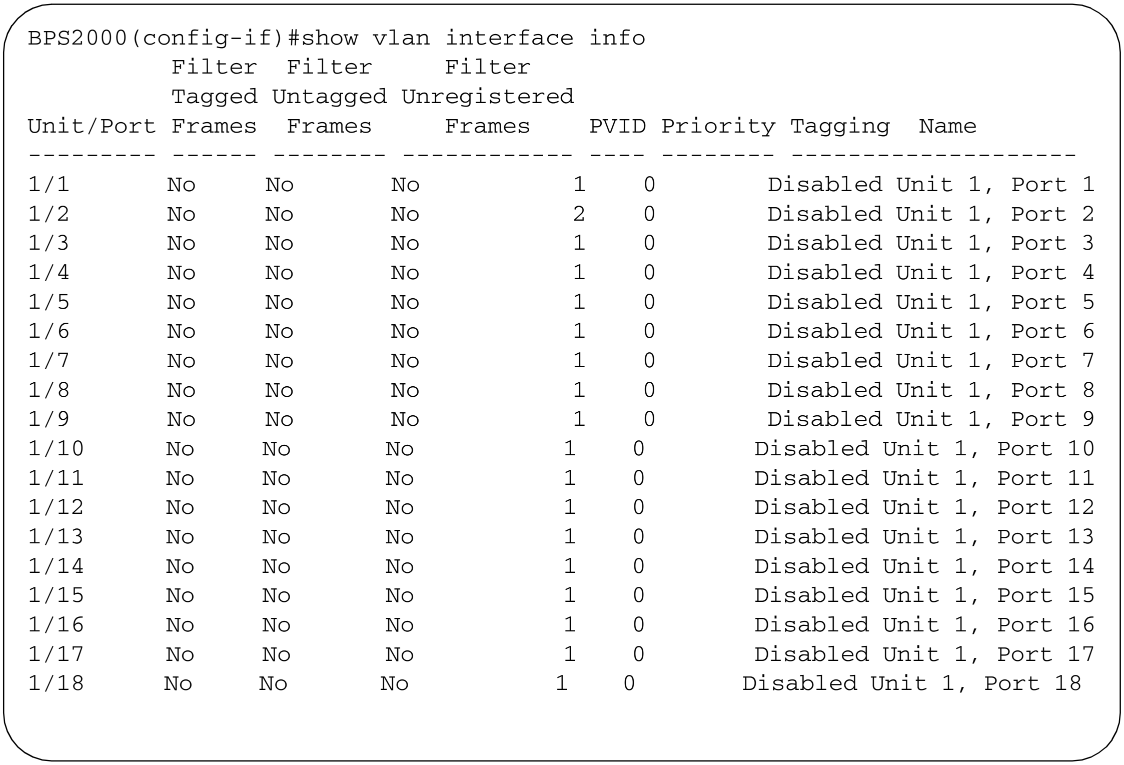
Table 88 describes the parameters and variables for the `show vlan interface info` command.

Table 88 show vlan command interface info parameters and variables

Parameters and variables	Description
<portlist>	Enter the list of ports you want the VLAN information for, or enter all to display all ports.

Figure 32 displays sample output from the `show vlan interface info` command.

Figure 32 show vlan interface info output



```
BPS2000(config-if)#show vlan interface info
          Filter  Filter     Filter
          Tagged Untagged Unregistered
Unit/Port Frames  Frames     Frames    PVID Priority Tagging  Name
--------- ------ -------- ------------ ---- -------- --------------------
1/1       No     No      No           1    0       Disabled Unit 1, Port 1
1/2       No     No      No           2    0       Disabled Unit 1, Port 2
1/3       No     No      No           1    0       Disabled Unit 1, Port 3
1/4       No     No      No           1    0       Disabled Unit 1, Port 4
1/5       No     No      No           1    0       Disabled Unit 1, Port 5
1/6       No     No      No           1    0       Disabled Unit 1, Port 6
1/7       No     No      No           1    0       Disabled Unit 1, Port 7
1/8       No     No      No           1    0       Disabled Unit 1, Port 8
1/9       No     No      No           1    0       Disabled Unit 1, Port 9
1/10      No     No      No          1    0       Disabled Unit 1, Port 10
1/11      No     No      No          1    0       Disabled Unit 1, Port 11
1/12      No     No      No          1    0       Disabled Unit 1, Port 12
1/13      No     No      No          1    0       Disabled Unit 1, Port 13
1/14      No     No      No          1    0       Disabled Unit 1, Port 14
1/15      No     No      No          1    0       Disabled Unit 1, Port 15
1/16      No     No      No          1    0       Disabled Unit 1, Port 16
1/17      No     No      No          1    0       Disabled Unit 1, Port 17
1/18     No     No      No          1    0       Disabled Unit 1, Port 18
```

show vlan interface vids command

The `show vlan interface vids` command displays port memberships in VLANs. The syntax for the `show vlan interface vids` command is:

```
show vlan interface vids [<portlist>]
```

The `show vlan interface vids` command is in the privExec command mode.

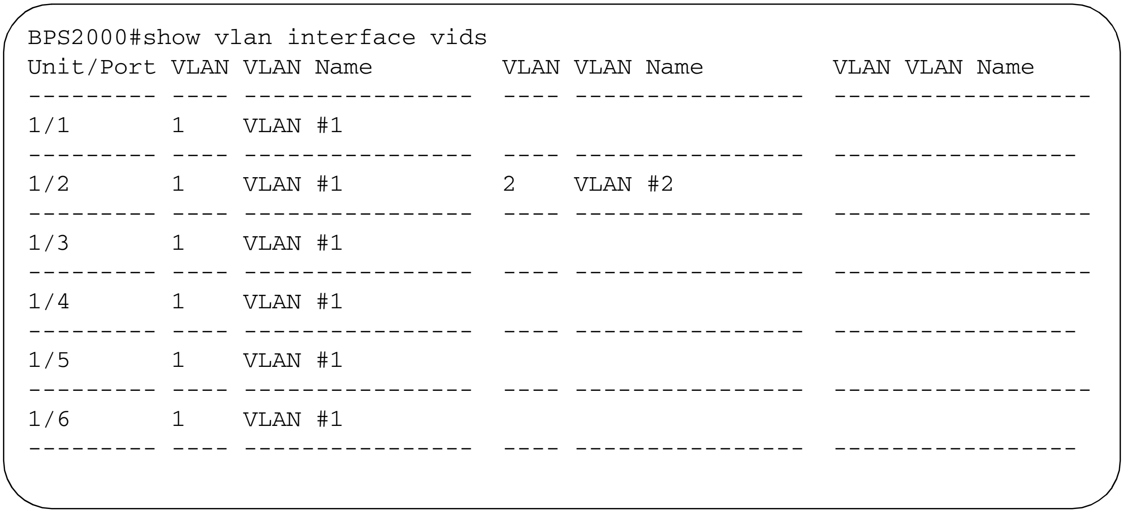
Table 88 describes the parameters and variables for the `show vlan interface vids` command.

Table 89 show vlan command interface vids parameters and variables

Parameters and variables	Description
<portlist>	Enter the list of ports you want the VLAN information for, or enter all to display all ports.

Figure 33 displays sample output from the `show vlan interface vids` command.

Figure 33 show vlan interface vids output



```
BPS2000#show vlan interface vids
Unit/Port VLAN VLAN Name         VLAN VLAN Name         VLAN VLAN Name
--------- ---- ----------------  ---- ----------------  ------------------
1/1       1    VLAN #1
--------- ---- ----------------  ---- ----------------  -----------------
1/2       1    VLAN #1           2    VLAN #2
--------- ---- ----------------  ---- ----------------  ------------------
1/3       1    VLAN #1
--------- ---- ----------------  ---- ----------------  ------------------
1/4       1    VLAN #1
--------- ---- ----------------  ---- ----------------  -----------------
1/5       1    VLAN #1
--------- ---- ----------------  ---- ----------------  ------------------
1/6       1    VLAN #1
--------- ---- ----------------  ---- ----------------  -----------------
```

vlan mgmt command

The `vlan mgmt` command allows you to set a VLAN as the management VLAN. The syntax for the `vlan mgmt` command is:

```
vlan mgmt <1-4094>
```

The `vlan mgmt` command is in the config command mode.

Table 91 describes the parameters and variables for the `vlan mgmt` command.

Table 90 vlan mgmt command parameters and variables

Parameters and variables	Description
<1-4094>	Enter the number of the VLAN you want to serve as the management VLAN.

default vlan mgmt command

The `default vlan mgmt` command resets the management VLAN to VLAN1. The syntax for the `default vlan mgmt` command is:

```
default vlan mgmt
```

The `default vlan mgmt` command is in the config command mode.

The `default vlan mgmt` command has no variables or parameters.

vlan create command

Note: For guidelines for configuring STGs, VLANs, and MLTs, refer to Chapter 1 of the *Using the Business Policy Switch 2000 Software Version 2.0*.

The `vlan create` command allows you to create a VLAN. You create a VLAN by setting the state of a previously non-existent VLAN.

Note: With software version 1.2, you can configure as many as 255 protocol-based VLANs, with up to 14 different protocols.

The syntax for the `vlan create` command is:

```
vlan create <1-4094>] [name <line>]
type
{macsa|
port|
protocol-ipEther2|
protocol-ipx802.3|
protocol-ipx802.2|
protocol-ipxSnap|
protocol-ipxEther2|
protocol-ApltkEther2Snap|
protocol-decEther2|
protocol-decOtherEther2|
protocol-sna802.2|
protocol-snaEther2|
protocol-Netbios|
protocol-xnsEther2|
protocol-vinesEther2|
protocol-ipv6Ether2|
protocol-Userdef <4096-65534>|
protocol-RarpEther2}
[learning {IVL|SVL}]
```

The `vlan create` command is in the config command mode.

Table 91 describes the parameters and variables for the `vlan create` command.

Table 91 vlan create command parameters and variables

Parameters and variables	Description
<1-4094>	Enter the number of the VLAN to create.
name <line>	Enter the name of the VLAN to create.
type	Enter the type of VLAN to create: • macsa—MAC source address-based • port—port-based • protocol—protocol-based (see following list)
protocol-ipEther2	Specifies an ipEther2 protocol-based VLAN.
protocol-ipx802.3	Specifies an ipx802.3 protocol-based VLAN.
protocol-ipx802.2	Specifies an ipx802.2 protocol-based VLAN.
protocol-ipxSnap	Specifies an ipxSnap protocol-based VLAN.

Table 91 vlan create command parameters and variables (continued)

Parameters and variables	Description
protocol-ipxEther2	Specifies an ipxEther2 protocol-based VLAN.
protocol-ApltkEther2Snap	Specifies an ApltkEther2Sanp protocol-based VLAN.
protocol-decEther2	Specifies a decEther2 protocol-based VLAN.
protocol-decOtherEther2	Specifies a decOtherEther2 protocol-based VLAN.
protocol-sna802.2	Specifies an sna802.2 protocol-based VLAN.
protocol-snaEther2	Specifies an snaEther2 protocol-based VLAN.
protocol-Netbios	Specifies a NetBIOS protocol-based VLAN.
protocol-xnsEther2	Specifies an xnsEther2 protocol-based VLAN.
protocol-vinesEther2	Specifies a vinesEther2 protocol-based VLAN.
protocol-ipv6Ether2	Specifies an ipv6Ether2 protocol-based VLAN.
protocol-Userdef <4096-65534>	Specifies a user-defined protocol-based VLAN.
protocol-RarpEther2	Specifies an RarpEther2 protocol-based VLAN.
learning {IVL|SVL}	Enter the type of learning you want for the VLAN: • IVL—independent VLAN learning • SVL—shared VLAN learning Note: IVL is available *only* when you are operating in the Pure BPS 2000 stack mode.

Note: This command fails if the VLAN already exists.

vlan delete command

The `vlan delete` command allows you to delete a VLAN. The syntax for the `vlan delete` command is:

```
vlan delete <1-4094>
```

The `vlan delete` command is in the config command mode.

Table 91 describes the parameters and variables for the `vlan delete` command.

Table 92 vlan delete command parameters and variables

Parameters and variables	Description
<1-4094>	Enter the number of the VLAN to delete.

no vlan command

The `no vlan` command allows you to delete a VLAN. The syntax for the `no vlan` command is:

```
no vlan <1-4094>
```

The `no vlan` command is in the config command mode.

Table 91 describes the parameters and variables for the `no vlan` command.

Table 93 no vlan command parameters and variables

Parameters and variables	Description
<1-4094>	Enter the number of the VLAN to delete.

vlan name command

The `vlan name` command allows you to change the name of an existing VLAN. The syntax for the `vlan name` command is:

```
vlan name <1-4094> <line>
```

The `vlan name` command is in the config command mode.

Table 91 describes the parameters and variables for the `vlan name` command.

Table 94 vlan name command parameters and variables

Parameters and variables	Description
<1-4094>	Enter the number of the VLAN you want to change the name of.
<line>	Enter the new name you want for the VLAN.

auto-pvid command

The `auto-pvid` command allows you to enable the automatic PVID feature. The syntax for the `auto-pvid` command is:

```
auto-pvid
```

The `auto-pvid` command is in the config command mode.

The `auto-pvid` command has no parameters or variables.

For more information on the automatic PVID feature, refer to *Using the Business Policy Switch 2000 Software Version 2.0*.

no auto-pvid command

The `no auto-pvid` command allows you to disable the automatic PVID feature. The syntax for the `no auto-pvid` command is:

```
no auto-pvid
```

The `no auto-pvid` command is in the config command mode.

The `no auto-pvid` command has no parameters or variables.

For more information on the automatic PVID feature, refer to *Using the Business Policy Switch 2000 Software Version 2.0*.

vlan ports command

The vlan ports command configures the VLAN-related settings for a port.The syntax for the vlan ports command is:

```
vlan ports [<portlist>] [tagging {enable|disable}]
[pvid <1-4094>] [filter-tagged-frame {enable|disable}]
[filter-untagged-frame {enable|disable}]
[filter-unregistered-frames {enable|disable}]
[priority <0-7>] [name <line>]
```

The vlan ports command is in the config command mode.

Table 95 describes the parameters and variables for the vlan ports command.

Table 95 vlan ports command parameters and variables

Parameters and variables	Description
<portlist>	Enter the port number(s) you want to configure for a VLAN.
tagging {enable|disable}	Enables or disables the port as a tagged VLAN member for egressing packet.
pvid <1-4094>	Associates the port with a specific VLAN
filter-tagged-frame {enable|disable}	Enables or disables the port to filter received tagged packets.
filter-untagged-frame {enable|disable}	Enables or disables the port to filter received untagged packets.
filter-unregistered-frames {enable|disable}	Enables or disables the port to filter received unregistered packets.
priority <0-7>	Sets the port as a priority for the switch to consider as it forwards received packets.
name <line>	Enter the name you want for this port. Note: This option can only be used if a single port is specified in the <portlist>.

vlan members command

The `vlan members` command adds a port to or deletes a port from a VLAN. The syntax for the `vlan members` command is:

```
vlan members [add|remove] <1-4094> <portlist>
```

The `vlan members` command is in the config mode.

Table 96 describes the parameters and variables for the `vlan members` command.

Table 96 vlan members command parameters and variables

Parameters and variables	Description
add|remove	Adds a port to or removes a port from a VLAN. Note: If you omit this parameter, you are setting the exact port membership for the VLAN; the prior port membership of the VLAN is discarded and replaced by the new list of ports.
<1-4094>	Specifies the target VLAN.
portlist	Enter the list of port(s) you are adding, removing, or assigning to the VLAN.

show vlan mac-address command

The `show vlan mac-address` command displays the configured MAC address for a MAC source address-based VLAN. The syntax for the `show vlan mac-address` command is:

```
show vlan mac-address <1-4094> [address H.H.H]
```

The `show vlan mac-address` command is in the privExec mode.

Table 97 describes the parameters and variables for the `show vlan mac-address` command.

Table 97 show vlan mac-address command parameters and variables

Parameters and variables	Description
<1-4094>	Enter the number of the VLAN you want to display MAC source addresses for.
address H.H.H	Specifies a particular MAC address to display; enter the MAC address in the H.H.H. format. Note: If you omit this parameter, the system displays the entire table.

Figure 34 displays sample output from the `show vlan mac-address` command.

Figure 34 show vlan mac-address command output

```
BPS2000(config)#show vlan mac-address 6
Active MAC Addresses
----------------------------------------------------------
08-00-01-02-02-03
```

vlan mac-address command

The `vlan mac-address` command adds MAC addresses to MAC source-address-based VLANs. The `vlan mac-address` syntax is:

```
vlan mac-address <1-4094> address <H.H.H>
```

The `vlan mac-address` command is in the config command mode.

Table 98 describes the parameters and variables for the `vlan mac-address` command.

Table 98 vlan mac-address command parameters and variables

Parameters and variables	Description
<1-4094>	Enter the number of the VLAN you want to add a MAC source address to.
address <H.H.H.>	Enter the MAC source address to assign to the VLAN.

no vlan mac-address command

The `no vlan mac-address` command removes MAC addresses from MAC source-address-based VLANs. The `no vlan mac-address` syntax is:

```
no vlan mac-address <1-4094> address <H.H.H>
```

The `no vlan mac-address` command is in the config command mode.

Table 98 describes the parameters and variables for the `no vlan mac-address` command.

Table 99 no vlan mac-address command parameters and variables

Parameters and variables	Description
<1-4094>	Enter the number of the VLAN you want to remove a MAC source address from.
address <H.H.H.>	Enter the MAC source address to remove from the VLAN.

Displaying multicast membership

You can display the membership of multicast groups using the CLI.

show vlan multicast membership command

The `show vlan multicast membership` command displays the IP multicast sessions in the network. The syntax for the `show vlan multicast membership` command is:

```
show vlan multicast membership <1-4094>
```

The `show vlan multicast membership` command is in the privExec mode.

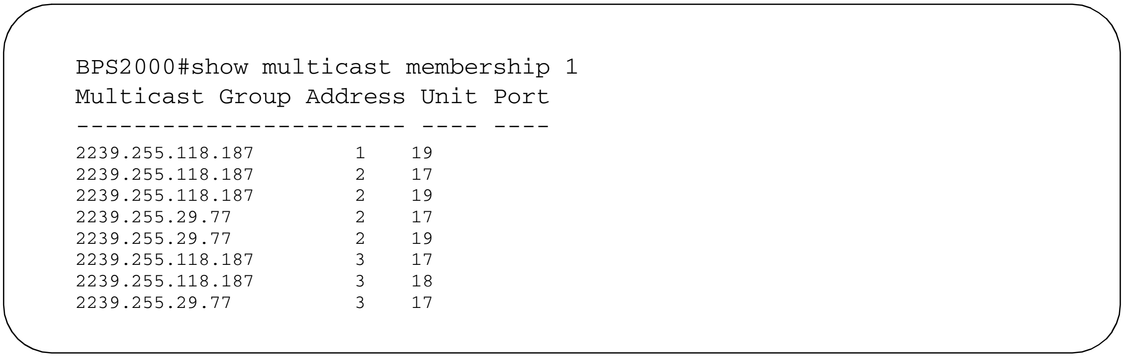
Table 100 describes the parameters and variables for the `show vlan multicast membership` command.

Table 100 show vlan multicast membership command parameters and variables

Parameters and variables	Description
<1-4094>	Specifies the VLAN to display IP multicast sessions.

Figure 35 displays sample output from the `show vlan multicast membership` command.

Figure 35 show vlan multicast membership command output



```
BPS2000#show multicast membership 1
Multicast Group Address Unit Port
----------------------- ---- ----
2239.255.118.187         1    19
2239.255.118.187         2    17
2239.255.118.187         2    19
2239.255.29.77           2    17
2239.255.29.77           2    19
2239.255.118.187         3    17
2239.255.118.187         3    18
2239.255.29.77           3    17
```

Using IGMP snooping

You can configure and display IGMP snooping parameters using the CLI. This section covers:

- "show vlan igmp command," next
- "vlan igmp command" on page 171
- "default vlan igmp command" on page 172

show vlan igmp command

The `show vlan igmp` command displays the IGMP snooping configuration. The syntax for the `show vlan igmp` command is:

```
show vlan igmp <1-4094>
```

The `show vlan igmp` command is in the privExec mode.

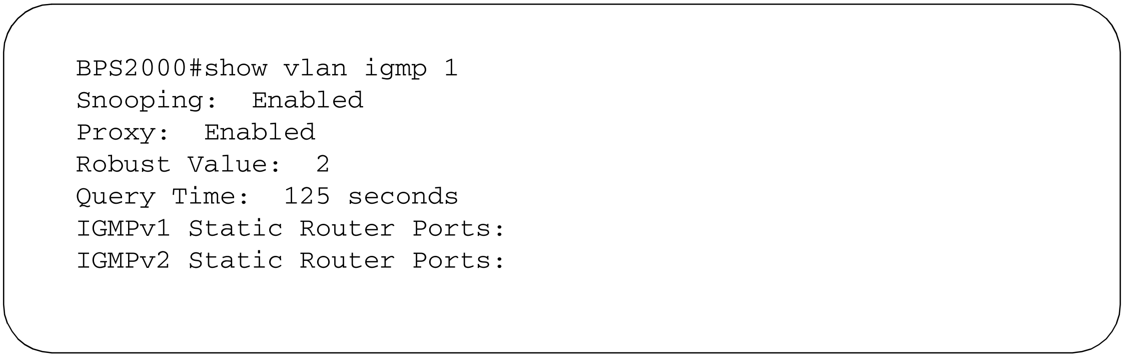
Table 101 describes the parameters and variables for the `show vlan igmp` command.

Table 101 show igmp command parameters and variables

Parameters and variables	Description
<1-4094>	Specifies the VLAN to display IGMP snooping configuration.

Figure 36 displays sample output from the `show vlan igmp` command.

Figure 36 show vlan igmp command output



```
BPS2000#show vlan igmp 1
Snooping:  Enabled
Proxy:  Enabled
Robust Value:  2
Query Time:  125 seconds
IGMPv1 Static Router Ports:
IGMPv2 Static Router Ports:
```

vlan igmp command

The `vlan igmp` command configures IGMP snooping parameters. The syntax for the `vlan igmp` command is:

```
vlan igmp <1-4094> [snooping {enable|disable}]
[proxy {enable|disable}] [robust-value <value>]
[query-interval <time>] [v1-members <portlist>] [v2-members
<portlist>]
```

The `vlan igmp` command is in the config mode.

Table 102 describes the parameters and variables for the `vlan igmp` command.

Table 102 vlan igmp command parameters and variables

Parameters and variables	Description
<1-4094>	Enter the VLAN to configure for IGMP.
snooping {enable|disable}	Enables or disables the VLAN for IGMP snooping.
proxy {enable|disable}	Enables or disables the VLAN for IGMP proxy.
robust-value <value>	Enter the robust value you want for IGMP.
query-interval <time>	Enter the number of seconds you want for the query interval of IGMP.
v1-members <portlist>	Enter the list of ports for port membership for IGMP v1.
v2-members <portlist>	Enter the list of ports for port membership for IGMP v2.

default vlan igmp command

The `default vlan igmp` command sets all IGMP snooping parameters to the factory default settings. The syntax for the `default vlan igmp` command is:

```
default vlan igmp <1-4094>
```

The `default vlan igmp` command is in the config mode.

Table 102 describes the parameters and variables for the `default vlan igmp` command.

Table 103 default vlan igmp command parameters and variables

Parameters and variables	Description
<1-4094>	Enter the VLAN to default IGMP settings to factory default.

Chapter 6
Policy-enabled networks and QoS

This chapter describes how to configure DiffServ and Quality of Service (QoS) parameters for policy-enabled networks. This chapter covers the following topics:

- "Displaying QoS parameters," next
- "Resetting" on page 185
- "Configuring COPS" on page 186
- "Configuring QoS interface groups" on page 193
- "Configuring DSCP and 802.1p and queue associations" on page 196
- "Configuring QoS filters and filter groups" on page 198
- "Configuring QoS actions" on page 204
- "Configuring QoS meters" on page 205
- "Configuring QoS shapers" on page 206
- "Gathering QoS statistics" on page 208
- "Configuring QoS policies" on page 209
- "Reordering packets" on page 211

Refer to the *Using the Business Policy Switch 2000 Software Version 2.0* for more information on policy-enable networks, Differentiated Services, and QoS. Refer to *Using Web-based Management for the Business Policy Switch 2000 Software Version 2.0* for information on configuring these features using the Web-based management system, and refer to *Reference for the Business Policy Switch 2000 Management Software Version 2.0* for configuration information for the DM.

Note: When you use the `ignore` value in QoS, the system matches all values for that parameter.

Displaying QoS parameters

You can display QoS parameters using the CLI. show qos command

The `show qos` command displays the current QoS policy configuration The syntax for the `show qos` command is:

```
show qos [interface-groups|interface-assignments|
if-assign-list|egressmap|ingressmap|
ip-filters|ip-filter-sets|
l2-filters|l2-filter-sets|
actions|meters|shapers|policies|
queue-sets|queue-set-assignments|
agent|statistics]
```

The `show qos` command is in the privExec command mode.

Table 104 describes the parameters and variables for the `show qos` command.

Table 104 show qos command parameters and variables

Parameters and variables	Description
interface-groups	Displays configured interface groups.
interface-assignments	Displays interface-to-interface group assignments.
if-assign-list	Displays interface-to-interface group assignments.
egressmap	Displays DSCP-to-802.1p priority and loss-sensitivity mapping.
ingressmap	Displays 802.1p priority-to-DSCP mapping.
ip-filters	Displays defined IP filters.
ip-filter-sets	Displays defined IP filter sets.
l2-filters	Displays defined Layer 2 filters.
l2-filter-sets	Displays defined Layer 2 filter sets.
actions	Displays defined QoS action entries.
meters	Displays defined traffic metering entries.
shapers	Displays defined traffic shaping entries.
policies	Displays configured QoS policies.
queue-sets	Displays current queue set information.
queue-set-assignments	Displays 802.1p priority-to-queue assignments by queue set.

Table 104 show qos command parameters and variables

Parameters and variables	Description
agent	Displays QoS agent configuration parameters.
statistics	Displays QoS policy statistics.

Figure 37 displays sample output from the `show qos interface-groups` command.

Figure 37 show qos interface-groups command output

```
BPS2000#show qos interface-groups
     Role        Interface              Capabilities                Storage
  Combination      Class                                             Type

_______________ ____________ ____________________________________ ___________
allBPSIfcs      Untrusted    Input 802, Input IP                  Read Only
```

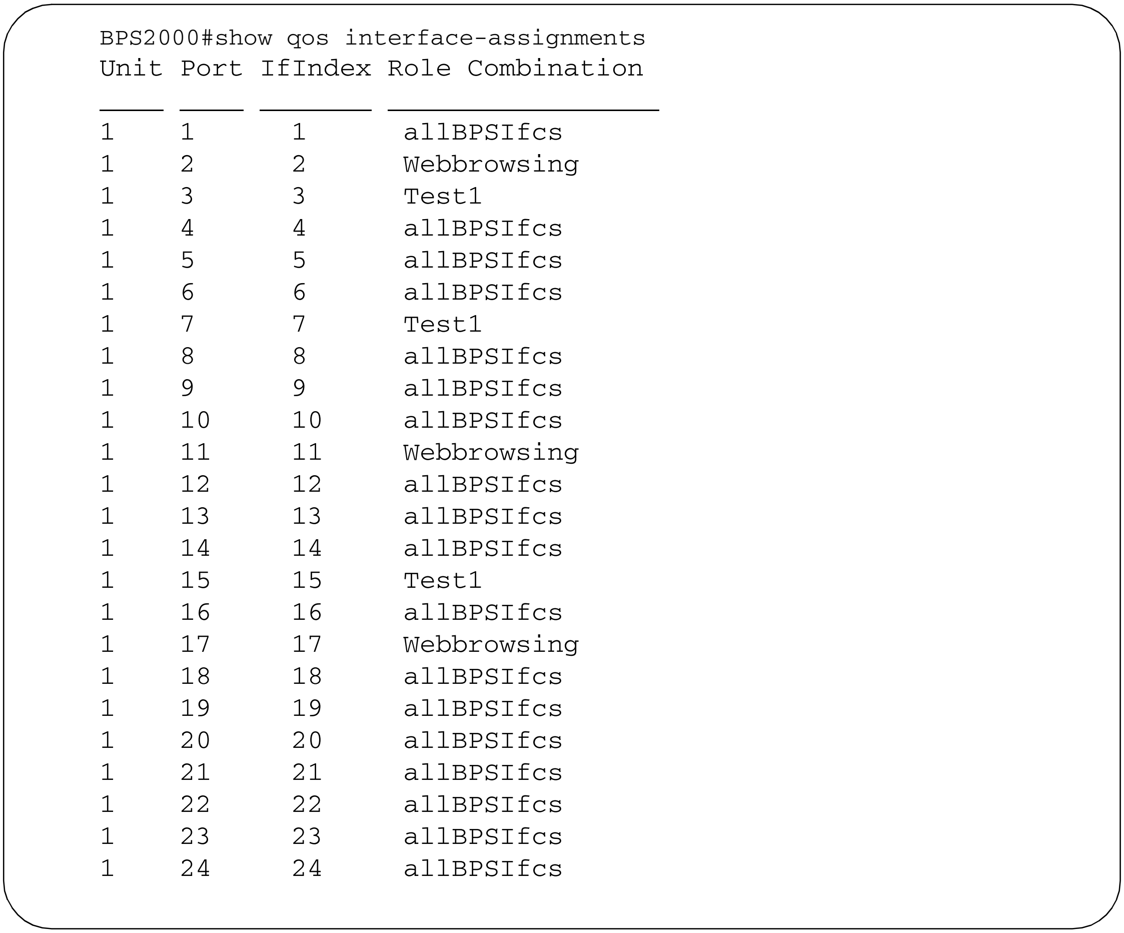
Figure 38 displays sample output from the `show qos interface-assignments` command.

Figure 38 show qos interface-assignments command output

```
BPS2000#show qos interface-assignments
Unit Port IfIndex Role Combination
____ ____ _______ _________________
1    1      1      allBPSIfcs
1    2      2      Webbrowsing
1    3      3      Test1
1    4      4      allBPSIfcs
1    5      5      allBPSIfcs
1    6      6      allBPSIfcs
1    7      7      Test1
1    8      8      allBPSIfcs
1    9      9      allBPSIfcs
1    10     10     allBPSIfcs
1    11     11     Webbrowsing
1    12     12     allBPSIfcs
1    13     13     allBPSIfcs
1    14     14     allBPSIfcs
1    15     15     Test1
1    16     16     allBPSIfcs
1    17     17     Webbrowsing
1    18     18     allBPSIfcs
1    19     19     allBPSIfcs
1    20     20     allBPSIfcs
1    21     21     allBPSIfcs
1    22     22     allBPSIfcs
1    23     23     allBPSIfcs
1    24     24     allBPSIfcs
```

Figure 39 displays sample output from the `show qos if-assign-list` command.

Figure 39 show qos if-assign-lists command output



```
BPS2000#show qos interface-assignments
Unit Port IfIndex Role Combination

____ ____ _______ _________________
1    1       1       allBPSIfcs
1    2       2       Webbrowsing
1    3       3       Test1
1    4       4       allBPSIfcs
1    5       5       allBPSIfcs
1    6       6       allBPSIfcs
1    7       7       Test1
1    8       8       allBPSIfcs
1    9       9       allBPSIfcs
1    10      10      allBPSIfcs
1    11      11      Webbrowsing
1    12      12      allBPSIfcs
1    13      13      allBPSIfcs
1    14      14      allBPSIfcs
1    15      15      Test1
1    16      16      allBPSIfcs
1    17      17      Webbrowsing
1    18      18      allBPSIfcs
1    19      19      allBPSIfcs
1    20      20      allBPSIfcs
1    21      21      allBPSIfcs
1    22      22      allBPSIfcs
1    23      23      allBPSIfcs
1    24      24      allBPSIfcs
```

Figure 40 displays sample output from the `show qos egressmap` command.

Figure 40 show qos egressmap command output

```
DSCP 802.1p Priority  Drop Precedence
____ _______________ __________________
0    0               Not Loss Sensitive
1    0               Not Loss Sensitive
2    0               Not Loss Sensitive
3    0               Not Loss Sensitive
4    0               Not Loss Sensitive
5    0               Not Loss Sensitive
6    0               Not Loss Sensitive
7    0               Not Loss Sensitive
8    2               Not Loss Sensitive
9    0               Not Loss Sensitive
10   2               Loss Sensitive
11   0               Not Loss Sensitive
12   2               Not Loss Sensitive
13   0               Not Loss Sensitive
14   2               Not Loss Sensitive
15   0               Not Loss Sensitive
16   3               Not Loss Sensitive
17   0               Not Loss Sensitive
18   3               Loss Sensitive
19   0               Not Loss Sensitive
```

Figure 41 displays sample output from the `show qos ingressmap` command.

Figure 41 show qos ingressmap command output

```
BPS2000#show qos ingressmap
802.1p Priority DSCP
_______________ ____
0               0
1               0
2               10
3               18
4               26
5               34
6               46
7               48
```

Figure 42 displays sample output from the `show qos ip-filters` command.

Figure 42 show qos ip-filters command output

```
BPS2000#show qos ip-filters
Id    Destination       Source       DSCP  Protocol  Dest     Src
      Addr / Mask     Addr / Mask                   L4 Port L4 Port

___ _______________ _______________ ______ ________ _______ _______
1   Ignore          Ignore          Ignore Ignore   0       0
    Ignore          Ignore
2   10.10.1.102     Ignore          Ignore Ignore   0       0
    255.255.255.255 Ignore
```

Figure 43 displays sample output from the `show qos ip-filter-sets` command.

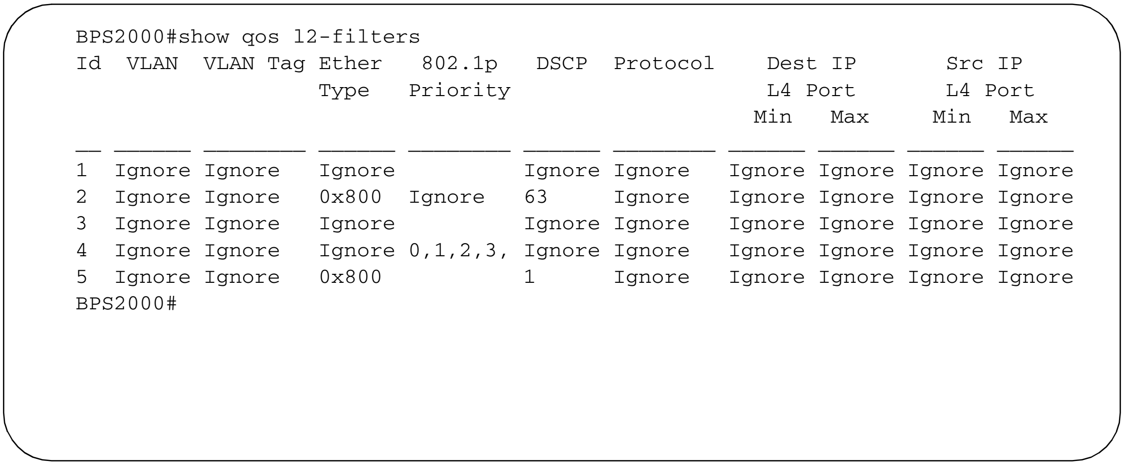
Figure 43 show qos ip-filter-sets command output

```
BPS2000#show qos ip-filter-sets
IP Filter Sets

Id        Name          Acl Id Ace Id Ace Order
___ ________________ ______ ______ _________
2   G1-ip                1      2      2
```

Figure 44 displays sample output from the `show qos l2-filters` command.

Figure 44 show qos l2-filters command output

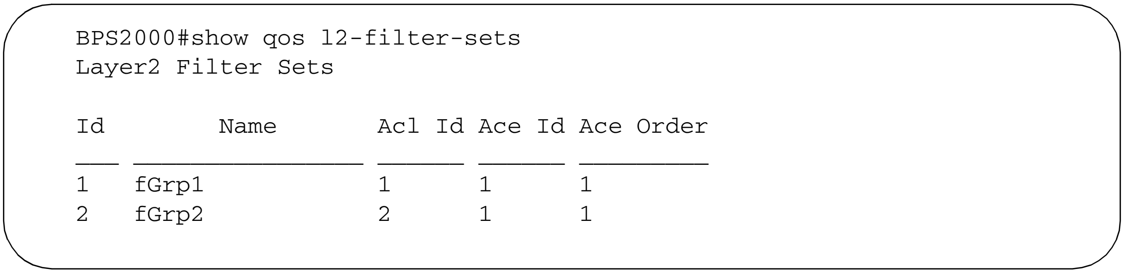


```
BPS2000#show qos l2-filters
Id  VLAN  VLAN Tag Ether   802.1p   DSCP  Protocol    Dest IP       Src IP
                   Type   Priority                    L4 Port       L4 Port
                                                     Min   Max     Min   Max

__ ______ ________ ______ ________ ______ ________ ______ ______ ______ ______
1  Ignore Ignore   Ignore          Ignore Ignore   Ignore Ignore Ignore Ignore
2  Ignore Ignore   0x800  Ignore   63     Ignore   Ignore Ignore Ignore Ignore
3  Ignore Ignore   Ignore          Ignore Ignore   Ignore Ignore Ignore Ignore
4  Ignore Ignore   Ignore 0,1,2,3, Ignore Ignore   Ignore Ignore Ignore Ignore
5  Ignore Ignore   0x800           1      Ignore   Ignore Ignore Ignore Ignore
BPS2000#
```

Figure 45 displays sample output from the `show qos l2-filter-sets` command.

Figure 45 show qos l2-filter-sets command output



```
BPS2000#show qos l2-filter-sets
Layer2 Filter Sets

Id        Name       Acl Id Ace Id Ace Order

___ ________________ ______ ______ _________
1   fGrp1            1      1      1
2   fGrp2            2      1      1
```

Figure 46 displays sample output from the `show qos actions` command. Beginning with software version 2.0, each service class has a default action that uses default mappings.

Figure 46 show qos actions command output

```
BPS2000#show qos actions
 Id          Name        Drop  Update      Set Drop       802.1p Priority
                                DSCP      Precedence

_____ ________________ _____ ______ __________________ _______________
65526 Drop_Traffic     True  Ignore Ignore             Ignore
65527 Standard_Service False 0x0    Not Loss Sensitive Priority 0
65528 Bronze_Service   False 0xA    Loss Sensitive     Priority 2
65529 Silver_Service   False 0x12   Loss Sensitive     Priority 3
65530 Gold_Service     False 0x1A   Loss Sensitive     Priority 4
65531 Platinum_Service False 0x22   Loss Sensitive     Priority 5
65532 Premium_Service  False 0x2E   Loss Sensitive     Priority 6
65533 Network_Service  False 0x30   Loss Sensitive     Priority 7
65534 Trusted_IP         False Ignore Use Egress Map     Use Egress Map
65535 Trusted_NonIP    False Ignore Ignore             Ignore
```

Figure 47 displays sample output from the `show qos meters` command. Beginning with software version 2.0, each service class has a default meter that uses default actions and mappings.

Figure 47 show qos meters command output

```
BPS2000 SW 2.0 in SC2-02 LAB#show qos meters
 Id         Name         Data    Commit Commit  In-Profile Out-Profile
                             Spec    Rate   Burst      Action           Action
                            (Kbps)(Bytes)

_____ ________________ ________ ______ __  ________________ ____
1     practice         Metered  3000 2047
65526 Drop_Traffic     No Meter 0     0    Drop_Traffic
65527 Standard_Service No Meter 0     0    Standard_Servic
65529 Bronze_Service   No Meter 0     0    Bronze_Service
65530 Silver_Service   No Meter 0     0    Silver_Service
65531 Gold_Service     No Meter 0     0    Gold_Service
65532 Platinum_Service No Meter 0     0    Platinum_Servic
65533 Premium_Service  No Meter 0     0    Premium_Service
65534 Network_Service  No Meter 0     0    Network_Service
```

Figure 48 displays sample output from the `show qos shapers` command.

Figure 48 show qos shapers command output

```
BPS2000#show qos shapers
Id        Name              Rate          Burst         Queue
                                          Size           Size
                           (Kbps)        (Bytes)        (Packets)

___ ___________________________  ___________ ________________ _________________
1         shaper1           64000         5555             2
```

Figure 49 displays sample output from the `show qos policies` command.

Figure 49 show qos policies command output

```
BPS2000#show qos policies

Id     Name         Filter Set     Filter      Role          Order
                                    Type     Combination

___ ___________ ________________ ______ ______________ ________
1   wizardIP     wizardIP_FLTR    IP     allBPSIfcs       1
2   wizardL2     wizardL2_FLTR    L2     allBPSIfcs       2

Id Meter      In-Profile   Out-of-Profile  Shaper  Shaper  Track
               Action        Action                Group   Stats

___ _________ ____________ ______________ ________ _____  ____
1             Standard_Servi                          0
2             Standard_Servi                          0
```

Figure 50 displays sample output from the `show qos queue-sets` command.

Figure 50 show qos queue-sets command output

```
BPS2000#show qos queue-sets
Set Queue  General     Extended  Bandwidth Absolute   Bandwith  Service  Size
ID   ID   Discipline  Discipline    (%)    Bandwidth Allocation  Order  (Bytes)
                                           (Kbps)

___ _____ ___________ __________ _________ _________ __________ _______ _______
1   1     Priority     0.0        100       0         Relative   1       16384
1   2     Weight Round 0.0        50        0         Relative   2       24576
1   3     Weight Round 0.0        30        0         Relative   2       32768
1   4     Weight Round 0.0        20        0         Relative   2       32768
2   1     Priority     0.0        100       0         Relative   1       16384
2   2     Priority     0.0        100       0         Relative   2       16384
```

Figure 51 displays sample output from the `show qos queue-set-assignments` command.

Figure 51 show qos queue-set-assignments command output

```
BPS2000#show qos queue-set-assignment
Queue Set 1

802.1p Priority Queue
_______________ _____
0               4
1               4
2               3
3               3
4               2
5               2
6               1
7               1
Queue Set 2

802.1p Priority Queue
_______________ _____
0               2
1               2
2               2
3               2
4               2
5               2
6               1
7               1
```

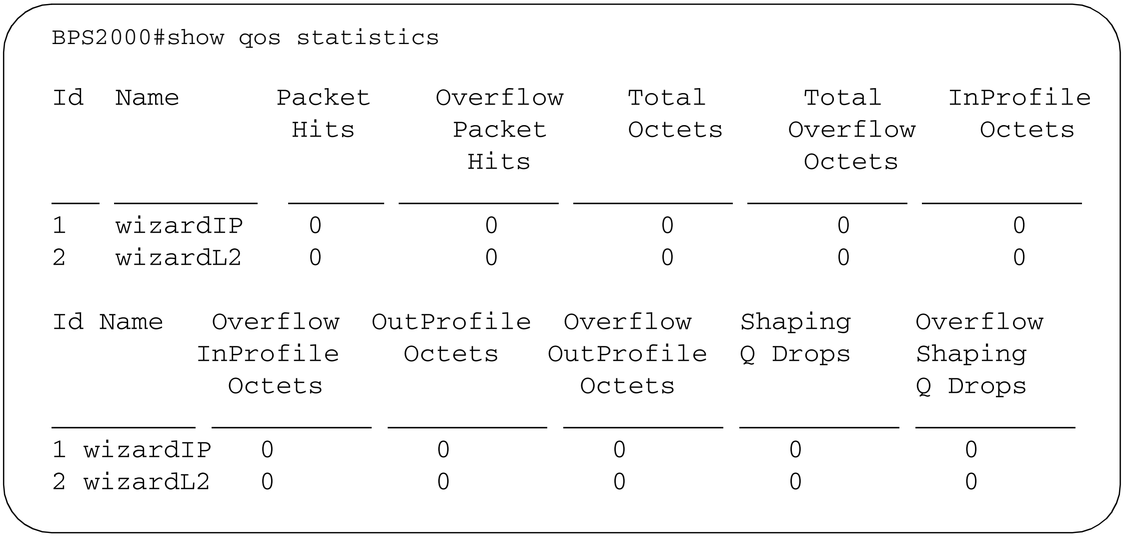
Figure 52 displays sample output from the `show qos agent` command.

Figure 52 show qos agent command output

```
BPS2000#show qos agent
QoS Policy Server Control: Enabled
QoS Policy Agent Retry Timer: 5 seconds
Allow Packet Reordering: Enabled
Maintain Policing Statistics: Enabled
```

Figure 53 displays sample output from the `show qos statistics` command.

Figure 53 show qos statistics command output



```
BPS2000#show qos statistics

Id  Name       Packet    Overflow    Total     Total     InProfile
                Hits      Packet     Octets   Overflow    Octets
                           Hits               Octets

___ _________ ______ __________ __________ __________ __________
1   wizardIP   0          0          0          0          0
2   wizardL2   0          0          0          0          0

Id Name    Overflow  OutProfile  Overflow   Shaping    Overflow
          InProfile    Octets   OutProfile  Q Drops    Shaping
            Octets                Octets               Q Drops

_________ __________ __________ __________ __________ __________
1 wizardIP   0          0          0          0          0
2 wizardL2   0          0          0          0          0
```

Resetting

You can reset the system to the factory defaults.

qosagent reset-default command

The `qosagent reset-default` command deletes all installed states and resets the system to factory default values. The syntax for the `qosagent reset-default` command is:

```
qosagent reset-default
```

The `qosagent reset-default` command is in the config mode.

The `qosagent reset-default` command has no parameters or variables.

Configuring COPS

You can enable COPS-PR, the dynamic management system, using the CLI. This section covers:

- "qosagent server-control command," next
- "show cops retry command" on page 187
- "show cops server command" on page 187
- "show cops stats command" on page 188
- "cops retry command" on page 191
- "cops server command" on page 191
- "default cops retry command" on page 192
- "no cops server command" on page 193

qosagent server-control command

The `qosagent server-control` command enables COPS. The syntax for the `qosagent server-control` command is:

```
qosagent server-control {enable|disable} [retry-timer
<no-retry|1-86400>]
```

The `qosagent server-control` command is in the config mode.

Table 105 describes the parameters and variables for the `qosagent server-control` command.

Table 105 qosagent server-control command parameters and variables

Parameters and variables	Description
enable|disable	Enables COPS.
retry-timer <no-retry|1-86400>	Sets the value for the retry timer: • no retry—connection retry not attempted after a failed attempt • 1-86400—specifies the seconds between receipt of a connection termination/rejection notification and initiation of a new connection request

show cops retry command

The `show cops retry` command displays COPS TCP retry settings. The syntax for the `show cops retry` command is:

```
show cops retry
```

The `show cops retry` command is in the privExec mode.

The `show cops retry` command has no variables or parameters.

Figure 54 displays sample output from the `show cops retry` command.

Figure 54 show cops retry command output

```
BPS2000#show cops retry
Retry Algorithm:  Sequential
Retry Count    :  1
Retry Interval :  100 seconds
```

show cops server command

The `show cops server` command displays configured COPS servers. The syntax for the `show cops server` command is:

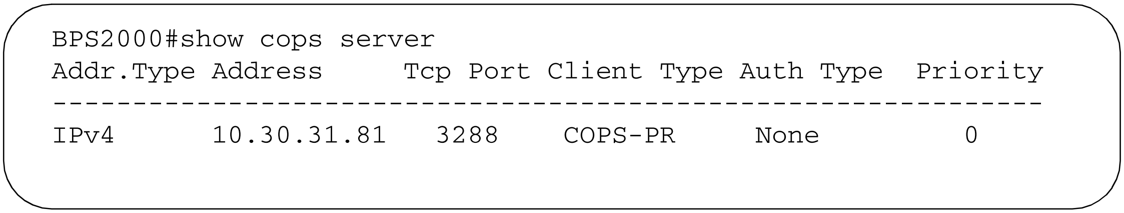
```
show cops server
```

The `show cops server` command is in the privExec mode.

The `show cops server` command has no variables or parameters.

Figure 55 displays sample output from the `show cops server` command.

Figure 55 show cops server command output



```
BPS2000#show cops server
Addr.Type Address     Tcp Port Client Type Auth Type  Priority
--------------------------------------------------------------
IPv4      10.30.31.81   3288    COPS-PR     None         0
```

show cops stats command

The `show cops stats` command displays COPS statistics. The syntax for the `show cops stats` command is:

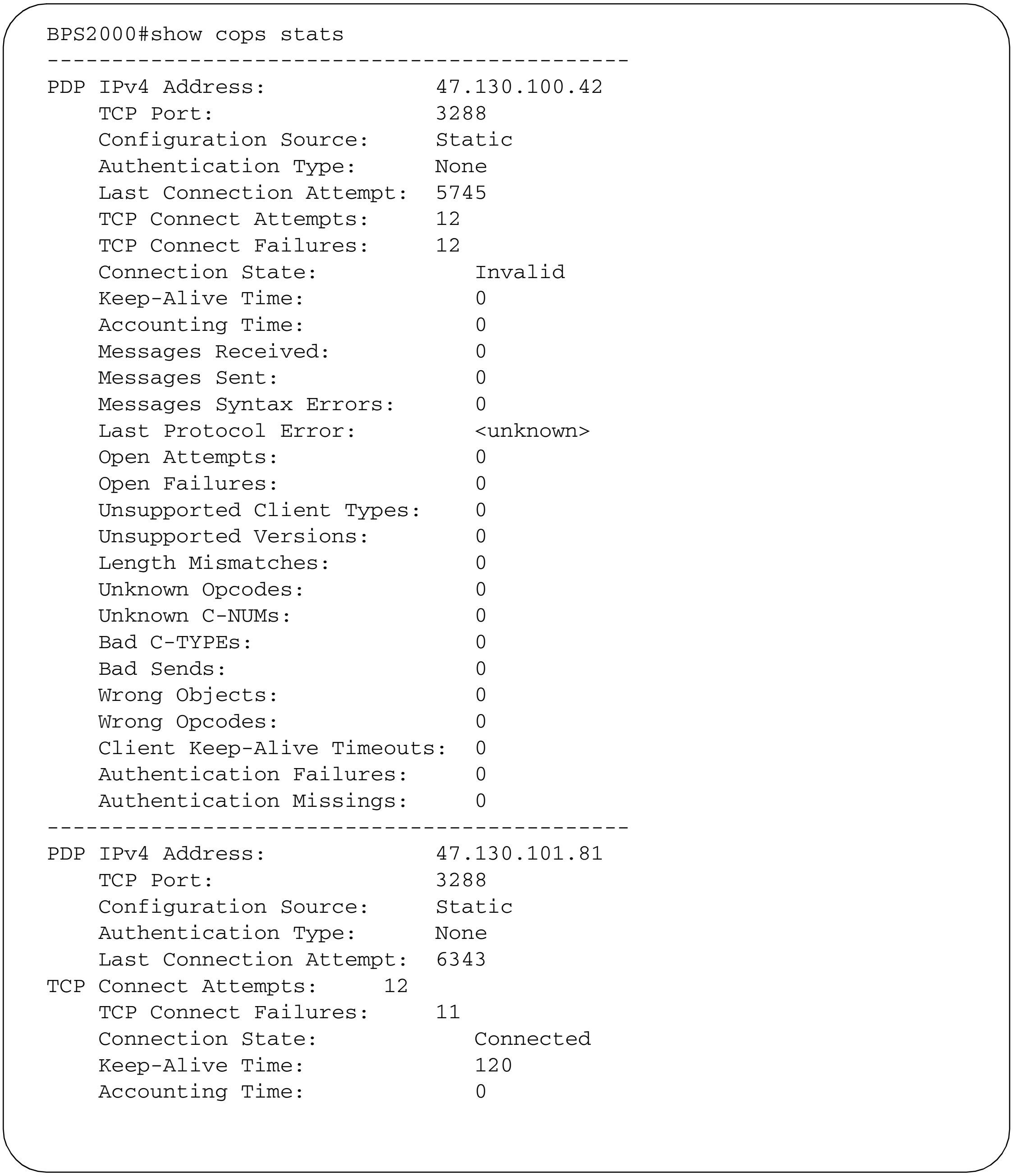
```
show cops stats
```

The `show cops stats` command is in the privExec mode.

The `show cops stats` command has no variables or parameters.

Figure 56 and Figure 57 display sample output from the `show cops stats` command.

Figure 56 show cops stats command output (1 of 2)



```
BPS2000#show cops stats
---------------------------------------------
PDP IPv4 Address:             47.130.100.42
    TCP Port:                 3288
    Configuration Source:     Static
    Authentication Type:      None
    Last Connection Attempt:  5745
    TCP Connect Attempts:     12
    TCP Connect Failures:     12
    Connection State:            Invalid
    Keep-Alive Time:             0
    Accounting Time:             0
    Messages Received:           0
    Messages Sent:               0
    Messages Syntax Errors:      0
    Last Protocol Error:         <unknown>
    Open Attempts:               0
    Open Failures:               0
    Unsupported Client Types:    0
    Unsupported Versions:        0
    Length Mismatches:           0
    Unknown Opcodes:             0
    Unknown C-NUMs:              0
    Bad C-TYPEs:                 0
    Bad Sends:                   0
    Wrong Objects:               0
    Wrong Opcodes:               0
    Client Keep-Alive Timeouts:  0
    Authentication Failures:     0
    Authentication Missings:     0
---------------------------------------------
PDP IPv4 Address:             47.130.101.81
    TCP Port:                 3288
    Configuration Source:     Static
    Authentication Type:      None
    Last Connection Attempt:  6343
TCP Connect Attempts:     12
    TCP Connect Failures:     11
    Connection State:            Connected
    Keep-Alive Time:             120
    Accounting Time:             0
```

Figure 57 show cops stats command output (2 of 2)

```
Accounting Time:             0
   Messages Received:           21
   Messages Sent:               3
   Messages Syntax Errors:      0
   Last Protocol Error:         <unknown>
   Open Attempts:               0
   Open Failures:               0
   Unsupported Client Types:    0
   Unsupported Versions:        0
   Length Mismatches:           0
   Unknown Opcodes:             0
   Unknown C-NUMs:              0
   Bad C-TYPEs:                 0
   Bad Sends:                   0
   Wrong Objects:               0
   Wrong Opcodes:               0
   Client Keep-Alive Timeouts:  0
   Authentication Failures:     0
   Authentication Missings:     0
   Client Type:  COPS-PR
           Connection State:            Accepted
           Keep-Alive Time:             120
           Accounting Time:             0
           Messages Received:           15
           Messages Sent:               16
           Messages Syntax Errors:      0
           Last Protocol Error:         <unknown>
           Open Attempts:               1
           Open Failures:               0
           Unsupported Client Types:    0
           Unsupported Versions:        0
           Length Mismatches:           0
           Unknown Opcodes:             0
           Unknown C-NUMs:              0
           Bad C-TYPEs:                 0
           Bad Sends:                   0
           Wrong Objects:               0
           Wrong Opcodes:               0
           Client Keep-Alive Timeouts:  0
           Authentication Failures:     0
           Authentication Missings:     0
```

cops retry command

The `cops retry` command sets the COPS TCP retry settings. The syntax for the `cops retry` command is:

```
cops retry <0-32> <1-600>
```

The `cops retry` command is in the config command mode.

Table 106 describes the parameters and variables for the `cops retry` command.

Table 106 cops retry command parameters and variables

Parameters and variables	Description
retry <0-32> <1-500>	Enter the number of retries and the retry interval (in seconds). Default is 10 seconds.

cops server command

The `cops server` command creates or modifies a COPS server configuration. The syntax for the `cops server` command is:

```
cops server <A.B.C.D> [tcp-port <0-65535>] [priority
<0-65535>]
```

The `cops server` command is in the config command mode.

Table 107 describes the parameters and variables for the `cops server` command.

Table 107 cops server command parameters and variables

Parameters and variables	Description
<A.B.C.D>	Enter the IP address of the COPS server you want to use.
tcp-port <0-65535>	Enter the number of the TCP port you want to use. The default port is 3288.
priority <0-65535>	Enter the priority you want this server to have. The default priority is 0.

default cops retry command

The `default cops retry` command restores the default COPS TCP retry settings. The syntax for the `default cops retry` command is:

```
default cops retry
```

The `default cops retry` command is in the config command mode.

The `default cops retry` command has no variables or parameters.

default cops server command

The `default cops server` command restores COPS TCP port and priority settings for a COPS server configuration. The syntax for the `default cops server` command is:

```
default cops server <A.B.C.D> [tcp-port] [priority]
```

The `default cops server` command is in the config command mode.

Table 108 describes the parameters and variables for the `default cops server` command.

Table 108 default cops server command parameters and variables

Parameters and variables	Description
<A.B.C.D>	Enter the IP address of the COPS server you want to use.
tcp-port	Restores the default TCP port. The default TCP port is 3288
priority <0-65535>	Restores the default priority. The default priority is 0.

no cops server command

The `no cops server` command removes a COPS server configuration. The syntax for the `no cops server` command is:

```
no cops server <A.B.C.D>
```

The `no cops server` command is in the config command mode.

Table 109 describes the parameters and variables for the `no cops server` command.

Table 109 no cops server command parameters and variables

Parameters and variables	Description
<A.B.C.D>	Enter the IP address of the COPS server you want to clear.

Configuring QoS interface groups

You can add or delete ports to or from an interface group or add or delete the interface groups themselves. This section covers:

- "qos if-assign command," next

- "qos if-group command" on page 194
- "qos if-assign-list command" on page 195

qos if-assign command

The `qos if-assign` command adds or deletes ports to or from a defined interface group. The syntax for the `qos if-assign` command is:

```
qos if-assign name <tag> {add|del} [port <portlist>]
```

The `qos if-assign` command is in the config-if command mode.

Table 110 describes the parameters and variables for the `qos if-assign` command.

Table 110 qos if-assign command parameters and variables

Parameters and variables	Description
name <tag>	Enter the name of the defined interface group.
add|del	Adds or deletes the port to or from the interface group.
port <portlist>	Enter the port(s) the port to add or delete to interface group. Note: If you omit this parameter, the system uses the port number specified when you issued the `interface` command.

qos if-group command

The `qos if-group` command adds or deletes interface groups. The syntax for the `qos if-group` command is:

```
qos if-group name <tag> {create class <ifclass>|delete}
```

The `qos if-group` command is in the config command mode.

Table 111 describes the parameters and variables for the `qos if-group` command.

Table 111 qos if-group command parameters and variables

Parameters and variables	Description
name <tag>	Enter the name of the interface group you are working with; maximum of 32 alphanumeric characters.
create class <ifclass>	Defines a new interface group and specifies the class of traffic received on interfaces associated with this interface group: • trusted • untrusted • unrestricted
delete	Deletes an existing interface group.

qos if-assign-list command

The `qos if-assign-list` command adds or deletes a list of ports to or from a defined interface group. The syntax for the `qos if-assign-list` command is:

```
qos if-assign-list name <tag> {add|del} [portlist
<portlist>]
```

The `qos if-assign-list` command is in the config-if command mode.

Table 110 describes the parameters and variables for the `qos if-assign-list` command.

Table 112 qos if-assign-list command parameters and variables

Parameters and variables	Description
name <tag>	Enter the name of the defined interface group.
add|del	Adds or deletes the port to or from the interface group.
portlist <portlist>	Enter the list of ports to add or delete to interface group. Note: If you omit this parameter, the system uses the port number specified when you issued the `interface` command.

Note: You cannot delete interface groups that are referenced by an installed policy or associated with device interfaces.

Configuring DSCP and 802.1p and queue associations

You can configure the DSCP, IEEE 802.1p priority, and queue set association using the CLI. This section covers:

- "qos egressmap command," next
- "qos ingressmap command" on page 197
- "qos queue-set-assignment command" on page 198

qos egressmap command

The `qos egressmap` command configures DSCP-to-802.1p priority and drop precedence associations that are used for assigning these values at packet egress, based on the DSCP in the received packet. The syntax for the `qos egressmap` command is:

```
qos egressmap ds <dscp> 1p <ieee1p> dp <dropprec>
```

The `qos egressmap` command is in the config command mode.

Table 113 describes the parameters and variables for the `qos egressmap` command.

Table 113 qos egressmap command parameters and variables

Parameters and variables	Description
ds <dscp>	Enter the DSCP value used as a lookup key for 802.1p priority and drop precedence at egress when appropriate; range is between 0 and 63.
1p <ieee1p>	Enter the 802.1p priority value associated with the DSCP; range is between 0 and 7.
dp <dropprec>	Enter the drop precedence values associated with the DSCP: • loss-sensitive • not-loss-sensitive

qos ingressmap command

The `qos ingressmap` command configures 802.1p priority-to-DSCP associations that are used for assigning default values at packet ingress, based on the 802.1p priority value in the received packet. The syntax for the `qos ingressmap` command is:

```
qos ingressmap 1p <ieee1p> ds <dscp>
```

The `qos ingressmap` command is in the config command mode.

Table 114 describes the parameters and variables for the `qos ingressmap` command.

Table 114 qos ingressmap command parameters and variables

Parameters and variables	Description
1p <ieee1p>	Enter the 802.1p priority value used as a lookup key for DSCP assignment at ingress when appropriate; range is between 0 and 7.
ds <dscp>	Enter the DSCP value associated with the 802.1p priority value; range is between 0 and 63.

qos queue-set-assignment command

The `qos queue-set-assignment` command associates the 802.1p priority values with a specific queue **within** a specific queue set. This association determines the egress scheduling treatment that traffic with a specific 802.1p priority value receives. The syntax for the `qos queue-set-assignment` command is:

```
qos queue-set-assignment queue-set <setid> 1p <ieee1p>
queue <qid>
```

The `qos queue-set-assignment` command is in the config command mode.

Table 115 describes the parameters and variables for the `qos queue-set-assignment` command.

Table 115 qos queue-set-assignment command parameters and variables

Parameters and variables	**Description**
queue-set <setid>	Enter the queue set ID.
1p <ieee1p>	Enter the 802.1p priority value for which the queue association is being modified; range is between 0 and 7.
queue <qid>	Enter the queue **within** the identified queue set to assign the 802.1p priority traffic at egress.

Configuring QoS filters and filter groups

You can configure filters and filter sets using the CLI. This section covers:

- "qos ip-filter command," next
- "qos ip-filter-set command" on page 200
- "qos l2-filter command" on page 201
- "qos l2-filter-set command" on page 203

qos ip-filter command

The `qos ip-filter` command adds or deletes IP filters. The syntax for the `qos ip-filter` command is:

```
qos ip-filter <fid> {create [src-ip <src-ip-info>] [dst-ip
<dst-ip-info>] [ds-field <dscp>] [protocol <protocoltype>]
[src-port <port>] [dst-port <port>]|delete}
```

The `qos ip-filter` command is in the config command mode.

Table 116 describes the parameters and variables for the `qos ip-filter` command.

Table 116 qos ip-filter command parameters and variables

Parameters and variables	Description
<fid>	Enter an integer to specify the filter ID.
create	Defines a new IP filter with the specified filter ID.
src-ip <src-ip-info>	Enter the source IP address and mask in the form of a.b.c.d/x or a.b.c.d x.x.x.x. Default is 0.0.0.0.
dst-ip <dst-ip-info>	Enter the destination IP address and mask in the form of a.b.c.d/x or a.b.c.d x.x.x.x. Default is 0.0.0.0.
ds-field <dscp>	Enter 6-bit DSCP value; range is 0 to 63. Default is ignore.
protocol <protocoltype>	Enter the protocol type: • ignore • icmp • tcp • udp Default is ignore.
src-port <port>	Enter TCP/UDP source port value. Default is ignore.
dst-port <port>	Enter TCP/UDP destination port value. Default is ignore.
delete	Deletes the IP filter with the specified filter ID.

Note: If you omit any parameter, the default value is used. You cannot delete an IP filter that is referenced by an IP filter set.

qos ip-filter-set command

The `qos ip-filter-set` command adds or deletes currently defined IP filters into an IP filter set. The syntax for the `qos ip-filter-set` command is:

```
qos ip-filter-set <fgid> {create set <setid> [name
<setname>] filter <fid> filter-prec <prec>|delete}
```

The `qos ip-filter-set` command is in the config command mode.

Table 117 describes the parameters and variables for the `qos ip-filter-set` command.

Table 117 qos ip-filter-set command parameters and variables

Parameters and variables	Description
<fgid>	Enter an integer to specify the filter group ID; range is 1 to 65535.
create set <setid>	Initiates creation of an IP filter set with the designated filter set ID. Enter the IP filter set ID; range is 1 to 65535
name <setname>	Assigns a name to the designated filter set ID. Enter the name for the filter set; maximum is 16 alphanumeric characters
filter <fid>	Adds an IP filter to the filter set; range is 1 to 65535.
filter-prec <prec>	Specifies the precedence, or filter evaluation order, within the set. Enter the precedence value you want for this filter; range is 1 to 65535.
delete	Deletes the IP filter set.

Note: You must define the filter before adding it to a filter set. You cannot delete an IP filter set that is referenced in an installed policy. You cannot delete the last IP filter in an IP filter set that is referenced in an installed policy.

qos l2-filter command

The `qos l2-filter` command adds and deletes layer 2 (L2) filters. The syntax for the `qos l2-filter` command is:

```
qos l2-filter <fid> {create [ethertype <etype>]
[vlan <vidlist>] [vlan-tag <vtag>] [priority <ieee1p-seq>]
[ds-field <dscp>] [protocol <protocoltype>] [src-port-min
<port> src-port-max <port>] [dst-port-min <port>
dst-port-max <port>]|delete}
```

The `qos l2-filter` command is in the config mode.

Note: Beginning with software version 2.0, you can reference up to 32 VLANs with a single layer 2 filter.

Table 118 describes the parameters and variables for the `qos l2-filter` command.

Table 118 qos l2-filter command parameters and variables

Parameters and variables	Description
<fid>	Enter an integer to specify the filter ID; range is 1 to 65535.
create	Defines a new L2 filter with the specified filter ID.
ethertype <etype>	Enter the Ethernet type in the form of 0xXXXX, for example, 0x0801. Default is ignore.

Table 118 qos l2-filter command parameters and variables (continued)

Parameters and variables	Description
vlan <vidlist>	Enter the number of the VLAN IDs, separated by commas. (Format: VLAN x-x, x, x) Default is ignore.
vlan-tag <vtag>	Enter the type of VLAN tagging filter you want: • tagged • untagged • ignore Default is ignore.
priority <ieee1p-seq>	Enter the 802.1p priority values; range from 0 to 7. Enter in the form of [a(,b)*(c-d)*], for example, 0, 3-4, 7. Default is ignore.
ds-field <dscp>	Enter a 6-bit value for the DS field; range is from 0 to 63. Default is ignore.
protocol <protocoltype>	Enter the protocol type: • ignore • icmp • tcp • udp Default is ignore.
src-port-min <port>	Enter the TCP/UDP minimum source port value; range is 0 to 65535. Default is 0 = ignore.
src-port-max <port>	Enter the TCP/UDP maximum source port value; range is 0 to 65535. Default is 65535 = ignore.
dst-port-min <port>	Enter the TCP/UDP minimum destination port value; range is 0 to 65535. Default is 0 = ignore.
dst-port-max <port>	Enter the TCP/UDP maximum destination port value; range is 0 to 65535. Default is 65535 = ignore.
delete <fid>	Enter the filter ID you want to delete.

Note: If you omit any parameter, the default value is used. You cannot delete a filter that is referenced by an L2 filter set.

qos l2-filter-set command

The `qos l2-filter-set` command adds and deletes Layer 2 filters into an L2 filter set. The syntax for the `qos l2-filter-set` command is:

```
qos l2-filter-set <fgid> {create set <setid> [name
<setname>] filter <fid> filter-prec <prec>|delete}
```

The `qos l2-filter-set` command is in the config command mode.

Table 119 describes the parameters and variables for the `qos l2-filter-set` command.

Table 119 qos l2-filter-set command parameters and variables

Parameters and variables	Description
<fgid>	Enter an integer to specify the filter group ID you want to work with; range is 1 to 65535.
create set <setid>	Initiates creation of an L2 filter set with the designated filter set ID. Enter the IP filter set ID; range is 1 to 65535.
name <setname>	Assigns a name to the designated filter set ID. Enter the name for the filter set; maximum is 16 alphanumeric characters.
filter <fid>	Adds an L2 filter to the filter set; range is 1 to 65535.
filter-prec <prec>	Specifies the precedence, or filter evaluation order, within the set. Enter the precedence value you want for this filter; range is 1 to 65535.
delete	Deletes the L2 filter set.

Note: You must define the filter before adding it to a filter set. You cannot delete an L2 filter set that is referenced in an installed policy. You cannot delete the last L2 filter in an L2 filter set that is referenced in an installed policy.

Configuring QoS actions

You can configure QoS actions, which directs the BPS 2000 to take specific action on each packet, using the CLI.

qos action command

The `qos action` command creates or deletes a QoS action. The syntax for the `qos action` command is:

```
qos action <actid> [name <actname>] [drop-action
{enable|disable}] [update-dscp <dscp>] [update-1p
{<ieee1p>|default|use-egress-map}] [set-drop-prec
{loss-sensitive|not-loss-sensitive|default|use-egress-map}]
```

The `qos action` command is in the config mode.

Table 120 describes the parameters and variables for the `qos action` command.

Table 120 qos action command parameters and variables

Parameters and variables	Description
<actid>	Enter an integer to specify the QoS action; range is 1 to 65535.
name <actname>	Assigns a name to a QoS action with the designated action ID. Enter the name for the action; maximum is 16 alphanumeric characters
drop-action {enableldisable}	Specifies whether packets should be dropped or not; the drop action equals enable. Default is disable.
update-dscp <dscp>	Specifies whether DSCP value should be updated or left unchanged; unchanged equals ignore. Enter the 6-bit DSCP value you want; range is 0 to 63. Default is ignore.

Table 120 qos action command parameters and variables (continued)

Parameters and variables	**Description**
update-1p	Specifies whether 802.1p priority value should be updated or left unchanged; unchanged equals ignore: • ieee1p—enter the value you want; range is 0 to 7 • default—allows the value to be derived based on assignment of other action parameters • use-egress-map—uses the egress map to assign value Default is default.
set-drop-prec {loss-sensitive|not-loss-sensitive|default|use-egress-map}	Enter the loss-sensitivity value you want: • loss-sensitive • not-loss-sensitive • default • use-egress-map Default is use default.

Note: Certain options may be restricted based on the policy associated with the specific action.
You cannot delete an action that is referenced in an installed policy.

Configuring QoS meters

Using the CLI, you set meters. If you want to meter, or police, the traffic, configure the committed rate, burst rate, and burst duration. If you are not metering data, skip this page.

qos meter command

The `qos meter` command creates or deletes a QoS meter. The syntax for the `qos meter` command is:

```
qos meter <metid> {create [name <metname>] committed-rate
<rate> max-burst-rate <burstrate> [max-burst-duration
<burstdur>]|delete}
```

The `qos meter` command is in the config command mode.

Table 121 describes the parameters and variables for the `qos meter` command.

Table 121 qos meter command parameters and variables

Parameters and variables	Description
<metid>	Enter an integer to specify the QoS meter; range is 1 to 65535.
name <metname>	Assigns a name to the QoS meter with the designated meter ID. Enter name for meter; maximum is 16 alphanumeric characters.
committed-rate <rate>	Specifies rate that traffic must not exceed for extended periods to be considered in-profile. Enter the rate in Kb/s for in-profile traffic; range is 1 to 65535 Kb/s.
max-burst-rate <burstrate>	Specifies the largest burst of traffic that can be received a given time for the traffic to be considered in-profile. Used in calculating the committed burst size. Enter the burst size in Kb/s for in-profile traffic; range is 1 to 65535 Kb/s
max-burst-duration <burstdur>	Specifies the amount of time that the largest burst of traffic that can be received for the traffic to be considered in-profile. Used in calculating the committed burst size. Enter the burst duration in ms for in-profile traffic; range is 1 to 65535 ms.
delete	Deletes the specified meter.

You cannot delete a meter that is referenced in an installed policy.

Configuring QoS shapers

Note: You must be using either the BPS2000-1GT, BPS2000-2GT, or BPS2000-2GE MDA in order to implement the QoS shaping features.

Using the CLI, you set shapers. If you want to shape traffic at the egress point, configure the committed rate, burst rate, burst duration, and queue depth for each shaper.

qos shaper command

The `qos shaper` command creates or deletes a QoS shaper. The syntax for the `qos shaper` command is:

```
qos shaper <shapeid> {create [name <shapername>] shape-rate
<rate> max-burst-rate <burstrate> [max-burst-duration
<burstdur>] queue-size <1|2|4|8|16>|delete}
```

The `qos shaper` command is in the config command mode.

Table 122 describes the parameters and variables for the `qos shaper` command.

Table 122 qos shaper command parameters and variables

Parameters and variables	**Description**
<shapeid>	Enter an integer to specify the QoS shaper; range is 1 to 65535.
name <shapername>	Assigns a name to the QoS shaper with the designated shaper ID. Enter name for shaper; maximum is 16 alphanumeric characters.
shape-rate <rate>	Specifies maximum rate that traffic will be transmitted over a given duration Enter the rate in Kbps; range is 1 to 42949672955 Kbps. Note**:** You must specify a value that is a multiple of 64 Kbps; O is invalid.
max-burst-rate <burstrate>	Specifies the largest burst of traffic that can be transmitted without a shaping delay. Used in calculating the committed burst size. Enter the burst size in bytes; range is 0 to 42949672955 bytes.
max-burst-duration <burstdur>	Specifies the amount of time that the largest burst of traffic can be transmitted without a shaping delay. Enter the burst duration in ms; range is 0 to 42949672955 ms.
queue-size <1|2|4|8|16>	Specifies the number of packets that can exceed the largest burst of traffic allowed and still be queued for transmission.
delete	Deletes the specified shaper.

➡ You cannot delete a shaper that is referenced in an installed policy.

Gathering QoS statistics

You can gather statistics on QoS, such as the number of in-profile octets and out-of-profile octets. These statistics can serve as an important method to evaluate the effectiveness of the installed policies. However, tracking these statistics requires additional system resources, which limits the number of filters for classification.

qosagent police-statistics command

The `qosagent police-statistics` command gathers traffic policing, or metering, statistics. The syntax for the `qosagent police-statistics` command is:

```
qosagent police-statistics {enable|disable}
```

The `qosagent police-statistics` command is in the config command mode.

Table 123 describes the parameters and variables for the `qosagent police-statistics` command.

Table 123 qosagent police-statistics command parameters and variables

Parameters and variables	**Description**
enable|disable	Set policing statistics to: • Enable—statistics are tracked by default for all policies defined after this command is issued • Disable—disables tracking statistics for policies defined after this command is issued

Configuring QoS policies

You configure QoS policies using the CLI.

qos policy command

The `qos policy` command creates or deletes a QoS policy. The syntax for the `qos policy` command is:

```
qos policy <polid> {create [name <polname>]
if-group <ifgroup> filter-set-type {ip|l2}
{filter-set <setid>|filter-set-name <setname>}
{{in-profile-action <actid>|in-profile-action-name
<actname>}|
{{meter <metid>|meter-name <metname>}
{in-profile-action <actid>|in-profile-action-name <actname>}
{out-profile-action <actid>|out-profile-action-name
<actname>}}}
[shaper <shapeid>|shaper-name <shapename>]
[shaper-group <shapegroup>]
[track-statistics {enable|disable}]order <order>|
delete|enable|disable}
```

The `qos policy` command is in the config command mode.

Table 124 describes the parameters and variables for the `qos policy` command.

Table 124 qos policy command parameters and variables

Parameters and variables	Description
<polid>	Enter an integer to specify the QoS policy; range is 1 to 65535.
create	Creates the QoS policy.
name <polname>	Assigns a name to the QoS policy with the designated policy ID. Enter the name for the policy; maximum is 16 alphanumeric characters.
if-group <ifgroup>	Enter the interface group name to which this policy applies.
filter-set-type {ip|l2}	Enter the type of filter set associated with this policy: • ip—specifies IP filter set • l2—specifies Layer 2 filter set

Table 124 qos policy command parameters and variables (continued)

Parameters and variables	Description
filter-set <setid>	Enter the filter set ID associated with this policy; range is 1 to 65535.
filter-set-name <setname>	Enter the name of the filter set associated with this policy.
in-profile-action <actid>	Enter the action ID for in-profile traffic; range is 1 to 65535.
in-profile-action-name <actname>	Enter the action name for in-profile traffic; maximum is 16 alphanumeric characters.
meter <metid>	Enter meter ID associated with this policy; range is 1 to 65535.
meter-name <metname>	Enter the meter name associated with this policy; maximum of 16 alphanumeric characters.
in-profile-action <actid>	Enter the action ID for in-profile traffic; range is 1 to 65535.
in-profile-action-name <actname>	Enter the action name for in-profile traffic; maximum is 16 alphanumeric characters.
out-profile-action <actid>	Enter the action ID for out-of-profile traffic; range is 1 to 65535.
out-profile-action-name <actname>	Enter the action name for in-profile traffic; maximum is 16 alphanumeric characters.
shaper <shapeid>	Enter shaper ID associated with this policy; range is 1 to 65535.
shaper-name <shapername>	Enter the shaper name associated with this policy; maximum of 16 alphanumeric characters.
shaper-group <shapegroup>	Enter shaper group ID associated with this policy; range is 2 to 63.
track-statistics {enable|disable}	Enables maintaining policing statistics on the specified flow. Default is based on value of setting of `qosagent police-statistics` command.
order <order>	Specifies the evaluation order of this policy in relation to other policies associated with the same interface group. Enter order number; range is 1 to 65535. Note: Policies with a lower order value are evaluated before policies with a higher order number. Evaluation goes from lowest value to highest.
delete	Deletes the specified QoS policy.
enable|disable	Enables or disables the specified QoS policy.

➡ You must define all components associated with a policy, including the interface group, filter set, meter, and shaper before referencing those components with a policy.

Reordering packets

Support for certain per-hop behaviors (PHBs) requires packets within a flow be reordered upon transmission. Using the CLI, you can assign packets to specified egress queues.

qosagent packet-reordering command

The `qosagent packet-reordering` command allows you to reorder packets for transmission. The syntax for the `qosagent packet-reordering` command is:

```
qosagent packet-reordering {enable|disable}
```

The `qosagent packet-reordering` command is in the config command mode.

Table 125 describes the parameters and variables for the `qosagent packet-reordering` command.

Table 125 qosagent packet-reordering command parameters and variables

Parameters and variables	**Description**
enable|disable	Set packet-reordering to: • Enable—allows full flexibility in terms of the egress queue to which a packet is assigned. • Disable—the system verifies that in-profile and out-of-profile actions associated with a flow will not cause packets from the same flow to be assigned to different egress queues.

Appendix A
Command List

This appendix provides the complete CLI command list in alphabetical order, with approximate page references for the beginning pages of further explanations.

Note: This information is presented for reference only and should not be considered to be an exact representation.

Table 126 CLI command list

Command	**Page No.**
auto-pvid	page 164
autotopology	page 108
boot [default] [unit <unitno>]	page 76
clear logging [nv]	page 97
clear-stats [port<portlist>]	page 100
cli-password {switch|stack} {ro|rw} <WORD> <WORD> cli-password {switch|stack} {serial|telnet} {none|local|radius}	page 38
configure {terminal|network|memory}	page 44
configure network [load-on-boot {disable|use-bootp|use-config}] configure network [filename <WORD>] configure network [address <XXX.XXX.XXX.XXX>]	page 61
cops retry	page 191
cops server	page 191
copy config tftp [address <XXX.XXX.XXX.XXX>] filename <WORD>	page 80
copy tftp config [address <XXX.XXX.XXX.XXX>] filename <WORD>	page 81
default autotopology	page 108
default cops retry	page 192
default cops server	page 192

Table 126 CLI command list (continued)

Command	Page No.
default duplex [port <portlist>]	page 106
default flowcontrol [port <portlist>]	page 110
default ip address unit <1-8>	page 70
default ip bootp server	page 78
default mac-address-table aging-time	page 53
default name [port <port.ist>]	page 103
default rate-limit [port <portlist>]	page 114
default set logging	page 97
default snmp trap link-status [port <portlist>]	page 94
default spanning-tree [stp <1-8>] [forward-time] [hello-time] [max-age] [priority] [tagged-bpdu]	page 143
default spanning-tree [port <portlist>] [stp <1-8>] [learning] [cost] [priority]	page 146
default speed [port <portlist>]	page 105
default telnet-access	page 74
default terminal {speed|length|width}	page 58
default vlan igmp <1-4094>	page 172
default vlan mgmt <1-4094>	page 160
disable	page 45
download [address <ip>] {image <image-name> [bs450-image <image-name>]|diag <filename>}	page 82
duplex [port <portlist>] {full|half|auto}	page 105
eapol [{enable|disable}] [port <portlist>] [init] [status authorized|unauthorized|auto] [traffic-control in-out|in] [re-authentication enable|disable] [re-authentication-interval <num>] [re-authenticate] [quiet-interval <num>] [transmit-interval <num>] [supplicant-timeout <num>] [server-timeout <num>] [max-request <num>]	page 129
enable	page 43
end	page 45
exit	page 45
flowcontrol [port <portlist>] {asymmetric|symmetrid|auto|disable}	page 109
help	page 42
interface FastEthernet {<portlist>}	page 44
ip address[stack|switch] <XXX.XXX.XXX.XXX> [netmask <XXX.XXX.XXX.XXX>]	page 64
ip address unit <1-8> A.B.C.D	page 68

Table 126 CLI command list (continued)

Command	Page No.
ip bootp server {last|needed|disable|always}	page 77
ip default-gateway <XXX.XXX.XXX.XXX>	page 65
ipmgr list {telnet|snmp|http}	page 118
ipmgr list {source-ip <1-10> <XXX.XXX.XXX.XXX> [mask <XXX.XXX.XXX.XXX>]}	page 119
logout	page 43
mac-address-table aging-time <time>	page 52
mac-security [disable|enable] [filtering {enable|disable}] [intrusion-detect{enable|disable|forever}] [intrusion-timer <1-65535>] [learning-ports <portlist>] [learning {enable|disable}] [snmp-lock {enable|disable}] [snmp-trap {enable|disable}]	page 122
mac-security [port <portlist>] {disable|enable|learning}	page 126
mac-security mac-address-table address <H.H.H.> {port <portlist>|security-list <1-32>}	page 123
mac-security security-list <1-32> mac-security security-list <portlist>	page 124
mac-security mac-da-filter	page 127
mlt <id> [name <trunkname>] [enable|disable] [member <portlist>]	page 149
name [port <portlist>] <LINE>	page 102
no auto-pvid	page 164
no autotopology	page 108
no cops server	page 193
no flowcontrol [port <portlist>]	page 110
no ip address {stack|switch}	page 65
no ip address unit <1-8>	page 69
no ip bootp server	page 78
no ip default-gateway	page 66
no ipmgr {telnet|snmp|http}	page 118
no ipmgr {source IP [<1-10>]}	page 119
no mac-security	page 125
no mac-security mac-address-table {address <H.H.H>|port <portlist>|security-list <1-32>]	page 125
no mac-security security-list <1-32>	page 126
no mlt [<id>]	page 150
no name [port <portlist>]	page 102

Table 126 CLI command list (continued)

Command	Page No.
no port-mirroring	page 153
no radius-server	page 133
no rate-limit [port <portlist>]	page 113
no set logging	page 97
no shutdown [port <portlist>]	page 101
no snmp server [authentication-trap|community [ro|rw] contact|host [<host-ip> <community-string>] [location|name]	page 92
no snmp trap link-status [port <portlist>]	page 93
no spanning-tree [port <portlist>] [stp <1-8>]	page 147
no telnet-access [source-ip [<1-10>]]	page 73
no tftp-server	page 80
no vlan <1-4094> no vlan mac-address <1-4094> address <H.H.H.>	page 163 page 168
no web-server	page 75
ping <XXX.XXX.XXX.XXX>	page 60
port-mirroring mode disable port-mirroring mode Xrx monitor-port <portlist> mirror-port X <portlist> port-mirroring mode XrxOrXtx monitor-port <portlist> mirror-port X <portlist> mirror-port-Y <portlist> port-mirroring mode XrxOrYtx monitor-port <portlist> mirror-port X <portlist> mirror-port-Y <portlist> port-mirroring mode XrxYtx monitor-port <portlist> mirror-port X <portlist> mirror-port-Y <portlist> port-mirroring mode XrxYtxOrYrxXtx monitor-port <portlist> mirror-port X <portlist> mirror-port-Y <portlist> port-mirroring mode Asrc monitor-port <portlist> mirror-MAC-A <macaddr> port-mirroring mode Adst monitor-port <portlist> mirror-MAC-A <macaddr> port-mirroring mode AsrcOrAdst monitor-port <portlist> mirror-MAC-A <macaddr> port-mirroring mode AsrcBdst monitor-port <portlist> mirror-MAC-A <macaddr> mirror-MAC-B <macaddr> port-mirroring mode AsrcBdstOrBsrcAdst monitor-port <portlist> mirror-MAC-A <macaddr> mirror-MAC-B <macaddr>	page 151

qos action <actid> name <actname>
qos action <actid> drop-action {enable|disable}
qos action <actid> update-dscsp <dscp>
qos action <actid> update-1p {<ieee1p>|default|use-egress-map}
qos action <actid> set-drop-prec {loss-sensitive|not-loss-sensitive|default|use-egress-map}
	page 204

Table 126 CLI command list (continued)

Command	Page No.
qos egress map ds <dscp> 1p <ieee1p> dp <dropprec>	page 196
qos if-assign name <tag> {add|del} [port <portlist>]	page 194
qos if-assign-list name <tag> {add|del} [portlist <portlist>]	page 195
qos if-group name <tag> {create <ifclass>|delete}	page 194
qos ingress map 1p <ieee1p> ds <dscp>	page 197

qos ip-filter <fid> {create src-ip <src-ip-info>}
qos ip-filter <fid> {create dst-ip <dst-ip-info>}
qos ip-filter <fid> {create ds-field <dscp>}
qos ip-filter <fid> {create protocol <protocoltype>}
qos ip-filter <fid> {create src-port <port>}
qos ip-filter <fid> {create dst-port <port>}
qos ip-filter <fid> {delete}
	page 199

qos ip-filter-set <fgid> {create set <setid> [name <setname>] filter-id <fid> filter-prec <prec>}
qos ip-filter-set <fgid> {delete}
	page 200

qos l2-filter <fid> {create ethertype <etype>}
qos l2-filter <fid> {create vlan <vidlist>}
qos l2-filter <fid> {create vlantag <vtag>}
qos l2-filter <fid> {create priority<ieee1p-seq>}
qos l2-filter <fid> {create dsfield <dscp>}
qos l2-filter <fid> {create protocol <protocoltype>}
qos l2-filter <fid> {create src-port <min> src-port <max>}
qos l2-filter <fid> {create dst-port <min> dst-port <max>}
qos l2-filter <fid> {delete}
	page 201

qos l2-filter-set <fgid> {create set <setid> [name <setname>] filter-id <fid> filter-prec <prec>}
qos l2-filter-set <fgid> {delete}
	page 203

qos meter <metid> {create [name <metname>] committed-rate <rate> max-burst-rate <burstrate> [max-burst-duration <burstdur>] |delete}	page 205

qos policy <polid> {create [name <polname>] if-group <ifgroup> filter-set-type {ip|l2} {filter-set <setid>|filter-set-name <setname>} {{in-profile-action <actid>|in-profile-action-name <actname>}| {{meter <metid>|meter-name <metname>} {in-profile-action <actid>|in-profile-action-name <actname>} {out-profile-action <actid>|out-profile-action-name <actname>}} [shaper <shhapeid>|shaper-name <shapename>] [shaper-group <shapegroup>] [track-statistics {enable|disable} order <order>}
qos policy <polid> {delete}
	page 209

qos queue-set-assignment queue-set <setid> 1p <ieee1p> queue <qid>	page 198
qos shaper <shapeid> {create [name <shapername>] shape-rate <rate> max-burst-rate <burstrate> [max-burst-duration <burstdur>] queue-size <1|2|4|8|16>|delete}	page 207

Table 126 CLI command list (continued)

Command	Page No.
qosagent packet-reordering {enable|disable}	page 211
qosagent police-statistics {enable|disable}	page 208
qosagent reset-default	page 185
qosagent server-control {enable|disable| [retry-timer <no-retry|1-86400>]	page 186
radius-server host <address> [secondary-host <address>] port <num> key <string>	page 132
rate-limit [port <portlist>] {multicast <pct>|broadcast <pct>|both <pct>}	page 112
renumber unit	page 49
set logging [enable|disable] [level critical|serious|informational] [nv-level critical|serious|informational|none]	page 96
show config-network	page 63
show cops retry	page 187
show cops server	page 187
show cops stats	page 188
show cpu-utilization	page 47
show eapol	page 128
show interfaces [names] [<portlist>]	page 88
show ip [bootp] [default-gateway] [address [stack|switch]]	page 67
show ipmgr	page 116
show logging [critical] show logging [serious] show logging [informational]	page 95
show mac-address-table [aging-time] show mac-address-table [vid <1-4094>] [address <H.H.H.>]	page 50
show mac-security {config|mac-address-table [addr <macaddr>]|port|security-lists}	page 120
show mac-security mac-da-filter	page 121
show memory-utilization	page 48
show mlt [utilization <1-6>]	page 148
show port-mirroring	page 151
show port-statistics [port <portlist>]	page 98

Table 126 CLI command list (continued)

Command	Page No.
show qos if-assign-list show qos interface-assignments show qos interface-groups show qos egressmap show qos ingressmap show qos ip-filters show qos ip-filter-sets show qos l2-filters show qos l2-filter-sets show qos actions show qos meters show qos shapers show qos policies show qos queue-sets show qos queue-set-assignments show qos agent show qos statistics	page 174
show radius-server	page 131
show rate-limit	page 111
show spanning-tree {stp <1-8>] {config|port}	page 136
show-stack-info	page 49
show stack-oper-mode	page 54
show sys-info	page 46
show telnet-access	page 71
show terminal	page 58
show tftp-server	page 79
show vlan igmp <1-4094>	page 170
show vlan interface info [<portlist>]	page 157
show vlan interface vids [<portlist>]	page 158
show vlan mac-address <1-4094> [<H.H.H>]	page 166
show vlan multicast membership <1-4094>	page 166
shutdown [port <portlist>]	page 100
snmp trap link-status [port <portlist>]	page 93
snmp-server {{enable|disable}|authentication-trap|community <community-string> [ro|rw] contact <text>|host <host-ip> <community-string>|location >text>|name <text>}	page 91
spanning-tree [stp <1-8>] add-vlan <1-4094>	page 143

Table 126 CLI command list (continued)

Command	Page No.
spanning-tree [stp <1-8>] [forward-time <4-30>] [hello-time <1-10>] [max-age <6-40>] [priority <0-65535>] [tagged-bpdu {enable|disable}] [tagged-bpdu-vid <1-4094>]	page 142
spanning-tree [port <portlist>] [stp <1-8>] [learning {disable|normal|fast}] [cost <1-65535>] [priority <0-255>]	page 145
spanning-tree [stp <1-8>] remove-vlan <1-4094>	page 144
spanning-tree stp <2-8> create	page 139
spanning-tree stp <2-8> delete	page 140
spanning-tree stp <2-8> disable	page 141
spanning-tree stp <2-8> enable	page 140
speed [port <portlist>] {10|100|1000|auto}	page 104
stack bootp-mac-addr-type {base-unit|stack}	page 77
stack oper-mode {bps2000|hybrid}	page 54
telnet-access [enable|disable] [login-timeout <1-10>] [retry <1-100>] [inactive-timeout <0-60>] [logging {none|access|failures|all}] [source-ip <1-10> <XXX.XXX.XXX.XXX> [mask <XXX.XXX.XXX.XXX>]]	page 72
terminal {2400|4800|9600|19200|38400}|length <1-132>|width <1-132>	page 59
tftp-server <XXX.XXX.XXX.XXX>	page 80
vlan create <1-4094> type macsa vlan create <1-4094> type port vlan create <1-4094> type protocol-ApltkEther2Snap vlan create <1-4094> type protocol-decEther2 vlan create <1-4094> type protocol-decOtherEther2 vlan create <1-4094> type protocol-ipEther2 vlan create <1-4094> type protocol-ipv6Ether2 vlan create <1-4094> type protocol-ipx802.2 vlan create <1-4094> type protocol-ipx802.3 vlan create <1-4094> type protocol-ipxEther2 vlan create <1-4094> type protocol-ipxSnap vlan create <1-4094> type protocol-Netbios vlan create <1-4094> type protocol-RarpEther2 vlan create <1-4094> type protocol-sna802.2 vlan create <1-4094> type protocol-snaEther2 vlan create <1-4094> type protocol-Userdef <4096-65534> vlan create <1-4094> type protocol-vinesEther2 vlan create <1-4094> type protocol-xnsEther2	page 160

Table 126 CLI command list (continued)

Command	Page No.
vlan create <1-4094> name <line> type macsa vlan create <1-4094> name <line> type port vlan create <1-4094> name <line> type protocol-ApltkEther2Snap vlan create <1-4094> name <line> type protocol-decEther2 vlan create <1-4094> name <line> type protocol-decOtherEther2 vlan create <1-4094> name <line> type protocol-ipEther2 vlan create <1-4094> name <line> type protocol-ipv6Ether2 vlan create <1-4094> name <line> type protocol-ipx802.2 vlan create <1-4094> name <line> type protocol-ipx802.3 vlan create <1-4094> name <line> type protocol-ipxEther2 vlan create <1-4094> name <line> type protocol-ipxSnap vlan create <1-4094> name <line> type protocol-Netbios vlan create <1-4094> name <line> type protocol-RarpEther2 vlan create <1-4094> name <line> type protocol-sna802.2 vlan create <1-4094> name <line> type protocol-snaEther2 vlan create <1-4094> name <line> type protocol-Userdef <4096-65534> vlan create <1-4094> name <line> type protocol-vinesEther2 vlan create <1-4094> name <line> type protocol-xnsEther2	page 160
vlan create <1-4094> type macsa learning IVL vlan create <1-4094> type port learning IVL vlan create <1-4094> type protocol-ApltkEther2Snap learning IVL vlan create <1-4094> type protocol-decEther2 learning IVL vlan create <1-4094> type protocol-decOtherEther2 learning IVL vlan create <1-4094> type protocol-ipEther2 learning IVL vlan create <1-4094> type protocol-ipv6Ether2 learning IVL vlan create <1-4094> type protocol-ipx802.2 learning IVL vlan create <1-4094> type protocol-ipx802.3 learning IVL vlan create <1-4094> type protocol-ipxEther2 learning IVL vlan create <1-4094> type protocol-ipxSnap learning IVL vlan create <1-4094> type protocol-Netbios learning IVL vlan create <1-4094> type protocol-RarpEther2 learning IVL vlan create <1-4094> type protocol-sna802.2 learning IVL vlan create <1-4094> type protocol-snaEther2 learning IVL vlan create <1-4094> type protocol-Userdef <4096-65534> learning IVL vlan create <1-4094> type protocol-vinesEther2 learning IVL vlan create <1-4094> type protocol-xnsEther2 learning IVL	page 160

Table 126 CLI command list (continued)

Command	Page No.
vlan create <1-4094> type macsa learning SVL vlan create <1-4094> type port learning SVL vlan create <1-4094> type protocol-ApltkEther2Snap learning SVL vlan create <1-4094> type protocol-decEther2 learning SVL vlan create <1-4094> type protocol-decOtherEther2 learning SVL vlan create <1-4094> type protocol-ipEther2 learning SVL vlan create <1-4094> type protocol-ipv6Ether2 learning SVL vlan create <1-4094> type protocol-ipx802.2 learning SVL vlan create <1-4094> type protocol-ipx802.3 learning SVL vlan create <1-4094> type protocol-ipxEther2 learning SVL vlan create <1-4094> type protocol-ipxSnap learning SVL vlan create <1-4094> type protocol-Netbios learning SVL vlan create <1-4094> type protocol-RarpEther2 learning SVL vlan create <1-4094> type protocol-sna802.2 learning SVL vlan create <1-4094> type protocol-snaEther2 learning SVL vlan create <1-4094> type protocol-Userdef <4096-65534> learning SVL vlan create <1-4094> type protocol-vinesEther2 learning SVL vlan create <1-4094> type protocol-xnsEther2 learning SVL	page 160
vlan create <1-4094> name <line> type macsa learning IVL vlan create <1-4094> name <line> type port learning IVL vlan create <1-4094> name <line> type protocol-ApltkEther2Snap learning IVL vlan create <1-4094> name <line> type protocol-decEther2 learning IVL vlan create <1-4094> name <line> type protocol-decOtherEther2 learning IVL vlan create <1-4094> name <line> type protocol-ipEther2 learning IVL vlan create <1-4094> name <line> type protocol-ipv6Ether2 learning IVL vlan create <1-4094> name <line> type protocol-ipx802.2 learning IVL vlan create <1-4094> name <line> type protocol-ipx802.3 learning IVL vlan create <1-4094> name <line> type protocol-ipxEther2 learning IVL vlan create <1-4094> name <line> type protocol-ipxSnap learning IVL vlan create <1-4094> name <line> type protocol-Netbios learning IVL vlan create <1-4094> name <line> type protocol-RarpEther2 learning IVL vlan create <1-4094> name <line> type protocol-sna802.2 learning IVL vlan create <1-4094> name <line> type protocol-snaEther2 learning IVL vlan create <1-4094> name <line> type protocol-Userdef <4096-65534> learning IVL vlan create <1-4094> name <line> type protocol-vinesEther2 learning IVL vlan create <1-4094> name <line> type protocol-xnsEther2 learning IVL	page 160

Table 126 CLI command list (continued)

Command	Page No.
vlan create <1-4094> name <line> type macsa learning SVL vlan create <1-4094> name <line> type port learning SVL vlan create <1-4094> name <line> type protocol-ApltkEther2Snap learning SVL vlan create <1-4094> name <line> type protocol-decEther2 learning SVL vlan create <1-4094> name <line> type protocol-decOtherEther2 learning SVL vlan create <1-4094> name <line> type protocol-ipEther2 learning SVL vlan create <1-4094> name <line> type protocol-ipv6Ether2 learning SVL vlan create <1-4094> name <line> type protocol-ipx802.2 learning SVL vlan create <1-4094> name <line> type protocol-ipx802.3 learning SVL vlan create <1-4094> name <line> type protocol-ipxEther2 learning SVL vlan create <1-4094> name <line> type protocol-ipxSnap learning SVL vlan create <1-4094> name <line> type protocol-Netbios learning SVL vlan create <1-4094> name <line> type protocol-RarpEther2 learning SVL vlan create <1-4094> name <line> type protocol-sna802.2 learning SVL vlan create <1-4094> name <line> type protocol-snaEther2 learning SVL vlan create <1-4094> name <line> type protocol-Userdef <4096-65534> learning SVL vlan create <1-4094> name <line> type protocol-vinesEther2 learning SVL vlan create <1-4094> name <line> type protocol-xnsEther2 learning SVL	page 160
vlan delete <1-4094>	page 162
vlan igmp <1-4094> [snooping {enable|disable}] [proxy {enable|disable}] [robust-value <value>] [query-interval <time>] [v1-members <portlist>] [v2-members <portlist>]	page 171
vlan mac-address <1-4094> address <H.H.H>	page 167
vlan members <1-4094> <portlist> vlan members add <1-4094> <portlist> vlan members remove <1-4094> <portlist>	page 166
vlan mgmt <1-4094>	page 159
vlan name <1-4094> <line>	page 163
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