D-Link
Building Networks for People

DES-3226L

Release 2

Layer 2 Switch

24 Port 10/100 Managed Switch

Plus 2 Combo Gigabit Copper/SFP Ports

CLI Command Reference

Business Class Networking

Table of Contents

List of Figures

List of Tables

About This Book

This document describes the command-line interface (CLI) commands that you use to view and configure settings for the D-Link DES-3226L switch.

Audience

This document is intended for system administrators who configure and operate systems using D-Link DES-3226L software. It provides an understanding of the configuration options of the D-Link DES-3226L software. This document assumes that the reader has a basic knowledge of Ethernet and networking concepts.

Document Organization

This document is organized into the following sections:

- "D-Link DES-3226L Overview" on page 17 introduces the D-Link DES-3226L software at a very high level.
- "Command Structure" on page 19 describes the command format and syntax.
- "Command-Line Interface Modes" on page 25 explains the CLI command modes.
- "Setup and Management Commands" on page 29 describes the commands you use to configure management access and basic port settings.
- "Switching Commands" on page 51 describes the commands you use to configure and view switch properties, such as VLANs and protected ports.
- "Access and Security Commands" on page 83 describes how to configure the device for secure access.
- "System Maintenance Commands" on page 105 describes the commands you use to view system information, view and configure system logs, troubleshoot connectivity, and restore various settings to their factory defaults.

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D-Link DES-3226L Overview

The D-Link DES-3226L software has two purposes:

- Assist attached hardware in switching frames.
- Provide a complete device management portfolio to the network administrator.

Scope

The D-Link DES-3226L encompasses both hardware and software support. The software is partitioned to run in the following processors:

- CPU

  This code runs the networking device management portfolio and controls the overall networking device hardware. It also assists in frame forwarding, as needed and specified.

- Networking device processor

  This code does the majority of the packet switching, usually at wire speed.

Product Concept

Fast Ethernet and Gigabit Ethernet switching continues to evolve from high-end backbone applications to desktop switching applications. The price of the technology continues to decline, while performance and feature sets continue to improve. The D-Link DES-3226L provides a flexible solution to these ever-increasing needs.

The D-Link DES-3226L provides the network administrator with a set of comprehensive management functions for managing both the switch and the network. The network administrator has a choice of three management methods:

- Web-based
- VT100 interface
- Simple Network Management Protocol (SNMP)

Each of the D-Link DES-3226L management methods enables the network administrator to configure, manage, and control the D-Link DES-3226L locally or remotely by using in-band or out-of-band mechanisms. Management is standards-based, with configuration parameters and a private MIB providing control for functions not completely specified in the MIBs.

Command Structure

The command-line interface (CLI) is a text-based way to manage and monitor the system. You can access the CLI by using a direct serial connection or by using a remote logical connection with telnet or SSH.

This chapter describes the CLI syntax, conventions, and help. It contains the following sections:

Command Syntax

A command is one or more words that might be followed by one or more parameters. Parameters can be required or optional values.

Some commands, such as **`show network`** or **`clear vlan,`** do not require parameters. Other commands, such as **`network parms`**, require that you supply a value after the command. You must type the parameter values in a specific order, and optional parameters follow required parameters. The following example describes the **`network parms`** command syntax:

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

- **`network parms`** is the command name.
- *`<ipaddr>`* and *`<netmask>`* are parameters and represent required values that you must enter after you type the command keywords.
- *`[<gateway>]`* is an optional parameter, so you are not required to enter a value in place of the parameter.

The *CLI Command Reference* lists each command by the command name and provides a brief description of the command. Each command reference also contains the following information:

- Format shows the command keywords and the required and optional parameters.
- Mode identifies the command mode you must be in to access the command.
- Default shows the default value, if any, of a configurable setting on the device.

The **`show`** commands also contain a description of the information that the command shows.

Command Conventions

In this document, the command name is in **`bold`** font. Parameters are in *`italic font`*. You must replace the parameter name with an appropriate value, which might be a name or number. Parameters are order dependent.

The parameters for a command might include mandatory values, optional values, or keyword choices. Table 1 describes the conventions this document uses to distinguish between value types.

Table 1. Parameter Conventions

Symbol	Example	Description
<> angle brackets	*<value>*	Indicates that you must enter a value in place of the brackets and text inside them.
[] square brackets	*[<value>]*	Indicates an optional parameter that you can enter in place of the brackets and text inside them.
{} curly braces	*{choice1 | choice2}*	Indicates that you must select a parameter from the list of choices.
| Vertical bars	*choice1 | choice2*	Separates the mutually exclusive choices.
[{}] Braces within square brackets	*[{choice1 | choice2}]*	Indicate a choice within an optional element.

Parameter Values

To use spaces as part of a name parameter, enclose the name value in double quotes. For example, the expression “System Name with Spaces” forces the system to accept the spaces. Empty strings (““) are not valid user defined strings.

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

The following table describes common parameter values and value formatting.

Table 2. Parameter Descriptions

Parameter	Description
ipaddr	This parameter is a valid IP address. You can enter the IP address in the following formats: **a** (32 bits) **a.b** (8.24 bits) **a.b.c** (8.8.16 bits) **a.b.c.d** (8.8.8.8) In addition to these formats, decimal, hexidecimal and octal formats are supported through the following input formats (where n is any valid hexidecimal, octal or decimal number): **0xn** (CLI assumes hexidecimal format) **0n** (CLI assumes octal format with leading zeros) **n** (CLI assumes decimal format)
macaddr	The MAC address format is six hexadecimal numbers separated by colons, for example 00:06:29:32:81:40.
interface	Valid slot and port number separated by forward slashes. For example, 0/1 represents slot number 0 and port number 1.

Table 2. Parameter Descriptions

Parameter	Description
Logical Interface	Logical slot and port number. This is applicable in the case of a port-channel (LAG). The operator can use the logical slot/port to configure the port-channel.
Character strings	Use double quotation marks to identify character strings, for example, “System Name with Spaces”. An empty string (“”) is not valid.

Slot-Port Naming Convention

D-Link DES-3226L software references physical entities such as cards and ports by using a Slot-Port (SP) naming convention. The D-Link DES-3226L software also uses this convention to identify certain logical entities such as Link Aggregation (LAG) or Port-Channel interfaces.

The slot number has two uses. In the case of physical ports, it identifies the card containing the ports. In the case of logical and CPU ports it also identifies the type of interface or port.

Table 3. Type of Slots

Slot Type	Description
Physical slot numbers	Physical slot numbers begin with zero, and are allocated up to the maximum number of physical slots
Logical slot numbers	Logical slots immediately follow physical slots and identify port-channel (LAG) interfaces.
CPU slot numbers	The CPU slots immediately follow the logical slots.

The port identifies the specific physical port or logical interface being managed on a given slot.

Table 4. Type of Ports

Port Type	Description
Physical Ports	The physical ports for each slot are numbered sequentially starting from zero.
Logical Interfaces	There is one type of logical interface: port-channel (LAG). Port-channel (LAG) interfaces are only used for bridging functions. Each port-channel interface consists of a set of up to eight physical ports identified by their own slot/port.
CPU ports	CPU ports are handled by the driver as one or more physical entities located on physical slots.

CLI Line-Editing Conventions

Table 5 describes the key combinations you can use to edit commands or increase the speed of command entry. You can access this list from the CLI by entering **help** from the User or Privileged EXEC modes.

Table 5. CLI Editing Conventions

Key Sequence	Description
DEL or Backspace	Delete previous character
Ctrl-A	Go to beginning of line
Ctrl-E	Go to end of line
Ctrl-F	Go forward one character
Ctrl-B	Go backward one character
Ctrl-D	Delete current character
Ctrl-U, X	Delete to beginning of line
Ctrl-K	Delete to end of line
Ctrl-W	Delete previous word
Ctrl-T	Transpose previous character
Ctrl-P	Go to previous line in history buffer
Ctrl-R	Rewrites or pastes the line
Ctrl-N	Go to next line in history buffer
Ctrl-Y	Prints last deleted character
Ctrl-Q	Enables serial flow
Ctrl-S	Disables serial flow
Ctrl-Z	Return to root command prompt
Tab, <SPACE>	Command-line completion
Exit	Go to next lower command prompt
?	List available commands, keywords, or parameters

Using the “No” Form of a Command

The **no** keyword is a specific form of an existing command and does not represent a new or distinct command. Almost every configuration command has a **no** form. In general, use the **no** form to reverse the action of a command or reset a value back to the default. For example, the **no shutdown** configuration command reverses the shutdown of an interface. Use the command without the keyword **no** to re-enable a disabled feature or to enable a feature that is disabled by default.

Only the configuration commands are available in the **no** form.

Using CLI Help

Enter a question mark (?) at the command prompt to display the commands available in the current mode.

```
(switch) >?

enable                    Enter into user privilege mode.
help                      Display help for various special keys.
logout                    Exit this session. Any unsaved changes are lost.
ping                      Send ICMP echo packets to a specified IP address.
show                      Display switch options and settings.
```

Enter a question mark (?) after each word you enter to display available command keywords or parameters.

```
(switch) #network ?

javamode                  Enable/Disable.
parms                     Configure Network Parameters of the router.
protocol                  Select DHCP, BootP, or None as the network config
                          protocol.
mgmt_vlan                 Configure the Management VLAN ID of the switch.
```

If the help output shows a parameter in angle brackets, you must replace the parameter with a value.

```
(switch) #network parms ?

<ipaddr>                  Enter the IP Address.
```

If there are no additional command keywords or parameters, or if additional parameters are optional, the following message appears in the output:

```
<cr>                      Press Enter to execute the command
```

You can also enter a question mark (?) after typing one or more characters of a word to list the available command or parameters that begin with the letters, as shown in the following example:

```
(switch)# show m?

mac-addr-table            mac-address-table        monitor
```

Accessing the CLI

You can access the CLI by using a direct console connection or by using a telnet or SSH connection from a remote management host.

For the initial connection, you must use a direct connection to the console port. You cannot access the system remotely until the system has an IP address, subnet mask, and default gateway. You can set the network configuration information manually, or you can configure the system to accept these settings from a BOOTP or DHCP server on your network. For more information, see “System Management Commands” on page 29.

Command-Line Interface Modes

The CLI groups all the commands into modes according to the nature of the commands. This section describes the CLI command modes for the D-Link DES-3226L switch. Each of the command modes supports specific D-Link DES-3226L software commands.

Table 6 lists the command modes and the prompts visible in that mode. It also explains how to enter or exit each mode.

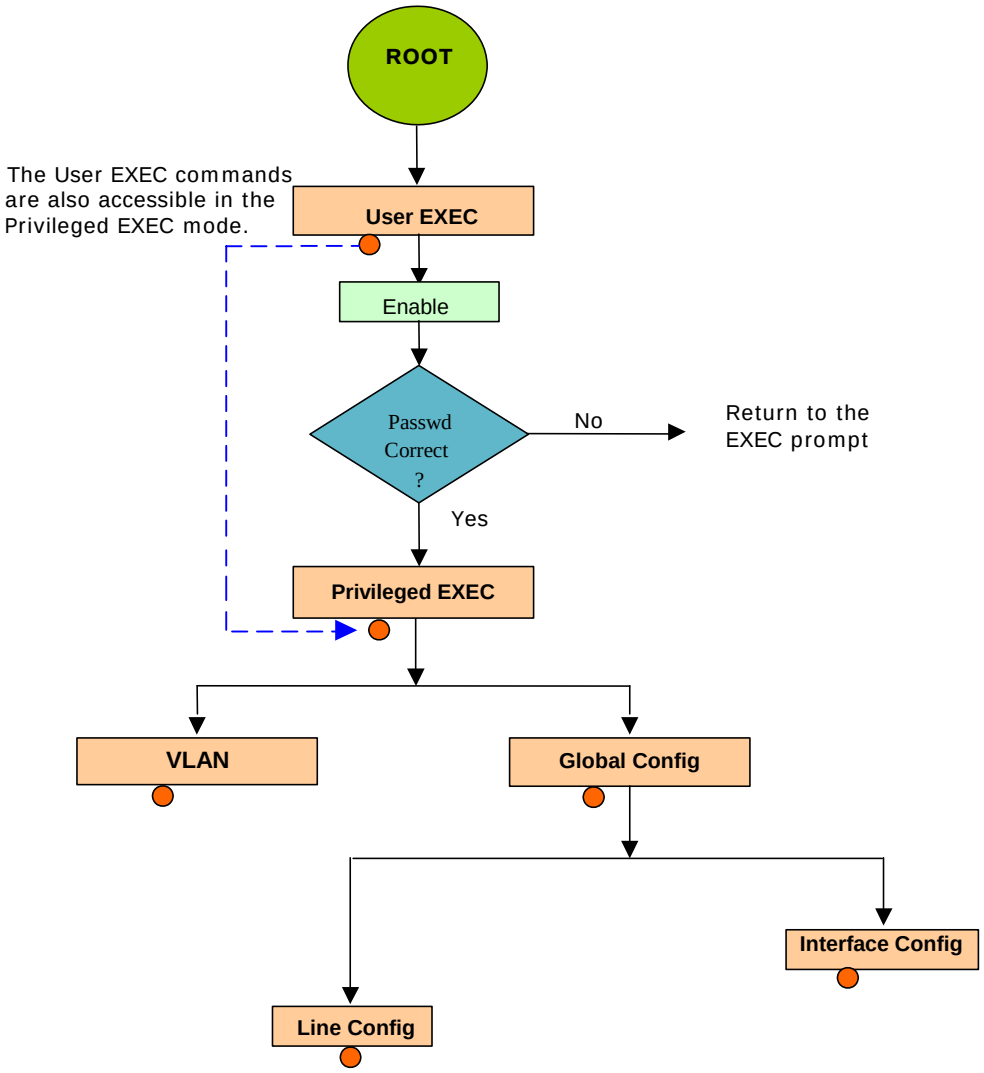
Table 6. CLI Command Modes

Command Mode	Access Method	Prompt	Exit or Access Previous Mode
User EXEC Mode	This is the first level of access. Perform basic tasks and list system information.	Switch>	Enter Logout command
Privileged EXEC Mode	From the User EXEC mode, enter **enable**	Switch#	To exit to the User EXEC mode, enter **exit** or press ***Ctrl-Z***.
VLAN Mode	From the Privileged EXEC mode, enter **vlan database**	Switch (Vlan)#	To exit to the Privileged EXEC mode, enter the **exit** command, or press ***Ctrl-Z*** to switch to the User EXEC mode.
Global Config Mode	From the Privileged EXEC mode, enter **configure**	Switch (Config)#	To exit to the Privileged EXEC mode, enter the **exit** command, or press ***Ctrl-Z*** to switch to the User EXEC mode.
Interface Config Mode	From the Global Config mode, enter **interface** *<slot/port>*	Switch (Interface <slot/port>)#	To exit to the Global Config mode, enter the **exit** command. To return to the User EXEC mode, enter ***Ctrl-Z***.
Line Config Mode	From the Global Config mode, enter **lineconfig**	Switch (line)#	To exit to the Global Config mode, enter the **exit** command. To return to the User EXEC mode, enter ***Ctrl-Z***.

Mode-based Topology

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

Figure 1. Mode-based CLI



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

Mode-based Command Hierarchy

The commands in one mode are not available until you switch to that particular mode, with the exception of the User EXEC mode commands. You can execute the User EXEC mode commands in the Privileged EXEC mode.

The commands available to you depend upon the mode. To display a list of the available commands and descriptions of the commands, enter a question mark (?) at the CLI prompt.

Command Mode Description

This section describes the CLI command modes.

User EXEC Mode

When you log into the CLI, the User EXEC mode is the initial mode. The User EXEC mode contains a limited set of commands. The command prompt shown at this level is:

Command Prompt: Switch>

Privileged EXEC Mode

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

Command Prompt: Switch#

VLAN Mode

This mode groups all the VLAN commands. The command prompt shown at this level is:

Command Prompt: Switch(Vlan)#

Global Config Mode

This mode groups general setup commands and permits you to make modifications to the running configuration. From the Global Configuration mode, you can enter the System Configuration mode, the Physical Port Configuration mode, the Interface Configuration mode, or the Protocol Specific modes specified below. The command prompt at this level is:

Command Prompt: Switch(Config)#

From the Global Config mode, you can enter the following configuration modes:

Interface Config Mode

Use the Interface commands to enable or modify the operation of an interface.

In this mode, a physical port is set up for a specific logical connection operation. The command prompt at this level is:

Command Prompt: Switch(Interface <*slot/port*>)#

The resulting prompt for the interface configuration command entered in the Global Configuration mode is shown below:

```
Switch(Config)# interface 2/1
Switch(Interface 2/1)#
```

Line Config Mode

Use the Line Config mode to configure the console interface. You can configure the interface from the console connection or the virtual terminal used with Telnet. The command prompt at this level is:

Command Prompt: Switch(line)#

Flow of Operation

This section describes the flow of operation for the CLI.

1. Log into the CLI session and enter the User EXEC mode. In the User EXEC mode the $(exec)> prompt displays on the screen.

You initiate the parsing process when you type a command and press ***<ENTER>***. If you enter an incorrect or unavailable command, the output message indicates where the offending entry begins. For instance, if you enter **`show arpp brief`** (notice the extra **`p`**) instead of **`show arp brief`**, the output message is **`$(exec)> show arpp^ brief. $%Invalid input detected at '^' marker`**. The message shows you where the invalid input is detected. Figure 2 shows the layout of the output.

Figure 2. Syntax Error Message

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

After you enter the required parameters, any additional parameters you enter are treated as optional parameters. If any of the parameters are not recognized, a syntax error message is displayed.

2. After the command is successfully parsed and validated, the control of execution goes to the corresponding CLI callback function.
3. For required parameters, the command tree extends until the required parameters make the leaf of the branch. The callback function is only invoked when all the required parameters are provided. For optional parameters, the command tree extends until the required parameters and the optional parameters make the leaf of the branch. However, the callback function is associated with the node where the required parameters are fetched. The call back function then takes care of the optional parameters.
4. Once the control has reached the callback function, the callback function has complete information about the parameters you enter.

Setup and Management Commands

This section describes the commands you use to configure management access and basic port settings on the D-Link DES-3226L switch. This section contains the following subsections:

The commands in this section are in one of three functional groups:

- Show commands display switch settings, statistics, and other information.
- Configuration commands configure features and options of the switch. For every configuration command, there is a show command that displays the configuration setting.
- Copy commands transfer or save configuration and informational files to and from the switch.

System Management Commands

You can use telnet to manage the D-Link DES-3226L switch from a remote management system. To manage the device locally, you can use a direct serial-cable connection. This section describes commands you use to manage remote and direct connections to the device. To manage the device by using SNMP, see "SNMP Community Commands" on page 42. To manage the device by using SSH, see "Secure Shell (SSH) Commands" on page 100.

To manage the device by using telnet, the switch must have an IP address, subnet mask, and default gateway. You can use **network parms** to configure the IP address, subnet mask, and default gateway, or you can use **network protocol** to configure the switch to request the information from a BOOTP or DHCP server on your network.

network parms

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

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

Mode **Privileged EXEC**

network protocol

This command specifies the network configuration protocol to be used. If you modify this value, the change is effective immediately. The **bootp** parameter indicates that the switch periodically sends requests to a Bootstrap Protocol (BootP) server until a response is received. The **dhcp** parameter configures the switch to send periodic requests to a DHCP server until a response is received. The parameter **none** indicates that the switch should be manually configured with IP information.

Default none

Format **network protocol** *{none | bootp | dhcp}*

Mode **Privileged EXEC**

network mgmt_vlan

This command configures the Management VLAN ID.

Default 1

Format **network mgmt_vlan** *<1-4069>*

Mode **Privileged EXEC**

no network mgmt_vlan

This command sets the Management VLAN ID to the default.

Format **no network mgmt_vlan** *<1-4069>*

Mode **Privileged EXEC**

transport input telnet

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

Default enabled

Format **transport input telnet**

Mode **Line Config**

no transport input telnet

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

Format **no transport input telnet**

Mode **Line Config**

telnetcon maxsessions

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

Default 5

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

Mode **Privileged EXEC**

no telnetcon maxsessions

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

Format **no telnetcon maxsessions**

Mode **Privileged EXEC**

telnetcon timeout

This command sets the telnet connection session timeout value, in minutes. A session is active as long as the session has not been idle for the value set. The time is a decimal value from 1 to 160.

Note: Changing the timeout value for active sessions does not become effective until the session is reaccessed. Also, any keystroke activates the new timeout duration.

Default 5

Format `telnetcon timeout <1-160>`

Mode `Privileged EXEC`

no telnetcon timeout

This command sets the telnet connection session timeout value to the default.

Note: Changing the timeout value for active sessions does not become effective until the session is reaccessed. Also, any keystroke activates the new timeout duration.

Format `no telnetcon timeout`

Mode `Privileged EXEC`

bridge aging-time

This command configures the forwarding database address aging timeout in seconds. In an IVL system, the [fdbid | all] parameter is required. The <seconds> parameter must be within the range of 10 to 1,000,000 seconds. Fdbid (Forwarding database ID) indicates which forwarding database's aging timeout is being configured. The All option is used to configure all forwarding database's agetime.

Default 300

Format `bridge aging-time <10-1,000,000> [fdbid | all]`

Mode `Global Config`

no bridge aging-time

This command sets the forwarding database address aging timeout to 300 seconds. In an IVL system, the [fdbid | all] parameter is required. Fdbid (Forwarding database ID) indicates which forwarding database's aging timeout is being configured. All is used to configure all forwarding database's agetime.

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

Mode `Global Config`

network javamode

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

Default enabled

Format `network javamode`

Mode `Privileged EXEC`

no network javamode

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

Format `no network javamode`

Mode `Privileged EXEC`

network mac-address

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

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

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

Format. `network mac-address` *<macaddr>*

Mode. `Privileged EXEC`

network mac-type

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

Default burnedin

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

Mode `Privileged EXEC`

no network mac-type

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

Format `no network mac-type`

Mode `Privileged EXEC`

serial baudrate

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

Default 9600

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

Mode `Line Config`

no serial baudrate

This command sets the communication rate of the terminal interface.

Format `no serial baudrate`

Mode `Line Config`

serial timeout

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

Default 5

Format `serial timeout <0-160>`

Mode `Line Config`

no serial timeout

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

Format `no serial timeout`

Mode `Line Config`

set prompt

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

Format `set prompt <prompt_string>`

Mode `Privileged EXEC`

show forwardingdb agetime

This command displays the timeout for address aging. In an IVL system, the [fdbid | all] parameter is required.

Default `all`

Format `show forwardingdb agetime [fdbid | all]`

Mode `Privileged EXEC`

Forwarding DB ID Fdbid (Forwarding database ID) indicates the forwarding database whose aging timeout is to be shown. The all option is used to display the aging timeouts associated with all forwarding databases. This field displays the forwarding database ID in an IVL system.

Agetime In an IVL system, this parameter displays the address aging timeout for the associated forwarding database.

show network

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

Format `show network`

Modes `Privileged EXEC`
`User EXEC`

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

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

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

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

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

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

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

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

Web Mode Specifies if the switch should allow access to the Web Interface.

show telnetcon

This command displays telnet settings.

Format `show telnetcon`

Modes `Privileged EXEC`
`User EXEC`

Remote Connection Login Timeout (minutes) This object indicates the number of minutes a remote connection session is allowed to remain inactive before

being logged off. May be specified as a number from 1 to 160. The factory default is 5.

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

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

show serial

This command displays serial communication settings for the switch.

Format `show serial`

Modes `Privileged EXEC`
`User EXEC`

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

Baud Rate (bps) The default baud rate at which the serial port will try to connect. The available values are 1200, 2400, 4800, 9600, 19200, 38400,57600, and 115200 baud. The factory Default is 9600 baud.

Character Size (bits) The number of bits in a character. The number of bits is always 8.

Flow Control Whether Hardware Flow-Control is enabled or disabled. Hardware Flow Control is always disabled.

Stop Bits The number of Stop bits per character. The number of Stop bits is always 1.

Parity Type The Parity Method used on the Serial Port. The Parity Method is always None.

System Configuration Commands

This section describes the commands you use to view and configure port settings.

addport

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

Note: Before adding a port to a port-channel, set the physical mode of the port. For more information, see “speed” on page 39.

Format `addport <logical slot/port>`

Mode. `Interface Config`

cablestatus

This command tests the status of the cable attached to an interface.

Format `cablestatus <slot/port>`

Mode `Privileged EXEC`

auto-negotiate

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

Format `auto-negotiate`

Mode `Interface Config`

no auto-negotiate

This command disables automatic negotiation on a port.

Note: Automatic sensing is disabled when automatic negotiation is disabled.

Format `no auto-negotiate`

Mode `Interface Config`

auto-negotiate all

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

Format `auto-negotiate all`

Mode `Global Config`

no auto-negotiate all

This command disables automatic negotiation on all ports.

Format `no auto-negotiate all`

Mode `Global Config`

deleteport *(Interface Config)*

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

Format `deleteport <logical slot/port>`

Mode `Interface Config`

deleteport *(Global Config)*

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

Format `deleteport {<logical slot/port> | all}`

Mode `Global Config`

monitor session

This command configures a probe port and a monitored port for monitor session (port monitoring). The first <slot/port> is the source monitored port and the second <slot/port> is the destination probe port. The monitor session (port monitoring) mode becomes enabled only when both the probe and monitored ports are configured. If enabled, the probe port monitors all the traffic received and transmitted on the physical monitored port.

Format `monitor session <session-id> source interface <slot/port> destination interface <slot/port>`

Mode `Global Config`

no monitor session

This command removes the monitor session (port monitoring) designation from the source probe port, the destination monitored port and all VLANs. Once the port is removed from the VLAN, the user must manually add the port to any desired VLANs.

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

Format `no monitor session <session-id>`

Mode `Global Config`

no monitor

This command removes all the source ports and a destination port and restores the default value for mirroring session mode for all the configured sessions.

Note: This is a stand-alone “no” command. This command does not have a “normal” form.

Default enabled

Format `no monitor`

Mode `Global config`

no monitor session 1

This command removes all the source ports and a destination port of the mirroring session and restores the default value for mirroring session mode. The <session-id> parameter is an integer value used to identify the session. In the current version of the software, the <session-id> parameter is always 1.

Note: This is a stand-alone “no” command and does not have a “normal” form. This command can be issued without regard for the session status (enabled or disabled).

Default enabled

Format `no monitor session <session-id>`

Mode `Global config`

show monitor session 1

This command displays the port monitoring information for a particular mirroring session.

Note: The <session-id> parameter is an integer value used to identify the session. In the current version of the software, the <session-id> parameter is always 1.

Format `show monitor session <session-id>`

Mode `Privileged EXEC`

Session ID It is an integer value used to identify the session.

Monitor Session Mode It indicates whether the Port Mirroring feature is enabled or disabled for the session identified with <session-id>. The possible values are Enabled and Disabled.

Probe Port It is the probe port (destination port) for the session identified with <session-id>. If probe port is not set, this field is blank.

List of Source Ports It is the list of ports, which are configured as mirrored ports (source ports) for the session identified with <session-id>. If no source port is configured for the session then this field is blank.

shutdown

This command disables a port.

Default enabled

Format `shutdown`

Mode `Interface Config`

no shutdown

This command enables a port.

Format `no shutdown`

Mode `Interface Config`

shutdown all

This command disables all ports.

Default enabled

Format `shutdown all`

Mode `Global Config`

no shutdown all

This command enables all ports.

Format `no shutdown all`

Mode `Global Config`

speed

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

Format `speed {100 | 10} {half-duplex | full-duplex}`

Mode `Interface Config`

Acceptable values are:

100h 100BASE-T half duplex

100f 100BASE-T full duplex

10h 10BASE-T half duplex

10f 10BASE-T full duplex

speed all

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

Format `speed all {<100 | 10> <half-duplex | full-duplex>}`

Mode `Global Config`

Acceptable values are:

100h 100BASE-T half-duplex

100f 100BASE-T full duplex

10h 10BASE-T half duplex

10f 10BASE-T full duplex

storm-control broadcast

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

The threshold implementation follows a percentage pattern. If the broadcast traffic on any Ethernet port exceeds the high threshold percentage (as represented in Table 7) of the link speed, the switch discards the broadcasts traffic until the broadcast traffic returns to the low threshold percentage or less. The full implementation is depicted in Table 7.

Table 7. Broadcast Storm Recovery Thresholds

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

Format `storm-control broadcast`

Mode `Global Config`

no storm-control broadcast

This command disables broadcast storm recovery mode.

The threshold implementation follows a percentage pattern. If the broadcast traffic on any Ethernet port exceeds the high threshold percentage (as represented in Table 7 on page 39) of the link speed, the switch discards the broadcasts traffic until the broadcast traffic returns to the low threshold percentage or less. The full implementation is depicted in Table 7.

Format `no storm-control broadcast`

Mode `Global Config`

storm-control flowcontrol

This command enables 802.3x flow control for the switch and only applies to full-duplex mode ports.

Note: 802.3x flow control works by pausing a port when the port becomes oversubscribed and dropping all traffic for small bursts of time during the congestion condition. This can lead to high-priority and/or network control traffic loss.

Default disabled

Format `storm-control flowcontrol`

Mode `Global Config`

no storm-control flowcontrol

This command disables 802.3x flow control for the switch.

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

Format `no storm-control flowcontrol`

Mode `Global Config`

show mac-address-table multicast

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

Format `show mac-address-table multicast <macaddr | all>`

Mode `Privileged EXEC`

MAC Address A multicast MAC address for which the switch has forwarding and or filtering information. The format is two-digit hexadecimal numbers separated by colons, for example 01:23:45:67:89:AB. In an IVL system the MAC address will be displayed as a MAC address and VLAN ID combination of 8 bytes.

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

Component The component that is responsible for this entry in the Multicast Forwarding Database. Possible values are IGMP Snooping, and Static Filtering.

Description The text description of this multicast table entry.

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

Forwarding Interfaces The resultant forwarding list is derived from combining all the component's forwarding interfaces and removing the interfaces that are listed as the static filtering interfaces.

show mac-address-table stats

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

Format `show mac-address-table stats`

Mode `Privileged EXEC`

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

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

Current Entries Displays the current number of entries in the MFDB.

show monitor session

This command displays the port monitoring information for the system.

Format `show monitor session <sessionid>`

Mode `Privileged EXEC`

Session ID The session identifying number.

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

Probe Port The interface configured as the probe port.

Mirrored Port The interface configured as the mirrored port.

show port

This command displays port information.

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

Mode `Privileged EXEC`

Interface Valid slot and port number separated by forward slashes.

Type If not blank, this field indicates that this port is a special type of port. The possible values are:

Mon - this port is a monitoring port. Look at the Port Monitoring screens to find out more information.

Lag - this port is a member of a port-channel (LAG).

Probe - this port is a probe port.

Admin Mode Selects the Port control administration state. The port must be enabled in order for it to be allowed into the network. - May be enabled or disabled. The factory default is enabled.

Physical Mode Selects the desired port speed and duplex mode. If auto-negotiation support is selected, then the duplex mode and speed is set from the auto-negotiation process. Note that the maximum capability of the port (full duplex -100M) is advertised. Otherwise, this object determines the port's duplex mode and transmission rate. The factory default is Auto.

Physical Status Indicates the port speed and duplex mode.

Link Status Indicates whether the Link is up or down.

Link Trap This object determines whether or not to send a trap when link status changes. The factory default is enabled.

LACP Mode Displays whether LACP is enabled or disabled on this port.

show storm-control

This command displays switch configuration information.

Format `show storm-control`

Mode `Privileged EXEC`

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

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

SNMP Community Commands

You can configure the D-Link DES-3226L switch to act as a Simple Network Management Protocol (SNMP) agent so that it can communicate with SNMP managers on your network. This section describes the commands you use to configure SNMP on the D-Link DES-3226L switch.

snmp-server

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

Default none

Format `snmp-server {sysname <name> | location <loc> | contact <con>}`

Mode `Global Config`

snmp-server community

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

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

Default Two default community names: Public and Private. You can replace these default community names with unique identifiers for each community. The default values for the remaining four community names are blank.

Format **snmp-server community** <*name*>

Mode **Global Config**

no snmp-server community

This command removes this community name from the table. The <name> is the community name to delete.

Format **no snmp-server community** <*name*>

Mode **Global Config**

snmp-server community ipaddr

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

Default 0.0.0.0

Format **snmp-server community ipaddr** <*ipaddr*> <*name*>

Mode *Global Config*

no snmp-server community ipaddr

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

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

Mode *Global Config*

snmp-server community ipmask

This command sets a client IP mask for an SNMP community. The address is the associated community SNMP packet sending address and is used along with the client IP address value to denote a range of IP addresses from which SNMP clients may use that community to access the device.

A value of 255.255.255.255 will allow access from only one station, and will use that machine's IP address for the client IP Address. A value of 0.0.0.0 will allow access from any IP address. The name is the applicable community name.

Default 0.0.0.0

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

Mode **Global Config**

no snmp-server community ipmask

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

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

Mode **Global Config**

snmp-server community mode

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

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

Format *snmp-server community mode <name>*

Mode *Global Config*

no snmp-server community mode

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

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

Mode *Global Config*

snmp-server community ro

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

Format **snmp-server community** *ro <name>*

Mode **Global Config**

snmp-server community rw

This command sets the access mode to read/write (also called private).

Format **snmp-server community** *rw <name>*

Mode **Global Config**

snmp-server enable traps

This command enables the Authentication Flag.

Default enabled

Format `snmp-server enable traps`

Mode `Global Config`

no snmp-server enable traps

This command disables the Authentication Flag.

Format. `no snmp-server enable traps`

Mode `Global Config`

snmp-server enable traps linkmode

This command enables Link Up/Down traps for the entire switch. When enabled, link traps are sent only if the Link Trap flag setting associated with the port is enabled. See “snmp trap link-status” on page 47.

Default enabled

Format *snmp-server enable traps linkmode*

Mode `Global Config`

no snmp-server enable traps linkmode

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

Format *no snmp-server enable traps linkmode*

Mode `Global Config`

snmp-server enable traps multiusers

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

Default enabled

Format *snmp-server enable traps multiusers*

Mode `Global Config`

no snmp-server enable traps multiusers

This command disables Multiple User traps.

Format *no snmp-server enable traps multiusers*

Mode `Global Config`

snmp-server enable traps stpmode

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

Default enabled

Format `snmp-server enable traps stpmode`

Mode `Global Config`

no snmp-server enable traps stpmode

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

Format `no snmp-server enable traps stpmode`

Mode `Global Config`

snmptrap

This command adds an SNMP trap receiver. The maximum length of <name> is 16 case-sensitive alphanumeric characters. The <snmpversion> is the version of SNMP. The version parameter options are snmpv1 or snmpv2.

Note: The <name> parameter does not need to be unique; however; the <name> and <ipaddr> pair must be unique. Multiple entries can exist with the same <name>, as long as they are associated with a different <ipaddr>. The reverse scenario is also acceptable. The <name> is the community name used when sending the trap to the receiver, but the <name> is not directly associated with the SNMP Community Table

Default snmpv2

Format `snmptrap <name> <ipaddr> [snmpversion <snmpversion>]`

Mode `Global Config`

no snmptrap

This command deletes trap receivers for a community.

Format `no snmptrap <name> <ipaddr>`

Mode `Global Config`

snmptrap snmpversion

This command modifies the SNMP version of a trap. The maximum length of <name> is 16 case-sensitive alphanumeric characters. The <snmpversion> parameter options are snmpv1 or snmpv2.

Note: This command does not support a “no” form.

Default. snmpv2

Format `snmptrap snmpversion <name> <ipaddr> <snmpversion>`

Mode `Global Config`

snmptrap ipaddr

This command assigns an IP address to a specified community name. The maximum length of name is 16 case-sensitive alphanumeric characters. IP addresses in the SNMP trap receiver table must be unique. If you make multiple entries using the same IP address, the first entry is retained and processed. All duplicate entries are ignored.

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

Mode `Global Config`

snmptrap mode

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

Format `snmptrap mode <name> <ipaddr>`

Mode `Global Config`

no snmptrap mode

This command deactivates an SNMP trap.

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

Mode `Global Config`

snmp trap link-status

This command enables link status traps by interface. This command is valid only when the Link Up/Down Flag is enabled. See “snmp-server enable traps linkmode” on page 45.

Format `snmp trap link-status`

Mode `Interface Config`

no snmp trap link-status

This command disables link status traps by interface. This command is valid only when the Link Up/Down Flag is enabled.

Format `no snmp trap link-status`

Mode `Interface Config`

snmp trap link-status all

This command enables link status traps for all interfaces. This command is valid only when the Link Up/Down Flag is enabled. See “snmp-server enable traps linkmode” on page 45.

Format `snmp trap link-status all`

Mode `Global Config`

no snmp trap link-status all

This command disables link status traps for all interfaces. This command is valid only when the Link Up/Down Flag is enabled. See “snmp-server enable traps linkmode” on page 45.

Format `no snmp trap link-status all`

Mode `Global Config`

show snmpcommunity

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

The SNMP agent of the switch complies with SNMP Versions 1, 2 or 3. For more information about the SNMP specification, see the SNMP RFCs. The SNMP agent sends traps through TCP/IP to an external SNMP manager based on the SNMP configuration (the trap receiver and other SNMP community parameters).

Format `show snmpcommunity`

Mode `Privileged EXEC`

SNMP Community Name The community string to which this entry grants access. The string is case-sensitive and can have up to 16 characters. Each row of this table must contain a unique community name.

Client IP Address An IP address (or portion thereof) from which this device will accept SNMP packets with the associated community. The requesting entity's IP address is ANDed with the Subnet Mask before being compared to the IP Address. Note: If the Subnet Mask is set to 0.0.0.0, an IP Address of 0.0.0.0 matches all IP addresses. The default value is 0.0.0.0

Client IP Mask A mask to be ANDed with the requesting entity's IP address before comparison with IP Address. If the result matches with IP Address then the address is an authenticated IP address. For example, if the IP Address = 9.47.128.0 and the corresponding Subnet Mask = 255.255.255.0 a range of incoming IP addresses would match, i.e. the incoming IP Address could equal 9.47.128.0 - 9.47.128.255. The default value is 0.0.0.0

Access Mode The access level for this community string.

Status The status of this community access entry.

show trapflags

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

Format `show trapflags`

Mode `Privileged EXEC`

Authentication Flag Can be enabled or disabled. The factory default is enabled. Indicates whether authentication failure traps will be sent.

Link Up/Down Flag Can be enabled or disabled. The factory default is enabled. Indicates whether link status traps will be sent.

Multiple Users Flag Can be enabled or disabled. The factory default is enabled. Indicates whether a trap will be sent when the same user ID is logged into the switch more than once at the same time (either via telnet or serial port).

Spanning Tree Flag Can be enabled or disabled. The factory default is enabled. Indicates whether spanning tree traps will be sent.

show snmptrap

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

Format `show snmptrap`

Mode `Privileged EXEC`

SNMP Trap Name The community string of the SNMP trap packet sent to the trap manager. The string is case sensitive and can be up to 16 alphanumeric characters.

IP Address The IP address to receive SNMP traps from this device.

Status Indicates the receiver's status (enabled or disabled).

Switching Commands

This section describes the switching commands available on the D-Link DES-3226L. The switching commands section includes the following subsections:

The commands are divided into three functional groups:

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

Virtual LAN (VLAN) Commands

VLANs allow users located on different physical networks to be on the same logical network. This section describes the commands you use to view and configure VLAN settings.

vlan

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

Format **vlan** *<2-4094>*

Mode **VLAN database**

no vlan

This command deletes an existing VLAN. The ID is a valid VLAN identification number between 2 and 4094. The VLAN ID 1 is reserved for the default VLAN.

Format **no vlan** *<2-4094>*

Mode **VLAN database**

vlan acceptframe

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

Default admit all

Format **vlan acceptframe** *{vlanonly | all}*

Mode **Interface Config**

no vlan acceptframe

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

Format **vlan acceptframe *{vlanonly | all}***

Mode **Interface Config**

vlan name

This command changes the name of a VLAN. The name is an alphanumeric string of up to 32 characters, and the ID is a valid VLAN identification number. ID range is 1-4094.

Default The name for VLAN ID 1 is always Default. The name for other VLANs is defaulted to a blank string.

Format **vlan name** *<2-4094> <name>*

Mode **VLAN database**

no vlan name

This command sets the name of a VLAN to a blank string. The VLAN ID is a valid VLAN identification number. ID range is 2-4094.

Format **no vlan name** *<2-4094>*

Mode **VLAN database**

vlan participation

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

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

Mode **Interface Config**

Participation options are:

include The interface is always a member of this VLAN. This is equivalent to registration fixed.

exclude The interface is never a member of this VLAN. This is equivalent to registration forbidden.

vlan participation all

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

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

Mode `Global Config`

Participation options are:

include The interface is always a member of this VLAN. This is equivalent to registration fixed.

exclude The interface is never a member of this VLAN. This is equivalent to registration forbidden.

vlan port acceptframe all

This command sets the frame acceptance mode for all interfaces. The modes are defined as follows:

- VLAN Only mode - Untagged frames or priority frames received on this interface are discarded.
- Admit All mode - Untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port.

With either option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1Q VLAN Specification.

Default admit all

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

Mode `Global Config`

no vlan port acceptframe all

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

Format `no vlan port acceptframe all`

Mode `Global Config`

vlan port pvid all

This command changes the VLAN ID for all interface.

Default 1

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

Mode `Global Config`

no vlan port pvid all

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

Format `no vlan port pvid all`

Mode `Global Config`

vlan port tagging all

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

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

Mode `Global Config`

no vlan port tagging all

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

Format `no vlan port tagging all`

Mode `Global Config`

vlan pvid

This command changes the VLAN ID per interface.

Default 1

Format `vlan pvid <1-4094>`

Mode `Interface Config`

no vlan pvid

This command sets the VLAN ID per interface to 1.

Format `no vlan pvid`

Mode `Interface Config`

vlan tagging

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

Format `vlan tagging <1-4094>`

Mode `Interface Config`

no vlan tagging

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

Format `no vlan tagging <1-4094>`

Mode `Interface Config`

show vlan

This command displays detailed information, including interface information, for a specific VLAN. The ID is a valid VLAN identification number.

Format `show vlan <vlanid>`

Modes `Privileged EXEC`
`User EXEC`

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

VLAN Name A string associated with this VLAN as a convenience. It can be up to 32 alphanumeric characters long, including blanks. The default is blank. VLAN ID 1 always has a name of `Default`. This field is optional.

VLAN Type Type of VLAN, which can be Default (VLAN ID = 1) or static (one that is configured and permanently defined).

Interface Valid slot and port number separated by forward slashes. It is possible to set the parameters for all ports by using the selectors on the top line.

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

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

Exclude - This port is never a member of this VLAN. This is equivalent to registration forbidden in the IEEE 802.1Q standard.

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

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

Exclude - This port is never a member of this VLAN. This is equivalent to registration forbidden in the IEEE 802.1Q standard.

Tagging Select the tagging behavior for this port in this VLAN.

Tagged - specifies to transmit traffic for this VLAN as tagged frames.

Untagged - specifies to transmit traffic for this VLAN as untagged frames.

show vlan brief

This command displays a list of all configured VLANs.

Format `show vlan brief`

Modes `Privileged EXEC`
`User EXEC`

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

VLAN Name A string associated with this VLAN as a convenience. It can be up to 32 alphanumeric characters long, including blanks. The default is blank. VLAN ID 1 always has a name of `Default`. This field is optional.

VLAN Type Type of VLAN, which can be Default (VLAN ID = 1) or static (one that is configured and permanently defined).

show vlan port

This command displays VLAN port information.

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

Modes **`Privileged EXEC`**
`User EXEC`

Interface Valid slot and port number separated by forward slashes. It is possible to set the parameters for all ports by using the selectors on the top line.

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

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

Protected Ports Commands

This section describes commands you use to configure and view protected ports on a switch. Protected ports do not forward traffic to each other, even if they are on the same VLAN. However, protected ports can forward traffic to all unprotected ports in their group. Unprotected ports can forward traffic to both protected and unprotected ports. Ports are unprotected by default.

switchport protected

Use this command to configure a protected port. The *groupid* parameter identifies the set of protected ports to which this interface is assigned. You can only configure an interface as protected in one group. The *name* parameter is an optional name associated with this group. The name can be up to 32 alphanumeric characters long, including blanks.

Note: Port protection occurs within a single switch. Protected port configuration does not affect traffic between ports on two different switches.

No traffic forwarding is possible between two protected ports.

Default **`Unprotected`**

Format **`switchport protected`** *[<groupid>] [name <name>]*

Mode **`Interface Config`**

no switchport protected

Use this command to configure a port as unprotected. The *groupid* parameter identifies the set of protected ports to which this interface is assigned. You can only configure an interface as protected in one group. The *name* parameter is an optional name associated with this group. The name can be up to 32 alphanumeric characters long, including blanks.

Format `no switchport protected [<groupid>] [name <name>]`

Mode `Interface Config`

show switchport protected

This command displays the status of all the interfaces, including protected and unprotected interfaces.

Format `show switchport protected [<groupid>]`

Mode `User EXEC`
`Privileged EXEC`

Group ID The number that identifies the protected port group.

Name An optional name of the protected port group. The name can be up to 32 alphanumeric characters long, including blanks. The default is blank.

List of Physical Ports List of ports, which are configured as protected for the group identified with <*groupid*>. If no port is configured as protected for this group, this field is blank.

Link Aggregation/Port-Channel (802.3AD) Commands

This section describes the commands you use to configure link aggregation groups (LAG), which are also called port-channels. Link aggregation allows you to combine multiple full duplex Ethernet links into a single logical link. Network devices treat the aggregation as if it were a single link, which increases fault tolerance and provides load sharing. The LAG feature initially load shares traffic based upon the source and destination MAC address.

The ports you combine to form a LAG must have equal port speed capabilities. In other words, each LAG must use all Fast Ethernet (10/100) ports or all Gigabit Ethernet (10/100/1000) ports, but not both, regardless of what you set the actual link speed to be.

You can create two LAGs on the switch if you use Fast Ethernet ports. You can create one LAG if you use Gigabit Ethernet ports.

Note: Assign the LAG VLAN membership after you create a LAG. If you do not assign VLAN membership, the LAG might become a member of the management VLAN which can result in learning and switching issues.

Note: The D-Link DES-3226L switch does not support spanning tree protocol (STP) on dynamic LAGs. If you want to run STP on a LAG, you must configure static capability on the LAG. For more information, see “port-channel staticcapability” on page 58.

port-channel

This command configures a new port-channel and generates a logical slot/port number for the port-channel. The <name> field is a character string which allows the dash "-" character as well as alphanumeric characters. Display this number using the "show port-channel" command.

Note: Before you include a port in a port-channel, set the port physical mode. For more information, see "speed" on page 39.

Format `port-channel <name>`

Mode `Global Config`

no port-channel

This command deletes a port-channel (LAG).

Format `no port-channel {<logical slot/port> | all}`

Mode `Global Config`

clear port-channel

Use this command to clear all configured port channels.

Format `clear port-channel`

Mode `Privileged EXEC`

port-channel staticcapability

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

Default disabled

Format `port-channel staticcapability`

Mode `Global Config`

no port-channel staticcapability

This command disables the support of static port-channels on the device.

Format `no port-channel staticcapability`

Mode `Global Config`

port lacpmode

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

Default enabled

Format `port lacpmode`

Mode `Interface Config`

no port lacpmode

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

Format `no port lacpmode`

Mode `Interface Config`

port lacpmode all

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

Format `port lacpmode all`

Mode `Global Config`

no port lacpmode all

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

Format `no port lacpmode all`

Mode `Global Config`

port-channel adminmode

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

Format `port-channel adminmode` *[all]*

Mode `Global Config`

no port-channel adminmode

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

Format `no port-channel adminmode` *[all]*

Mode `Global Config`

port-channel linktrap

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

Default enabled

Format `port-channel linktrap` *{<logical* `slot/port>` | *all}*

Mode `Global Config`

no port-channel linktrap

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

Format `no port-channel linktrap {<logical slot/port> | all}`

Mode `GlobalConfig`

port-channel name

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

Format `port-channel name {<logical slot/port> | all | <name>}`

Mode `Global Config`

show port-channel brief

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

Format `show port-channel brief`

Mode `Privileged EXEC`
`User EXEC`

Static Capability This field displays whether or not the device has static capability enabled.

For each port-channel the following information is displayed:

Name This field displays the name of the port-channel.

Link State This field indicates whether the link is up or down.

Mbr Ports This field lists the ports that are members of this port-channel, in **<**slot/port**>** notation.

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

show port-channel

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

Format `show port-channel {<logical slot/port> | all}`

Modes `Privileged EXEC`
`User EXEC`

Logical slot/port Valid slot and port number separated by forward slashes.

Lag Name The name of this port-channel (LAG). You may enter any string of up to 15 alphanumeric characters.

Link State Indicates whether the Link is up or down.

Admin Mode May be enabled or disabled. The factory default is enabled.

Link Trap Mode This object determines whether or not to send a trap when link status changes. The factory default is enabled.

STP Mode The Spanning Tree Protocol Administrative Mode associated with the port or port-channel (LAG). The possible values are:

Disable - Spanning tree is disabled for this port.

Enable - Spanning tree is enabled for this port.

Mbr Ports A listing of the ports that are members of this port-channel (LAG), in slot/port notation. There can be a maximum of eight ports assigned to a given port-channel (LAG).

Port Speed Speed of the port-channel port.

Type This field displays the status designating whether a particular port-channel (LAG) is statically or dynamically maintained.

Static - The port-channel is statically maintained.

Dynamic - The port-channel is dynamically maintained.

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

IGMP Snooping Commands

This section describes the commands you use to configure Internet Group Management Protocol (IGMP) Snooping on the D-Link DES-3226L switch. The IGMP Snooping feature can help conserve bandwidth because it allows the switch to forward IP multicast traffic only to connected hosts that request multicast traffic.

set igmp

This command enables IGMP Snooping on the system (Global Config Mode) or an interface (Interface Config Mode). This command also enables IGMP snooping on a particular VLAN and on all interfaces participating in this VLAN.

If an interface has IGMP Snooping enabled and you enlist it as a member of a port-channel (LAG), IGMP Snooping functionality is disabled on that interface. IGMP Snooping functionality is re-enabled if you remove port-channel (LAG) membership from an interface that has IGMP Snooping enabled.

The IGMP application supports the following activities:

- Validation of the IP header checksum (as well as the IGMP header checksum) and discarding of the frame upon checksum error.
- Maintenance of the forwarding table entries based on the MAC address versus the IP address.
- Flooding of unregistered multicast data packets to all ports in the VLAN.

Default disabled

Format **`set igmp`** <*`vlanId`*>

Modes
`Global Config`
`Interface Config`
`Vlan Mode`

no set igmp

This command disables IGMP Snooping on the system.

Format **no set igmp** <*vlanId*>

Modes **Global Config**
Interface Config
Vlan Mode

set igmp interfacemode

This command enables IGMP Snooping on all interfaces. If an interface has IGMP Snooping enabled and you enlist it as a member of a port-channel (LAG), IGMP Snooping functionality is disabled on that interface. IGMP Snooping functionality is re-enabled if you remove port-channel (LAG) membership from an interface that has IGMP Snooping enabled.

Default **disabled**

Format **set igmp interfacemode**

Mode **Global Config**

no set igmp interfacemode

This command disables IGMP Snooping on all interfaces.

Format **no set igmp interfacemode**

Mode **Global Config**

set igmp fast-leave

This command enables or disables IGMP Snooping fast-leave admin mode on a selected interface or VLAN. Enabling fast-leave allows the switch to immediately remove the layer 2 LAN interface from its forwarding table entry upon receiving an IGMP leave message for that multicast group without first sending out MAC-based general queries to the interface.

You should enable fast-leave admin mode only on VLANs where only one host is connected to each layer 2 LAN port. This prevents the inadvertent dropping of the other hosts that were connected to the same layer 2 LAN port but were still interested in receiving multicast traffic directed to that group. Also, fast-leave processing is supported only with IGMP version 2 hosts.

Default disable

Format **set igmp fast-leave** <*vlanId*>

Modes **Interface Config**
Vlan Mode

no set igmp fast-leave

This command disables IGMP Snooping fast-leave admin mode on a selected interface.

Format **no set igmp fast-leave** <*vlanId*>

Modes **Interface Config**
Vlan Mode

set igmp groupmembership-interval

This command sets the IGMP Group Membership Interval time on one interface or all interfaces. The Group Membership Interval time is the amount of time in seconds that a switch waits for a report from a particular group on a particular interface before deleting the interface from the entry. This value must be greater than the IGMPv3 Maximum Response time value. The range is 2 to 3600 seconds.

Default 260 seconds

Format **set igmp groupmembership-interval** *<vlanId> <2-3600>*

Modes **Interface Config**
Global Config

no set igmp groupmembership-interval

This command sets the IGMPv3 Group Membership Interval time to the default value.

Format **no set igmp groupmembership-interval**

Modes **Interface Config**
Global Config

set igmp maxresponse

This command sets the IGMP Maximum Response time for the system, on a particular interface or VLAN. The Maximum Response time is the amount of time in seconds that a switch will wait after sending a query on an interface because it did not receive a report for a particular group in that interface. This value must be less than the IGMP Query Interval time value. The range is 1 to 3599 seconds.

Default 10 seconds

Format **set igmp maxresponse** *<1-3599>*

Modes **Global Config**
Interface Config
VLAN Mode

no set igmp maxresponse

This command sets the IGMP Maximum Response time (on the interface or VLAN) to the default value.

Format **no set igmp maxresponse**

Modes **Global Config**
Interface Config
VLAN Mode

set igmp mcrtexpiretime

This command sets the Multicast Router Present Expiration time. The time is set for the system, on a particular interface or VLAN.

This is the amount of time in seconds that a switch waits for a query to be received on an interface before the interface is removed from the list of interfaces with multicast routers attached. The range is 0 to 3600 seconds. A value of 0 indicates an infinite time-out, i.e. no expiration.

Default 0

Format **set igmp mcrtexpiretime** <*vlanId*> <*0-3600*>

Modes **Global Config**
Interface Config

no set igmp mcrtexpiretime

This command sets the Multicast Router Present Expiration time to 0. The time is set for the system, on a particular interface or a VLAN.

Format **no set igmp mcrtexpiretime** <*vlanId*>

Modes **Global Config**
Interface Config

set igmp mrouter

This command configures the VLAN ID (<*vlanId*>) that has the multicast router mode enabled.

Format **set igmp mrouter <***vlanId***>**

Mode **Interface Config**

no set igmp mrouter

This command disables multicast router mode for a particular VLAN ID (<*vlanId*>).

Format **no set igmp mrouter <***vlanId***>**

Mode **Interface Config**

set igmp mrouter interface

This command configures the interface as a multicast router interface. When configured as a multicast router interface, the interface is treated as a multicast router interface in all VLANs.

Default disabled

Format **set igmp mrouter interface**

Mode **Interface Config**

no set igmp mrouter interface

This command disables the status of the interface as a statically configured multicast router interface.

Format **no set igmp mrouter interface**

Mode **Interface Config**

show igmpsnooping

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

Format `show igmpsnooping [<slot/port> | <vlanId>]`

Mode `Privileged EXEC`

When you do not specify a parameter, the command displays the following information:

Admin Mode This indicates whether IGMP Snooping is active on the switch.

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

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

VLANs Enabled for IGMP Snooping Displays the list of VLANs on which IGMP Snooping is enabled.

When you specify the <slot/port> or VLAN ID values, the following information prints to the screen:

IGMP Snooping Admin Mode This indicates whether IGMP Snooping is active on the specified interface or VLAN.

Fast Leave Mode Indicates whether Fast Leave mode is enabled.

Group Membership Interval Displays the amount of time in seconds that the device waits for a report from a particular group on a particular interface before deleting the interface from the entry.

Max Response Time Displays the amount of time the switch waits after it sends a query on an interface, participating in the VLAN, because it did not receive a report for a particular group on that interface.

Multicast Router Present Expiration Time Displays the amount of time to wait before removing an interface that is participating in the VLAN from the list of interfaces with multicast routers attached. The interface is removed if a query is not received.

show igmpsnooping mrouter interface

This command displays information about statically configured ports.

Format `show igmpsnooping mrouter interface <slot/port>`

Mode `Privileged EXEC`

Interface Shows the port on which multicast router information is being displayed.

Multicast Router Attached Indicates whether or not multicast router is statically enabled on the interface.

VLAN ID Displays the list of VLANs of which the interface is a member.

show igmpsnooping mrouter vlan

This command displays IGMP snooping information for a port that participates in a VLAN.

Format **`show igmpsnooping mrouter vlan`** *<slot/port>*

Mode **`Privileged EXEC`**

Slot/Port Shows the port on which multicast router information is being displayed.

VLAN ID Displays the list of VLANs of which the interface is a member.

show mac-address-table igmpsnooping

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

Format **`show mac-address-table igmpsnooping`**

Mode **`Privileged EXEC`**

MAC Address A multicast MAC address for which the switch has forwarding or filtering information. The format is two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. In an IVL system the MAC address is displayed as a MAC address and VLAN ID combination of 8 bytes.

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

Description The text description of this multicast table entry.

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

Spanning Tree Protocol (STP) Commands

This section describes the commands you use to configure Spanning Tree Protocol (STP) on the D-Link DES-3226L switch. STP helps prevent network loops, duplicate messages, and network instability.

Note: STP is disabled by default. When you enable STP on the switch, STP is still disabled on each port.

Note: The D-Link DES-3226L switch does not support spanning tree protocol (STP) on dynamic LAGs. If you want to run STP on a LAG, you must configure static capability on the LAG. For more information, see “port-channel staticcapability” on page 58.

spanning-tree

This command sets the STP mode for a specific port-channel (LAG). This is the value specified for STP Mode on the Port Configuration Menu. The default is 802.1D. The interface is a logical slot/port for a configured port-channel. The **`all`** option sets all configured port-channels (LAGs) with the same option. If you do not specify any parameters, the **`spanning tree`** command enables the STP mode.

The mode is one of the following:

802.1d IEEE 802.1D-compliant STP mode is used

fast Fast STP mode is used

off STP is turned off

Default disabled

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

Mode **Global Config**

no spanning-tree

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

Format **no spanning-tree**

Mode **Global Config**

spanning-tree bpdumigrationcheck

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

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

Mode **Global Config**

spanning-tree configuration name

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

Default The base MAC address displayed using hexadecimal notation.

Format **spanning-tree configuration name** <*name*>

Mode **Global Config**

no spanning-tree configuration name

This command resets the Configuration Identifier Name to its default.

Format **no spanning-tree configuration name**

Mode **Global Config**

spanning-tree configuration revision

This command sets the Configuration Identifier Revision Level is a number in the range of 0 to 65535 and is used to identify the configuration that this switch is currently using.

Default 0

Format **spanning-tree configuration revision** <*0-65535*>

Mode **Global Config**

no spanning-tree configuration revision

This command sets the Configuration Identifier Revision Level the default value of 0.

Format `no spanning-tree configuration revision`

Mode `Global Config`

spanning-tree edgeport

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

Format `spanning-tree edgeport`

Mode `Interface Config`

no spanning-tree edgeport

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

Format `no spanning-tree edgeport`

Mode `Interface Config`

spanning-tree forceversion

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

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

Default 802.1s

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

Mode `Global Config`

no spanning-tree forceversion

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

Format `no spanning-tree forceversion`

Mode `Global Config`

spanning-tree forward-time

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

Default 15

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

Mode `Global Config`

no spanning-tree forward-time

This command sets the Bridge Forward Delay parameter to the default value of 15.

Format `no spanning-tree forward-time`

Mode `Global Config`

spanning-tree hello-time

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

Default 2

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

Mode `Interface Config`

no spanning-tree hello-time

This command sets the admin Hello Time parameter for the common and internal spanning tree to two.

Format `no spanning-tree hello-time`

Mode `Interface Config`

spanning-tree max-age

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

Default 20

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

Mode `Global Config`

no spanning-tree max-age

This command sets the Bridge Max Age parameter for the common and internal spanning tree to 20.

Format `no spanning-tree max-age`

Mode `Global Config`

spanning-tree max-hops

This command sets the MSTP Max Hops parameter to a new value for the common and internal spanning tree. The max-hops value is a range from 1 to 127.

Default 20

Format `spanning-tree max-hops <1-127>`

Mode `Global Config`

no spanning-tree max-hops

This command sets the Bridge Max Hops parameter for the common and internal spanning tree to the default value.

Format `no spanning-tree max-hops`

Mode `Global Config`

spanning-tree mst

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

If you specify the **cost** option, the command sets the path cost for this port within a multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter. You can set the path cost as a number in the range of 1 to 200000000 or **auto**. If you select **auto** the path cost value is set based on Link Speed.

If you specify the **external-cost** option, this command sets the external-path cost for MST instance '0' i.e. CIST instance. You can set the external cost as a number in the range of 1 to 200000000 or **auto**. If you specify auto, the external path cost value is set based on Link Speed.

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

Default cost: auto; external-cost: auto; port-priority: 128

Format `spanning-tree mst` *<mstid> {{cost <1-200000000> | auto} | {external-cost <1-200000000> | auto}| port-priority <0-240>}*

Mode `Interface Config`

no spanning-tree mst

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

If the you specify **cost**, this command sets the path cost for this port within a multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter, to the default value, i.e. a path cost value based on the Link Speed. If you specify **external-cost**, this command sets the external path cost for this port for mst '0' instance, to the default value, i.e. a path cost value based on the Link Speed. If you specify **port-priority**, this command sets the priority for this port within a specific multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter, to the default value, i.e. 128.

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

Mode `Interface Config`

spanning-tree mst instance

This command adds a multiple spanning tree instance to the switch. The parameter <mstid> is a number within a range of 1 to 4094, that corresponds to the new instance ID to be added. The maximum number of multiple instances supported by the D-Link DES-3226L switch is 4.

Format `spanning-tree mst instance <mstid>`

Mode `Global Config`

no spanning-tree mst instance

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

Format `no spanning-tree mst instance <mstid>`

Mode `Global Config`

spanning-tree mst priority

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

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

Default 32768

Format `spanning-tree mst priority <mstid> <0-61440>`

Mode `Global Config`

no spanning-tree mst priority

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

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

Format `spanning-tree mst priority <mstid>`

Mode `Global Config`

spanning-tree mst vlan

This command adds an association between a multiple spanning tree instance and a VLAN so that the VLAN is no longer associated with the common and internal spanning tree. The parameter <mstid> is a

number that corresponds to the desired existing multiple spanning tree instance. The <vlanid> corresponds to an existing VLAN ID.

Format `spanning-tree mst vlan <mstid> <vlanid>`

Mode `Global Config`

no spanning-tree mst vlan

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

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

Mode `Global Config`

spanning-tree port mode

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

Default disabled

Format `spanning-tree port mode`

Mode `Interface Config`

no spanning-tree port mode

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

Format `no spanning-tree port mode`

Mode `Interface Config`

spanning-tree port mode all

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

Default disabled

Format `spanning-tree port mode all`

Mode `Global Config`

no spanning-tree port mode all

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

Format `no spanning-tree port mode all`

Mode `Global Config`

show spanning-tree

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

Format `show spanning-tree <brief>`

Modes `Privileged EXEC`
`User EXEC`

Bridge Priority Specifies the bridge priority for the Common and Internal Spanning tree (CST). The value lies between 0 and 61440. It is displayed in multiples of 4096.

Bridge Identifier The bridge identifier for the CST. It is made up using the bridge priority and the base MAC address of the bridge.

Time Since Topology Change Time in seconds.

Topology Change Count Number of times changed.

Topology Change Boolean value of the Topology Change parameter for the switch indicating if a topology change is in progress on any port assigned to the common and internal spanning tree.

Designated Root The bridge identifier of the root bridge. It is made up from the bridge priority and the base MAC address of the bridge.

Root Path Cost Value of the Root Path Cost parameter for the common and internal spanning tree.

Root Port Identifier Identifier of the port to access the Designated Root for the CST.

Root Port Max Age Derived value.

Root Port Bridge Forward Delay Derived value.

Hello Time Configured value of the parameter for the CST.

Bridge Hold Time Minimum time between transmission of Configuration Bridge Protocol Data Units (BPDUs)

Bridge Max Hops Bridge max-hops count for the device.

CST Regional Root Bridge Identifier of the CST Regional Root. It is made up using the bridge priority and the base MAC address of the bridge.

Regional Root Path Cost Path Cost to the CST Regional Root.

Associated FIDs List of forwarding database identifiers currently associated with this instance.

Associated VLANs List of VLAN IDs currently associated with this instance.

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

Bridge Priority Configured value.

Bridge Identifier The bridge identifier for the selected MST instance. It is made up using the bridge priority and the base MAC address of the bridge.

Bridge Max Age Configured value.

Bridge Max Hops Bridge max-hops count for the device.

Bridge Hello Time Configured value.

Bridge Forward Delay Configured value.

Bridge Hold Time Minimum time between transmission of Configuration Bridge Protocol Data Units (BPDUs)

show spanning-tree summary

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

Format `show spanning-tree summary`

Modes `Privileged EXEC`

`User EXEC`

Spanning Tree Adminmode Enabled or disabled.

Spanning Tree Version Version of 802.1 currently supported (IEEE 802.1s, IEEE 802.1w, or IEEE 802.1d) based upon the Force Protocol Version parameter.

Configuration Name Identifier used to identify the configuration currently being used.

Configuration Revision Level Identifier used to identify the configuration currently being used.

Configuration Digest Key Identifier used to identify the configuration currently being used.

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

show spanning-tree interface

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

Format `show spanning-tree interface` <slot/port>

Mode `Privileged EXEC`

`User EXEC`

Hello Time Admin hello time for this port.

Port mode Enabled or disabled.

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

STP BPDUs Transmitted Spanning Tree Protocol Bridge Protocol Data Units sent

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

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

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

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

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

show spanning-tree mst port detailed

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

Format `show spanning-tree mst port detailed <mstid> <slot/port>`

Mode `Privileged EXEC`
`User EXEC`

MST Instance ID The ID of the existing MST instance.

Port Identifier The port identifier for the specified port within the selected MST instance. It is made up from the port priority and the interface number of the port.

Port Priority The priority for a particular port within the selected MST instance. The port priority is displayed in multiples of 16.

Port Forwarding State Current spanning tree state of this port.

Port Role Each enabled MST Bridge Port receives a Port Role for each spanning tree. The port role is one of the following values: Root Port, Designated Port, Alternate Port, Backup Port, Master Port or Disabled Port

Auto-Calculate Port Path Cost This indicates whether auto calculation for port path cost is enabled.

Port Path Cost Configured value of the Internal Port Path Cost parameter.

Auto-Calculate External Port Path Cost This indicates whether auto calculation for external port path cost is enabled.

External Port Path Cost Configured value of the external Port Path Cost parameter.

Designated Root The Identifier of the designated root for this port.

Designated Port Cost Path Cost offered to the LAN by the Designated Port

Designated Bridge Bridge Identifier of the bridge with the Designated Port.

Designated Port Identifier Port on the Designated Bridge that offers the lowest cost to the LAN.

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

Port Identifier The port identifier for this port within the CST.

Port Priority The priority of the port within the CST.

Port Forwarding State The forwarding state of the port within the CST.

Port Role The role of the specified interface within the CST.

Port Path Cost The configured path cost for the specified interface.

Designated Root Identifier of the designated root for this port within the CST.

Designated Port Cost Path Cost offered to the LAN by the Designated Port.

Designated Bridge The bridge containing the designated port

Designated Port Identifier Port on the Designated Bridge that offers the lowest cost to the LAN

Topology Change Acknowledgement Value of flag in next Configuration Bridge Protocol Data Unit (BPDU) transmission indicating if a topology change is in progress for this port.

Hello Time The hello time in use for this port.

Edge Port The configured value indicating if this port is an edge port.

Edge Port Status The derived value of the edge port status. True if operating as an edge port; false otherwise.

Point To Point MAC Status Derived value indicating if this port is part of a point to point link.

CST Regional Root The regional root identifier in use for this port.

CST Port Cost The configured path cost for this port.

show spanning-tree mst port summary

This command displays the settings of one or all ports within the specified multiple spanning tree instance. The parameter <mstid> indicates a particular MST instance. The parameter {<slot/port> | all} indicates the desired switch port or all ports. If you specify 0 (defined as the default CIST ID) as the <mstid>, the status summary displays for one or all ports within the common and internal spanning tree.

Format **`show spanning-tree mst port summary`** <*`mstid`*> *{*<slot/port> | *`all`}*

Modes **`Privileged EXEC`**
`User EXEC`

MST Instance ID The MST instance associated with this port.

Interface Valid slot and port number separated by forward slashes.

Type Currently not used.

STP State The forwarding state of the port in the specified spanning tree instance

Port Role The role of the specified port within the spanning tree.

Link Status The operational status of the link. Possible values are “Up” or “Down”.

Link Trap The link trap configuration for the specified interface.

show spanning-tree mst summary

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

Format `show spanning-tree mst summary`

Modes `Privileged EXEC`
`User EXEC`

MST Instance ID List List of multiple spanning trees IDs currently configured.

For each MSTID:

Associated FIDs List of forwarding database identifiers associated with this instance.

Associated VLANs List of VLAN IDs associated with this instance.

show spanning-tree vlan

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

Format `show spanning-tree vlan <vlanid>`

Modes `Privileged EXEC`
`User EXEC`

VLAN Identifier The VLANs associated with the selected MST instance.

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

GVRP Commands

This section describes the commands you use to configure and view GARP VLAN Registration Protocol (GVRP) information. GVRP-enabled switches exchange VLAN configuration information, which allows GVRP to provide dynamic VLAN creation on trunk ports and automatic VLAN pruning.

NOTE: If GVRP is disabled, the system does not forward GVRP messages.

set gvrp adminmode

This command enables GVRP.

Default disabled

Format `set gvrp adminmode`

Mode `Privileged EXEC`

no set gvrp adminmode

This command disables GVRP.

Format `no set gvrp adminmode`

Mode `Privileged EXEC`

set gvrp interfacemode

This command enables GVRP.

Default disabled

Format `set gvrp interfacemode`

Modes `Interface Config`
`Global Config`

no set gvrp interfacemode

This command disables GVRP. If GVRP is disabled, Join Time, Leave Time and Leave All Time have no effect.

Format `no set gvrp interfacemode`

Modes `Interface Config`
`Global Config`

show gvrp configuration

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

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

Modes `Privileged EXEC`
`User EXEC`

Interface Valid slot and port number separated by forward slashes.

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

Leave Timer Specifies the period of time to wait after receiving an unregister request for an attribute before deleting the attribute. Current attributes are a VLAN or multicast group. This may be considered a buffer time for another station to assert registration for the same attribute in order to maintain uninterrupted service. There is an instance of this timer on a per-Port, per-GARP participant basis. Permissible values are 20 to 600 centiseconds (0.2 to 6.0 seconds). The factory default is 60 centiseconds (0.6 seconds).

LeaveAll Timer This Leave All Time controls how frequently LeaveAll PDUs are generated. A LeaveAll PDU indicates that all registrations will shortly be deregistered. Participants will need to rejoin in order to maintain registration. There

is an instance of this timer on a per-Port, per-GARP participant basis. The Leave All Period Timer is set to a random value in the range of LeaveAllTime to 1.5*LeaveAllTime. Permissible values are 200 to 6000 centiseconds (2 to 60 seconds). The factory default is 1000 centiseconds (10 seconds).

Port GMRP Mode Indicates the GARP Multicast Registration Protocol (GMRP) administrative mode for the port, which is enabled or disabled (default). If this parameter is disabled, Join Time, Leave Time and Leave All Time have no effect.

Class of Service (CoS) Commands

This section describes the commands you use to configure and view Class of Service (CoS) settings on the D-Link DES-3226L switch. The commands in this section allow you to control the priority and transmission rate of traffic.

Note: Commands you issue in the Interface Config mode affect a single interface, while commands you issue in the 'Global Config' mode affect all interfaces.

classofservice dot1p-mapping

This command maps an 802.1p priority to an internal traffic class. The <userpriority> parameter is the 802.1p priority level. The value ranges from 0-7. The <trafficclass> parameter specifies the traffic class to map to the 802.1p priority. The value ranges from 0-2. The 'no' form of this command is not supported.

Format **classofservice dot1p-mapping** *<userpriority> <trafficclass>*

Modes **Global Config**

classofservice trust dot1p

This command sets the class of service trust mode to 802.1p packet markings.

Format **classofservice trust dot1p**

Mode **Global Config**

no classofservice trust

This command sets the interface mode to untrusted.

Format **no classofservice trust**

Modes **Global Config**

traffic-shape

This command specifies the maximum transmission bandwidth limit for the interface as a whole. Traffic shaping smoothes temporary traffic bursts over time so that the transmitted traffic rate is bounded. The *<0-100>* value is the percentage of port speed. For example, a value of 20 means that the port speed for egress traffic is at 20% of the maximum rate. The **<rate** *0-10000000***>** is the absolute bandwidth value of the port in kbps in increments of 64 kbps.

The default traffic shaping value is 0, meaning no upper limit is enforced, which allows the interface to transmit up to its maximum traffic rate.

Default 0

Format **traffic-shape** *{<0-100> | rate <0-10000000>}*

Modes **Global Config**
Interface Config

Note: The value is independent of any per-queue maximum bandwidth value(s) in effect for the interface and should be considered as a second-level transmission rate control mechanism that regulates the output of the entire interface regardless of which queues originate the outbound traffic.

no traffic-shape

This command restores the egress port speed to the default value.

Format **no traffic-shape**

Modes **Global Config**
Interface Config

rate-limit

This command allows you to limit the rate of ingress traffic arriving on the port. You can set the rate on a per-port basis or on all ports. The *<0-100>* value is the percentage of bandwidth to limit. For example, a value of 20 means that the port speed for ingress traffic is at 20% of the maximum rate. The **<rate** *0-10000000>* value is the absolute bandwidth value in increments of 64 kbps.

The default ingress rate shaping value is 0, meaning no upper limit is enforced, which allows the port to accept up to its maximum traffic rate.

Default 0

Format **rate-limit** *{<0-100> | rate <0-10000000>}*

Modes **Global Config**
Interface Config

no rate-limit

This command restores the ingress port speed to the default value.

Format **no rate-limit**

Modes **Global Config**
Interface Config

show classofservice dot1p-mapping

This command displays the current Dot1p (802.1p) priority mapping to internal traffic classes for a specific interface. The slot/port parameter is optional and is only valid on platforms that support independent per-port class of service mappings. If specified, the 802.1p mapping table of the interface is displayed. If omitted, the most recent global configuration settings are displayed.

Format **show classofservice dot1p-mapping** *[*slot/port*]*

Mode **Privileged EXEC**

The following information is repeated for each user priority.

User Priority The 802.1p user priority value.

Traffic Class The traffic class internal queue identifier to which the user priority value is mapped.

show classofservice trust

This command displays the current trust mode setting for a specific interface. The slot/port parameter is optional and is only valid on platforms that support independent per-port class of service mappings. If specified, the port trust mode of the interface is displayed. If omitted, the most recent global configuration settings are displayed.

Format **show classofservice trust** *[*<slot/port>*]*

Mode **Privileged EXEC**

show interfaces cos-queue

This command displays the class-of-service queue configuration for the specified interface. The slot/port parameter is optional and is only valid on platforms that support independent per-port class of service mappings. If specified, the class-of-service queue configuration of the interface is displayed. If omitted, the most recent global configuration settings are displayed.

Format **show interfaces cos-queue** *[*<slot/port>*]*

Mode **Privileged EXEC**

Interface This displays the slot/port of the interface. If displaying the global configuration, this output line is replaced with a Global Config indication.

Intf Shaping Rate The maximum transmission bandwidth limit for the interface as a whole. It is independent of any per-queue maximum bandwidth value(s) in effect for the interface. This is a configured value.

Access and Security Commands

This section provides a detailed explanation of the access and security commands available on the D-Link DES-3226L switch. The security commands section includes the following subsections:

This section provides a detailed explanation of the security commands. The commands are divided into the following groups:

- Configuration commands are used to configure features and options of the switch. For every configuration command there is a show command that will display the configuration setting.
- Show commands are used to display switch settings, statistics and other information.

User Account Commands

The D-Link DES-3226L switch has two default users: admin and guest. The admin user can view and configure system settings, and the guest user can view settings. This section describes the commands you use to add, manage, and delete system users.

Note: You cannot delete the admin user, and there is only one user allowed with read/write privileges. You can configure up to five read-only users on the system.

users name

This command adds a new user account, if space permits. The account <username> can be up to eight characters in length. You can use alphanumeric characters as well as the dash ('-') and underscore ('_'). The <username> is not case-sensitive.

You can define up to six user names.

Format `users name <username>`

Mode `Global Config`

no users name

This command removes a user account.

Format `no users name <username>`

Mode `Global Config`

Note: You cannot delete the "admin" user account.

users passwd

Use this command to change a password. Passwords are a maximum of eight alphanumeric characters. If a user is authorized for authentication or encryption is enabled, the password length must be at least

eight alphanumeric characters. The username and password are not case-sensitive. When you change a password, a prompt asks for the old password. If there is no password, press enter.

Default. no password

Format. **users passwd** *<username>*

Mode **Global Config**

no users passwd

This command sets the password of an existing user to blank. When you change a password, a prompt asks for the old password. If there is no password, press enter.

Format. **no users passwd** *<username>*

Mode. **Global Config**

users snmpv3 accessmode

This command specifies the snmpv3 access privileges for the specified login user. The valid accessmode values are **readonly** or **readwrite**. The <**username>** is the login user name for which the specified access mode applies. The default is **readwrite** for the "admin" user and **readonly** for all other users

Default admin - readwrite; other - readonly

Format **users snmpv3 accessmode** *<username> {readonly | readwrite}*

Mode **Global Config**

no users snmpv3 accessmode

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

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

Mode **Global Config**

users snmpv3 authentication

This command specifies the authentication protocol to be used for the specified user. The valid authentication protocols are **none**, **md5** or **sha**. If you specify **md5** or **sha**, the login password is also used as the snmpv3 authentication password and therefore must be at least eight characters in length. The <*username***>** is the user name associated with the authentication protocol.

Default no authentication

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

Mode **Global Config**

no users snmpv3 authentication

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

Format `users snmpv3 authentication <username>`

Mode `Global Config`

users snmpv3 encryption

This command specifies the encryption protocol used for the specified user. The valid encryption protocols are **des** or **none.**

If you select **des**, you can specify the required key on the command line. The encryption key must be 8 to 64 characters long. If you select the **des** protocol but do not provide a key, the user is prompted for the key. When you use the **des** protocol, the login password is also used as the snmpv3 encryption password, so it must be a minimum of eight characters. If you select **none**, you do not need to provide a key.

The <username> value is the login user name associated with the specified encryption.

Default no encryption

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

Mode `Global Config`

no users snmpv3 encryption

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

Format `no users snmpv3 encryption <username>`

Mode `Global Config`

show loginsession

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

Format `show loginsession`

Mode `Privileged EXEC`

ID Login Session ID

User Name The name the user will use to login using the serial port or Telnet.

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

Idle Time Time this session has been idle.

Session Time Total time this session has been connected.

show users

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

Format `show users`

Mode `Privileged EXEC`

User Name The name the user enters to login using the serial port, Telnet or Web.

Access Mode Shows whether the user is able to change parameters on the switch (Read/Write) or is only able to view them (Read Only). As a factory default, the "admin" user has Read/Write access and the "guest" has Read Only access. There can only be one Read/Write user and up to five Read Only users.

SNMPv3 Access Mode This field displays the SNMPv3 Access Mode. If the value is set to **`ReadWrite,`** the SNMPv3 user is able to set and retrieve parameters on the system. If the value is set to **`ReadOnly,`** the SNMPv3 user is only able to retrieve parameter information. The SNMPv3 access mode may be different than the CLI and Web access mode.

SNMPv3 Authentication This field displays the authentication protocol to be used for the specified login user.

SNMPv3 Encryption This field displays the encryption protocol to be used for the specified login user.

disconnect

This command closes a telnet session.

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

Mode `Privileged EXEC`

Port-Based Network Access Control Commands

This section describes the commands you use to configure Port-Based Network Access Control (IEEE 802.1X). Use Port-Based Network Access Control to prevent unauthenticated devices from accessing the network through the directly-connected port.

authentication login

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

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

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

To authenticate a user, the first authentication method in the user's login (authentication login list) is attempted. D-Link DES-3226L software does not utilize multiple entries in the user's login. If the first entry returns a timeout, the user authentication attempt fails.

Note: *The default login list included with the default configuration can not be changed.*

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

Mode **Global Config**

no authentication login

This command deletes the specified authentication login list. The attempt to delete fails if any of the following conditions are true:

- The login list name is invalid or does not match an existing authentication login list
- The specified authentication login list is assigned to any user or to the non configured user for any component
- The login list is the default login list included with the default configuration and was not created using 'authentication login'. The default login list cannot be deleted.

Format **no authentication login** <*listname*>

Mode **Global Config**

clear dot1x statistics

This command resets the 802.1x statistics for the specified port or for all ports.

Format **clear dot1x statistics** *{*<slot/port> | *all}*

Mode **Privileged EXEC**

clear radius statistics

This command is used to clear all RADIUS statistics.

Format **clear radius statistics**

Mode **Privileged EXEC**

dot1x default-login

This command assigns the authentication login list to use for non-configured users for 802.1x port security. This setting is over-ridden by the authentication login list assigned to a specific user if the user is configured locally. If this value is not configured, users will be authenticated using local authentication only.

Format **dot1x defaultlogin** <*listname*>

Mode **Global Config**

dot1x initialize

This command begins the initialization sequence on the specified port. This command is only valid if the control mode for the specified port is 'auto'. If the control mode is not 'auto' an error will be returned.

Format **dot1x initialize** <slot/port>

Mode **Privileged EXEC**

dot1x login

This command assigns the specified authentication login list to the specified user for 802.1x port security. The <user> parameter must be a configured user and the <listname> parameter must be a configured authentication login list.

Format **dot1x login** *<user> <listname>*

Mode **Global Config**

dot1x max-req

This command sets the maximum number of times the authenticator state machine on this port will transmit an EAPOL EAP Request/Identity frame before timing out the supplicant. The <count> value must be in the range 1 - 10.

Default 2

Format **dot1x max-req** *<count>*

Mode **Interface** Config

no dot1x max-req

This command sets the maximum number of times the authenticator state machine on this port will transmit an EAPOL EAP Request/Identity frame before timing out the supplicant.

Format **no dot1x max-req**

Mode **Interface Config**

dot1x port-control

This command sets the authentication mode to be used on the specified port. The control mode may be one of the following.

force-unauthorized: The authenticator PAE unconditionally sets the controlled port to unauthorized.

force-authorized: The authenticator PAE unconditionally sets the controlled port to authorized.

auto: The authenticator PAE sets the controlled port mode to reflect the outcome of the authentication exchanges between the supplicant, authenticator and the authentication server.

Default auto

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

Mode **Interface Config**

no dot1x port-control

This command sets the authentication mode to be used on the specified port to 'auto'.

Format **no dot1x port-control**

Mode **Interface Config**

dot1x port-control all

This command sets the authentication mode on all ports. The control mode can be:

force-unauthorized: The authenticator PAE unconditionally sets the controlled port to unauthorized.

force-authorized: The authenticator PAE unconditionally sets the controlled port to authorized.

auto: The authenticator PAE sets the controlled port mode to reflect the outcome of the authentication exchanges between the supplicant, authenticator and the authentication server.

Default auto

Format **dot1x port-control all** *{force-unauthorized | force-authorized | auto}*

Mode **Global Config**

no dot1x port-control All

This command sets the authentication mode to be used on all ports to 'auto'.

Format **no dot1x port-control all**

Mode **Global Config**

dot1x re-authenticate

This command begins the re-authentication sequence on the specified port. This command is only valid if the control mode for the specified port is 'auto'. Otherwise, an error message appears.

Format **dot1x re-authenticate <***slot/port***>**

Mode **Privileged EXEC**

dot1x re-authentication

This command enables re-authentication of the supplicant for the specified port.

Default disabled

Format **dot1x re-authenticati**on

Mode **Interface Config**

no dot1x re-authentication

This command disables re-authentication of the supplicant for the specified port.

Format **no dot1x re-authentication**

Mode **Interface Config**

dot1x system-auth-control

This command is used to enable the dot1x authentication support on the switch. By default, the authentication support is disabled. While disabled, the dot1x configuration is retained and can be changed, but is not activated.

Default disabled

Format `dot1x system-auth-control`

Mode `Global Config`

no dot1x system-auth-control

This command is used to disable the dot1x authentication support on the switch.

Format `no dot1x system-auth-control`

Mode `Global Config`

dot1x timeout

This command sets the value, in seconds, of the timer used by the authenticator state machine on this port. Depending on the token used and the value (in seconds) passed, various timeout configurable parameters are set. The following tokens are supported.

reauth-period: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to determine when re-authentication of the supplicant takes place. The reauth-period must be a value in the range 1 - 65535.

quiet-period: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to define periods of time in which it will not attempt to acquire a supplicant. The quiet-period must be a value in the range 0 - 65535.

tx-period: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to determine when to send an EAPOL EAP Request/Identity frame to the supplicant. The quiet-period must be a value in the range 1 - 65535.

supp-timeout: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to timeout the supplicant. The supp-timeout must be a value in the range 1 - 65535.

server-timeout: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to timeout the authentication server. The supp-timeout must be a value in the range 1 - 65535.

Default reauth-period: 3600 seconds
quiet-period: 60 seconds
tx-period: 30 seconds
supp-timeout: 30 seconds
server-timeout: 30 seconds

Format `dot1x timeout` *{{reauth-period <seconds>} | {quiet-period <seconds>} | {tx-period <seconds>} | {supp-timeout <seconds>} | {server-timeout <seconds>}}*

Mode Interface Config

no dot1x timeout

This command sets the value, in seconds, of the timer used by the authenticator state machine on this port to the default values. Depending on the token used, the corresponding default values are set.

Format **no dot1x timeout** *{reauth-period | quiet-period | tx-period | supp-timeout | server-timeout}*

Mode **Interface Config**

dot1x user

This command adds the specified user to the list of users with access to the specified port or all ports. The <user> parameter must be a configured user.

Format **dot1x user** *<user> {*<slot/port> | *all}*

Mode **Global Config**

no dot1x user

This command removes the user from the list of users with access to the specified port or all ports.

Format **no dot1x user** *<user> {*<slot/port> | *all}*

Mode **Global Config**

users defaultlogin

This command assigns the authentication login list to use for non-configured users when attempting to log in to the system. This setting is overridden by the authentication login list assigned to a specific user if the user is configured locally. If this value is not configured, users will be authenticated using local authentication only.

Format **users defaultlogin** *<listname>*

Mode **Global Config**

users login

This command assigns the specified authentication login list to the specified user for system login. The <**user>** must be a configured <**user>** and the <**listname>** must be a configured login list.

If the user is assigned a login list that requires remote authentication, all access to the interface from all CLI, web, and telnet sessions will be blocked until the authentication is complete.

Note that the login list associated with the ‘admin’ user can not be changed to prevent accidental lockout from the switch.

Format **users login** *<user> <listname>*

Mode **Global Config**

show authentication

This command displays the ordered authentication methods for all authentication login lists.

Format. `show authentication`

Mode `Privileged EXEC`

Authentication Login List This displays the authentication login listname.

Method 1 This displays the first method in the specified authentication login list, if any.

Method 2 This displays the second method in the specified authentication login list, if any.

Method 3 This displays the third method in the specified authentication login list, if any.

show authentication users

This command displays information about the users assigned to the specified authentication login list. If the login is assigned to non-configured users, the user "default" will appear in the user column.

Format `show authentication users` <*listname*>

Mode `Privileged EXEC`

User This field displays the user assigned to the specified authentication login list.

Component This field displays the component (User or 802.1x) for which the authentication login list is assigned.

show dot1x

This command is used to show a summary of the global dot1x configuration, summary information of the dot1x configuration for a specified port or all ports, the detailed dot1x configuration for a specified port and the dot1x statistics for a specified port - depending on the tokens used.

Format `show dot1x` *[{summary {*<slot/port> | *all}* | *{detail* <slot/port>*}* | *{statistics* <slot/port>*}]*

Mode `Privileged EXEC`

If none of the optional parameters are used, the global dot1x configuration summary is displayed.

Administrative mode Indicates whether authentication control on the switch is enabled or disabled.

If the optional parameter 'summary {<slot/port> | all}' is used, the dot1x configuration for the specified port or all ports are displayed.

Port The interface whose configuration is displayed.

Control Mode The configured control mode for this port. Possible values are force-unauthorized | force-authorized | auto.

Operating Control Mode The control mode under which this port is operating. Possible values are authorized | unauthorized.

Reauthentication Enabled Indicates whether re-authentication is enabled on this port.

Key Transmission Enabled Indicates if the key is transmitted to the supplicant for the specified port.

If the optional parameter 'detail <slot/port>' is used, the detailed dot1x configuration for the specified port are displayed.

Port The interface whose configuration is displayed.

Protocol Version The protocol version associated with this port. The only possible value is 1, corresponding to the first version of the dot1x specification.

PAE Capabilities The port access entity (PAE) functionality of this port. Possible values are Authenticator or Supplicant.

Authenticator PAE State Current state of the authenticator PAE state machine. Possible values are Initialize, Disconnected, Connecting, Authenticating, Authenticated, Aborting, Held, ForceAuthorized, and ForceUnauthorized.

Backend Authentication State Current state of the backend authentication state machine. Possible values are Request, Response, Success, Fail, Timeout, Idle, and Initialize.

Quiet Period The timer used by the authenticator state machine on this port to define periods of time in which it will not attempt to acquire a supplicant. The value is expressed in seconds and will be in the range 0 and 65535.

Transmit Period The timer used by the authenticator state machine on the specified port to determine when to send an EAPOL EAP Request/Identity frame to the supplicant. The value is expressed in seconds and will be in the range of 1 and 65535.

Supplicant Timeout The timer used by the authenticator state machine on this port to timeout the supplicant. The value is expressed in seconds and will be in the range of 1 and 65535.

Server Timeout The timer used by the authenticator on this port to timeout the authentication server. The value is expressed in seconds and will be in the range of 1 and 65535.

Maximum Requests The maximum number of times the authenticator state machine on this port will retransmit an EAPOL EAP Request/Identity before timing out the supplicant. The value will be in the range of 1 and 10.

Reauthentication Period The timer used by the authenticator state machine on this port to determine when reauthentication of the supplicant takes place. The value is expressed in seconds and will be in the range of 1 and 65535.

Reauthentication Enabled Indicates if reauthentication is enabled on this port. Possible values are ‘True” or “False”.

Key Transmission Enabled Indicates if the key is transmitted to the supplicant for the specified port. Possible values are True or False.

Control Direction Indicates the control direction for the specified port or ports. Possible values are both or in.

If the optional parameter 'statistics <slot/port>' is used, the dot1x statistics for the specified port are displayed.

Port The interface whose statistics are displayed.

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

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

EAPOL Start Frames Received The number of EAPOL start frames that have been received by this authenticator.

EAPOL Logoff Frames Received The number of EAPOL logoff frames that have been received by this authenticator.

Last EAPOL Frame Version The protocol version number carried in the most recently received EAPOL frame.

Last EAPOL Frame Source The source MAC address carried in the most recently received EAPOL frame.

EAP Response/Id Frames Received The number of EAP response/identity frames that have been received by this authenticator.

EAP Response Frames Received The number of valid EAP response frames (other than resp/id frames) that have been received by this authenticator.

EAP Request/Id Frames Transmitted The number of EAP request/identity frames that have been transmitted by this authenticator.

EAP Request Frames Transmitted The number of EAP request frames (other than request/identity frames) that have been transmitted by this authenticator.

Invalid EAPOL Frames Received The number of EAPOL frames that have been received by this authenticator in which the frame type is not recognized.

EAP Length Error Frames Received The number of EAPOL frames that have been received by this authenticator in which the frame type is not recognized.

show dot1x users

This command displays 802.1x port security user information for locally configured users.

Format **`show dot1x users`** <slot/port>

Mode **`Privileged EXEC`**

User Users configured locally to have access to the specified port.

show users authentication

This command displays all user and all authentication login information. It also displays the authentication login list assigned to the default user.

Format **`show users authentication`**

Mode **`Privileged EXEC`**

User This field lists every user that has an authentication login list assigned.

System Login This field displays the authentication login list assigned to the user for system login.

802.1x Port Security This field displays the authentication login list assigned to the user for 802.1x port security.

RADIUS Commands

This section describes the commands you use to configure the D-Link DES-3226L switch to use a Remote Authentication Dial In User Service (RADIUS) server on your network for authentication and accounting.

radius accounting mode

This command is used to enable the RADIUS accounting function.

Default `disabled`

Format `radius accounting mode`

Mode `Global Config`

no radius accounting mode

This command is used to set the RADIUS accounting function to the default value - i.e. the RADIUS accounting function is disabled.

Format `no radius accounting mode`

Mode `Global Config`

radius server host

This command is used to configure the RADIUS authentication and accounting server. If you use the <auth> parameter, the command configures the IP address to use to connect to a RADIUS authentication server. You can configure up to 3 servers per RADIUS client. If the maximum number of configured servers is reached, the command fails until you remove one of the servers by issuing the "no" form of the command. If you use the optional <port> parameter, the command configures the UDP port number to use when connecting to the configured RADIUS server. The <port> number range is 1 - 65535, with 1812 being the default value.

Note: To re-configure a RADIUS authentication server to use the default UDP <port>, set the <port> parameter to 1812.

If you use the <acct> token, the command configures the IP address to use for the RADIUS accounting server. You can only configure one accounting server. If an accounting server is currently configured, use the "no" form of the command to remove it from the configuration. The IP address you specify must match that of a previously configured accounting server. If you use the optional <port> parameter, the command configures the UDP port to use when connecting to the RADIUS accounting server. If a <port> is already configured for the accounting server, the new <port> replaces the previously configured <port>. The <port> must be a value in the range 1 - 65535, with 1813 being the default.

Note: To re-configure a RADIUS accounting server to use the default UDP <port>, set the <port> parameter to 1813.

Format `radius server host {auth | acct} <ipaddr> [<port>]`

Mode `Global Config`

no radius server host

This command is used to remove the configured RADIUS authentication server or the RADIUS accounting server. If the 'auth' token is used, the previously configured RADIUS authentication server is removed from the configuration. Similarly, if the 'acct' token is used, the previously configured RADIUS accounting server is removed from the configuration. The <ipaddr> parameter must match the IP address of the previously configured RADIUS authentication / accounting server.

Format `no radius server host {auth | acct} <ipaddress>`

Mode `Global Config`

radius server key

This command is used to configure the shared secret between the RADIUS client and the RADIUS accounting / authentication server. Depending on whether the 'auth' or 'acct' token is used, the shared secret is configured for the RADIUS authentication or RADIUS accounting server. The IP address provided must match a previously configured server. When this command is executed, the secret is prompted.

Note: The secret must be an alphanumeric value not exceeding 16 characters.

Format `radius server key {auth | acct} <ipaddr>`

Mode `Global Config`

radius server msgauth

This command enables the message authenticator attribute for a specified server.

Default `radius server msgauth <ipaddr>`

Mode `Global Config`

no radius server msgauth

This command disables the message authenticator attribute for a specified server.

Default `no radius server msgauth <ipaddr>`

Mode `Global Config`

radius server primary

This command is used to configure the primary RADIUS authentication server for this RADIUS client. The primary server is the one that is used by default for handling RADIUS requests. The remaining configured servers are only used if the primary server cannot be reached. A maximum of three servers can be configured on each client. Only one of these servers can be configured as the primary. If a primary server is already configured prior to this command being executed, the server specified by the

IP address specified used in this command will become the new primary server. The IP address must match that of a previously configured RADIUS authentication server.

Format `radius server primary <ipaddr>`

Mode `Global Config`

radius server retransmit

This command sets the maximum number of times a request packet is re-transmitted when no response is received from the RADIUS server. The retries value is an integer in the range of 1 to 15.

Default 4

Format `radius server retransmit <retries>`

Mode `Global Config`

no radius server retransmit

This command sets the maximum number of times a request packet is re-transmitted, to the default value.

Format `no radius server retransmit`

Mode `Global Config`

radius server timeout

This command sets the timeout value (in seconds) after which a request must be retransmitted to the RADIUS server if no response is received. The timeout value is an integer in the range of 1 to 30.

Default 5

Format `radius server timeout <seconds>`

Mode `Global Config`

no radius server timeout

This command sets the timeout value to the default value.

Format `no radius server timeout`

Mode `Global Config`

show radius

This command is used to display the various RADIUS configuration items for the switch as well as the configured RADIUS servers. If the optional token 'servers' is not included, the following RADIUS configuration items are displayed.

Format `show radius [servers]`

Mode `Privileged EXEC`

Primary Server IP Address Indicates the configured server currently in use for authentication.

Number of configured servers The configured IP address of the authentication server.

Max number of retransmits The configured value of the maximum number of times a request packet is retransmitted.

Timeout Duration The configured timeout value, in seconds, for request re-transmissions.

Accounting Mode Yes or No.

If the optional token 'servers' is included, the following information regarding the configured RADIUS servers is displayed.

IP Address IP Address of the configured RADIUS server.

Port The port in use by this server.

Type Primary or secondary.

Secret Configured Yes / No.

Message Authenticator Enables or disables. the message authenticator attribute for the selected server.

show radius accounting

This command is used to display the configured RADIUS accounting mode, accounting server and the statistics for the configured accounting server.

Format `show radius accounting` *`[statistics <ipaddr>]`*

Mode `Privileged EXEC`

If the optional token 'statistics <ipaddr>' is not included, then only the accounting mode and the RADIUS accounting server details are displayed.

Mode Enabled or disabled

IP Address The configured IP address of the RADIUS accounting server.

Port The port in use by the RADIUS accounting server.

Secret Configured Yes or No.

If the optional token 'statistics <ipaddr>' is included, the statistics for the configured RADIUS accounting server are displayed. The IP address parameter must match that of a previously configured RADIUS accounting server. The following information regarding the statistics of the RADIUS accounting server is displayed.

Accounting Server IP Address IP Address of the configured RADIUS accounting server

Round Trip Time The time interval, in hundredths of a second, between the most recent Accounting-Response and the Accounting-Request that matched it from the RADIUS accounting server.

Requests The number of RADIUS Accounting-Request packets sent to this accounting server. This number does not include retransmissions.

Retransmission The number of RADIUS Accounting-Request packets retransmitted to this RADIUS accounting server.

Responses The number of RADIUS packets received on the accounting port from this server.

Malformed Responses The number of malformed RADIUS Accounting-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators and unknown types are not included as malformed accounting responses.

Bad Authenticators The number of RADIUS Accounting-Response packets containing invalid authenticators received from this accounting server.

Pending Requests The number of RADIUS Accounting-Request packets sent to this server that have not yet timed out or received a response.

Timeouts The number of accounting timeouts to this server.

Unknown Types The number of RADIUS packets of unknown types, which were received from this server on the accounting port.

Packets Dropped The number of RADIUS packets received from this server on the accounting port and dropped for some other reason.

show radius statistics

This command is used to display the statistics for RADIUS or configured server. To show the configured RADIUS server statistic, the IP Address specified must match that of a previously configured RADIUS server. On execution, the following fields are displayed.

Format `show radius statistics` *`[ipaddr]`*

Mode `Privileged EXEC`

If the IP address is not specified, then only Invalid Server Address field is displayed. Otherwise other listed fields are displayed.

Invalid Server Addresses The number of RADIUS Access-Response packets received from unknown addresses.

Server IP Address IP Address of the Server.

Round Trip Time The time interval, in hundredths of a second, between the most recent Access-Reply, Access-Challenge and the Access-Request that matched it from the RADIUS authentication server.

Access Requests The number of RADIUS Access-Request packets sent to this server. This number does not include retransmissions.

Access Retransmission The number of RADIUS Access-Request packets retransmitted to this RADIUS authentication server.

Access Accepts The number of RADIUS Access-Accept packets, including both valid and invalid packets, which were received from this server.

Access Rejects The number of RADIUS Access-Reject packets, including both valid and invalid packets, which were received from this server.

Access Challenges The number of RADIUS Access-Challenge packets, including both valid and invalid packets, which were received from this server.

Malformed Access Responses The number of malformed RADIUS Access-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or signature attributes or unknown types are not included as malformed access responses.

Bad Authenticators The number of RADIUS Access-Response packets containing invalid authenticators or signature attributes received from this server.

Pending Requests The number of RADIUS Access-Request packets destined for this server that have not yet timed out or received a response.

Timeouts The number of authentication timeouts to this server.

Unknown Types The number of RADIUS packets of unknown types, which were received from this server on the authentication port.

Packets Dropped The number of RADIUS packets received from this server on the authentication port and dropped for some other reason.

Secure Shell (SSH) Commands

This section describes the commands you use to configure SSH. Use SSH for secure, remote access to the switch. You can have a maximum of five simultaneous SSH connections.

ip ssh

This command is used to enable SSH.

Default disabled

Format **`ip ssh`**

Mode **`Privileged EXEC`**

no ip ssh

This command is used to disable SSH.

Format **`no ip ssh`**

Mode **`Privileged EXEC`**

ip ssh protocol

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

Default 1 and 2

Format **`ip ssh protocol`** *`[1] [2]`*

Mode **`Privileged EXEC`**

sshcon maxsessions

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

Default 5

Format `sshcon maxsessions <0-5>`

Mode `Privileged EXEC`

no sshcon maxsessions

This command sets the maximum number of allowed SSH connection sessions to the default value.

Format `no sshcon maxsessions`

Mode `Privileged EXEC`

sshcon timeout

This command sets the SSH connection session timeout value, in minutes. A session is active as long as the session has been idle for the value set. The time is a decimal value from 1 to 160.

Changing the timeout value for active sessions does not become effective until the session is re accessed. Also, any keystroke activates the new timeout duration.

Default 5

Format `sshcon timeout <1-160>`

Mode `Privileged EXEC`

no sshcon timeout

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

Changing the timeout value for active sessions does not become effective until the session is re accessed. Also, any keystroke activates the new timeout duration.

Format `no sshcon timeout`

Mode `Privileged EXEC`

show ip ssh

This command displays the ssh settings.

Format `show ip ssh`

Mode `Privileged EXEC`

Administrative Mode This field indicates whether the administrative mode of SSH is enabled or disabled.

Protocol Level The protocol level may have the values of version 1, version 2 or both versions 1 and version 2.

Connections This field specifies the current SSH connections.

Hypertext Transfer Protocol (HTTP) Commands

This section describes the commands you use to configure Web-based access to the device.

ip http secure-port

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

Default 443

Format **ip http secure-port** *<portid>*

Mode **Privileged EXEC**

no ip http secure-port

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

Format **no ip http secure-port**

Mode **Privileged EXEC**

ip http secure-protocol

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

Default SSL3 and TLS1

Format **ip http secure-protocol** *[SSL3] [TLS1]*

Mode **Privileged EXEC**

ip http secure-server

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

Default disabled

Format **ip http secure-server**

Mode **Privileged EXEC**

no ip http secure-server

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

Format **no ip http secure-server**

Mode **Privileged EXEC**

ip http server

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

Disabling the Web interface takes effect on all interfaces immediately.

Default enabled

Format `ip http server`

Mode `Privileged EXEC`

no ip http server

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

Format `no ip http server`

Mode `Privileged EXEC`

show ip http

This command displays the http settings for the switch.

Format `show ip http`

Mode `Privileged EXEC`

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

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

Secure Port This field specifies the port configured for SSLT.

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

System Maintenance Commands

This section describes the commands you use to view system information, view and configure system logs, troubleshoot connectivity, and restore various settings to their factory defaults.

The system maintenance commands section includes the following subsections:

The commands in this section are in one of four functional groups:

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

System Information and Statistics Commands

This section describes the commands you use to view information about system features, components, and configurations.

show arp switch

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

Format `show arp switch`

Mode `Privileged EXEC`

MAC Address A unicast MAC address for which the switch has forwarding and/or filtering information. The format is 6 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB

IP Address The IP address assigned to each interface.

Interface Valid slot and port number separated by forward slashes.

show eventlog

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

Format `show eventlog`

Mode `Privileged EXEC`

File The file in which the event originated.

Line The line number of the event

Task Id The task ID of the event.

Code The event code.

Time The time this event occurred.

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

show hardware

This command displays inventory information for the switch.

Format `show hardware`

Mode `Privileged EXEC`

Switch Description Text used to identify the product name of this switch.

Machine Type Specifies the machine model as defined by the Vital Product Data.

Machine Model Specifies the machine model as defined by the Vital Product Data.

Serial Number The unique box serial number for this switch.

FRU Number The field replaceable unit number.

Part Number Manufacturing part number.

Maintenance Level Indicates hardware changes that are significant to software.

Manufacturer Manufacturer descriptor field.

Burned in MAC Address Universally assigned network address.

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

Operating System The operating system currently running on the switch.

Network Processing Device The type of the processor microcode.

show interface

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

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

Mode `Privileged EXEC`

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

show interface ethernet

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

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

Mode **Privileged EXEC**

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

Packets Received

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

interval. The result of this equation is the value Utilization which is the percent utilization of the Ethernet segment on a scale of 0 to 100 percent.

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

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

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

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

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

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

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

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

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

Packets Received Successfully

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

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

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

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

Packets Received with MAC Errors

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

Jabbers Received - The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS

Error) or a bad FCS with a non-integral number of octets (Alignment Error). Note that this definition of jabber is different than the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.

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

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

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

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

Received Packets Not Forwarded

Total - A count of valid frames received which were discarded (in other words, filtered) by the forwarding process.

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

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

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

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

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

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

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

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

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

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

Packets Transmitted Successfully

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

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

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

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

Transmit Errors

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

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

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

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

Transmit Discards

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

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

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

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

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

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

Protocol Statistics

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

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

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

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

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

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

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

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

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

Dot1x Statistics

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

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

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

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

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

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

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

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

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

Receive Packets Discarded - The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent

their being deliverable to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

show logging

This command displays the trap log maintained by the switch. The trap log contains a maximum of 256 entries that wrap.

Format `show logging`

Mode `Privileged EXEC`

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

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

Log The sequence number of this trap.

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

Trap The relevant information of this trap.

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

show mac-addr-table

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

Format **show mac-addr-table** *[<macaddr> | all]*

Mode **Privileged EXEC**

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

Interface The port which this address was learned.

Interface Index This object indicates the ifIndex of the interface table entry associated with this port.

Status The status of this entry. The meanings of the values are:

Static The value of the corresponding instance was added by the system or a user when a static MAC filter was defined. It cannot be relearned.

Learned The value of the corresponding instance was learned by observing the source MAC addresses of incoming traffic, and is currently in use.

Management The value of the corresponding instance (system MAC address) is also the value of an existing instance of dot1dStaticAddress. It is identified with interface 0/1.

Self The value of the corresponding instance is the address of one of the switch's physical interfaces (the system's own MAC address).

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

show running-config

This command is used to display/capture the current setting of different protocol packages supported on the switch. This command displays/captures commands with settings/configurations that differ from the default value. To display/capture the commands with settings/configurations that are equal to the default value, the user must include the [all] option.

The output is displayed in script format, which can be used to configure another switch with the same configuration. If the optional <scriptname> is provided with a file name extension of ".scr", the output is redirected to a script file.

Format `show running-config [all | <scriptname>]`

Mode `Privileged EXEC`

show sysinfo

This command displays switch information.

Format `show sysinfo`

Mode `Privileged EXEC`

Switch Description Text used to identify this switch.

System Name Name used to identify the switch.

System Location Text used to identify the location of the switch. May be up to 31 alpha-numeric characters. The factory default is blank.

System Contact Text used to identify a contact person for this switch. May be up to 31 alpha-numeric characters. The factory default is blank.

System ObjectID The base object ID for the switch's enterprise MIB.

System Up Time The time in days, hours and minutes since the last switch reboot.

MIBs Supported A list of MIBs supported by this agent.

Logging Commands

This section describes the commands you use to configure system logging, and to view logs and the logging settings.

logging persistent

This command enables logging of system startup and system operation logs to storage. The <severitylevel> value is specified as either an integer from 0 to 7 or symbolically through one of the following keywords: EMERGENCY (0), ALERT (1), CRITICAL (2), ERROR (3), WARNING (4), NOTICE (5), INFORMATIONAL (6), DEBUG (7).

Default `enabled; severitylevel - critical`

Format `logging persistent [<severitylevel>]`

Mode `Global Config`

no logging persistent

This command disables logging. It does not clear the contents of the log.

Format `no logging persistent`

Mode `Global Config`

logging host

This command enables logging to a host where up to eight hosts can be configured. The *<port>* value is a port number. The *<severitylevel>* value is specified as either an integer from 0 to 7 or symbolically through one of the following keywords: EMERGENCY (0), ALERT (1), CRITICAL (2), ERROR (3), WARNING (4), NOTICE (5), INFORMATIONAL (6), DEBUG (7).

Default `Port - 514; Level - Critical;`

Format `logging host` *<ipaddress> [<port>] [<severitylevel>]*

Mode `Global Config`

logging host remove

This command disables logging to host. See “show logging hosts” on page 116 for a list of host indices.

Format. `logging host remove` *<hostindex>*

Mode `Global Config`

logging syslog

This command enables syslog logging.

Default `disabled; local0`

Format `logging syslog`

Mode `Global Config`

no logging syslog

This command disables syslog logging.

Format `no logging syslog`

Mode `Global Config`

show logging

This command displays logging.

Format `show logging`

Mode `Privileged EXEC`

Client Local Port The port on the collector/relay to which syslog messages are sent.

Historical Logging Administrative Mode The mode for historical logging.

Historical Logging Severity Filter The minimum severity to log to the historical log. Messages with an equal or lower numerical severity are logged.

Syslog Logging Administrative Mode The mode for logging to configured syslog hosts. If set to disable logging stops to all syslog hosts.

Log Messages Received The number of messages received by the log process. This includes messages that are dropped or ignored

Log Messages Dropped The number of messages that could not be processed.

show logging persistent

This command displays logging.

Format `show logging persistent`

Mode `Privileged EXEC`

Persistent Logging Administrative Mode The mode for historical logging.

Persistent Logging Severity Filter The minimum severity to log to the historical log. Messages with an equal or lower numerical severity are logged.

Persistent Log Count The number of messages received by the log process. This includes messages that are dropped or ignored

show logging hosts

This command displays all configured logging hosts.

Format `show logging hosts`

Mode `Privileged EXEC`

Host Index (Used for deleting hosts)

Severity Level The minimum severity to log to the specified address.

Port Server Port Number. This is the port on the local host from which syslog messages are sent.

Host Status The state of logging to configured syslog hosts. If the status is disabled, no logging occurs.

show logging traplogs

This command displays SNMP trap events and statistics.

Format `show logging traplogs`

Mode `Privileged EXEC`

Number of Traps Since Last Reset Shows the number of traps since the last boot.

Trap Log Capacity Shows the number of traps the system can retain.

Number of Traps Since Log Last Viewed Shows the number of new traps since the command was last executed.

Log Shows the log number.

System Time Up Shows how long the system had been running at the time the trap was sent.

Trap Shows the text of the trap message.

System Utility Commands

This section describes the commands you use to help troubleshoot connectivity issues and to restore various configurations to their factory defaults.

traceroute

Use the **`traceroute`** command to discover the routes that packets actually take when traveling to their destination through the network on a hop-by-hop basis. The <ipaddr> value should be a valid IP address. The [port] value should be a valid decimal integer in the range of 0(zero) to 65535. The default value is 33434.

The optional port parameter is the UDP port used as the destination of packets sent as part of the traceroute. This port should be an unused port on the destination system.

Format **`traceroute`** *<ipaddr> [port]*

Mode **`Privileged EXEC`**

clear config

This command resets the configuration to the factory defaults without powering off the switch. When you issue this command, a prompt appears to confirm that the reset should proceed. When you enter **y**, you automatically reset the switch.

Format **`clear config`**

Mode **`Privileged EXEC`**

clear counters

This command clears the statistics for a specified <slot/port>, for all the ports, or for the entire switch based upon the argument.

Format **`clear counters`** *{*<slot/port> | *all}*

Mode **`Privileged EXEC`**

clear igmpsnooping

This command clears the tables managed by the IGMP Snooping function and attempts to delete these entries from the Multicast Forwarding Database.

Format **`clear igmpsnooping`**

Mode **`Privileged EXEC`**

clear pass

This command resets all user passwords to the factory defaults without powering off the switch. You are prompted to confirm that the password reset should proceed.

Format `clear pass`

Mode `Privileged EXEC`

enable passwd

This command prompts you to change the Privileged EXEC password.

Format `enable passwd`

Mode `User EXEC`

clear port-channel

This command clears all port-channels (LAGs).

Format `clear port-channel`

Mode `Privileged EXEC`

clear traplog

This command clears the trap log.

Format `clear traplog`

Mode `Privileged EXEC`

clear vlan

This command resets VLAN configuration parameters to the factory defaults.

Format `clear vlan`

Mode `Privileged EXEC`

logout

This command closes the current telnet connection or resets the current serial connection.

Note: Save configuration changes before logging out.

Format `logout`

Mode `Privileged EXEC`

ping

This command checks if another computer is on the network and listens for connections. To use this command, configure the switch for network (in-band) connection. The source and target devices must have the ping utility enabled and running on top of TCP/IP. You can ping the switch from any IP workstation the switch is connected to through the default VLAN (VLAN 1), as long as there is a

physical path between the switch and the workstation. The terminal interface sends three pings to the target station.

Format **ping** <*ipaddr*>

Modes **Privileged EXEC**
User EXEC

reload

This command resets the switch without powering it off. Reset means that all network connections are terminated and the boot code executes. The switch uses the stored configuration to initialize the switch. You are prompted to confirm that the reset should proceed. The LEDs on the switch indicate a successful reset.

Format **reload**

Mode **Privileged EXEC**

copy

This command uploads and downloads files to and from the switch. You can specify local URLs using tftp or xmodem. You can specify one of the following four files as the source file for uploading from the switch: startup configuration (**nvram:startup-config**), error log (**nvram:errorlog**), trap log (**nvram:traplog**) and configuration script (**nvram:script** <*scriptname*>). Specify a URL (tftp://<ip address>/<filepath>/<filename>) for the destination.

Use the **copy** command to download the startup configuration, code image or configuration script by specifying the source URL and destination as **nvram:startup-config**, **system:image** or **nvram:script,** respectively. During the download of a configuration script, the **copy** command validates the script. In case of any error, the command lists all the lines at the end of the validation process and prompts you to confirm before copying the script file.

Use the **copy** command to download secure shell (ssh) key files, including **nvram:sshkey-rsa, nvram:sshkey-rsa2**, and **nvram:sshkey-dsa**. See “Secure Shell (SSH) Commands” on page 100 for more information.

Use the **copy** command to download HTTP secure-server certificates, including **nvram:sslpem-root**, **nvram:sslpem-server**, **nvram:sslpem-dhweak**, and **nvram:sslpem-dhstrong**. For more information, see “Hypertext Transfer Protocol (HTTP) Commands” on page 102.

Use the **copy** command to save the running configuration to nvram by specifying the source as **system:running-config** and the destination as **nvram:startup-config**.

Default **none**

Format **copy nvram:startup-config** <*tftp://<ipaddr>/<filepath>/<filename>>*
copy nvram:errorlog <*tftp://<ipaddr>/<filepath>/<filename>>*
copy nvram:script <*scriptname*> <*tftp://<ipaddr>/<filepath>/<filename>>*
copy nvram:traplog <*tftp://<ipaddr>/<filepath>/<filename>>*
copy system:running-config nvram:startup-config
copy <*tftp://<ipaddr>/<filepath>/<filename>>* **nvram:clibanner**
copy <*tftp://<ipaddr>/<filepath>/<filename>>* **nvram:script**
copy <*tftp://<ipaddr>/<filepath>/<filename>>* **nvram:sshkey-dsa**
copy <*tftp://<ipaddr>/<filepath>/<filename>>***nvram:sshkey-rsa1**
copy <*tftp://<ipaddr>/<filepath>/<filename>>* **nvram:sshkey-rsa2**

copy *<tftp://<ipaddr>/<filepath>/<filename>>* **nvram:sslpem-root**
copy *<tftp://<ipaddr>/<filepath>/<filename>>***nvram:sslpem-server**
copy *<tftp://<ipaddr>/<filepath>/<filename>>* **nvram:sslpem-dhweak**
copy *<tftp://<ipaddr>/<filepath>/<filename>>* **nvram:sslpem-dhstrong**
copy *<tftp://<ipaddr>/<filepath>/<filename>>* **nvram:startup-config**
copy *<tftp://<ipaddr>/<filepath>/<filename>>* **system:image**

Mode **Privileged EXEC**

Configuration Scripting Commands

Configuration Scripting allows you to generate text-formatted script files representing the current configuration. You can upload these configuration script files to a PC or UNIX system and edit them. Then, you can download the edited files to the system and apply the new configuration. You can apply configuration scripts to one or more switches with no or minor modifications.

Use the **show running-config** command (see "show running-config" on page 114) to capture the running configuration into a script. Use the **copy** command (see "copy" on page 119) to transfer the configuration script to or from the switch.

You should use scripts on systems with default configuration; however, you are not prevented from applying scripts on systems with non-default configurations.

Note: Scripts must conform to the following rules:

- The file extension must be ".scr".
- A maximum of ten scripts are allowed on the switch.
- The combined size of all script files on the switch shall not exceed 2048 KB.
- The maximum number of configuration file command lines is 2000.

You can type single-line annotations at the command prompt to use when you write test or configuration scripts. These comments improve script readability. The exclamation point (!) character flags the beginning of a comment. The comment flag character can begin a word anywhere on the command line, and all input following this character is ignored. Any command line that begins with the "!" character is recognized as a comment line and ignored by the parser.

For example:

```
! Script file for displaying the interface

! Display information about interfaces

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

! Display information about the next interface

show interface 0/2

! End of the script file
```

script apply

This command applies the commands in the script to the switch. The <scriptname> parameter is the name of the script to apply.

Format **script apply** *<scriptname>*

Mode **Privileged EXEC**

script delete

This command deletes a specified script where the <scriptname> parameter is the name of the script to delete. The “all” option deletes all the scripts present on the switch.

Format **script delete** *{<scriptname> | all}*

Mode **Privileged EXEC**

script list

This command lists all scripts present on the switch as well as the remaining available space.

Format. script list

Mode **Privileged EXEC**

Configuration Script Name of the script.

Size Size of the script.

script show

This command displays the contents of a script file. The parameter <scriptname> is the name of the script file.

Format **script show** *<scriptname>*

Mode **Privileged EXEC**

Output Format **line** *<number>*: *<line contents>*

script validate

This command validates a script file by parsing each line in the script file where <scriptname> is the name of the script to validate.The validate option is intended to be used as a tool for script development. Validation identifies potential problems. It may or may not identify all problems with a given script on any given box.

Format **script validate** *<scriptname>*

Mode **Privileged EXEC**

Glossary

Numerics

802.1D. The IEEE designator for Spanning Tree Protocol (STP). STP, a link management protocol, is part of the 802.1D standard for media access control bridges. Using the spanning tree algorithm, STP provides path redundancy while preventing endless loops in a network. An endless loop is created by multiple active paths between stations where there are alternate routes between hosts. To establish path redundancy, STP creates a logical tree that spans all of the switches in an extended network, forcing redundant paths into a standby, or blocked, state. STP allows only one active path at a time between any two network devices (this prevents the loops) but establishes the redundant links as a backup if the initial link should fail. If STP costs change, or if one network segment in the STP becomes unreachable, the spanning tree algorithm reconfigures the spanning tree topology and reestablishes the link by activating the standby path. Without spanning tree in place, it is possible that both connections may be simultaneously live, which could result in an endless loop of traffic on the LAN.

802.1P. The IEEE protocol designator for Local Area Network (LAN). This Layer 2 network standard improves support of time critical traffic, and limits the extent of high bandwidth multicast traffic within a bridged LAN. To do this, 802.1P defines a methodology for introducing traffic class priorities. The 802.1P standard allows priority to be defined in all 802 MAC protocols (Ethernet, Token Bus, Token Ring), as well as in FDDI. For protocols (such as Ethernet) that do not contain a priority field, 802.1P specifies a method for indicating frame priority based on the new fields defined in the 802.1Q (VLAN) standard.

802.1Q VLAN. The IEEE protocol designator for Virtual Local Area Network (VLAN). This standard provides VLAN identification and quality of service (QoS) levels. Four bytes are added to an Ethernet frame to allow eight priority levels (QoS) and to identify up to 4096 VLANs. See “VLAN” on page 127 for more information.

A

Address Resolution Protocol. An Internet Protocol that dynamically maps Internet addresses to physical (hardware) addresses on a LAN.

Aging. When an entry for a node is added to the lookup table of a switch, it is given a timestamp. Each time a packet is received from a node, the timestamp is updated. The switch has a user-configurable timer that erases the entry after a certain length of time with no activity from that node.

B

BPDU. See “Bridge Protocol Data Unit” on page 123.

BootP. See “Bootstrap Protocol.” on page 123.

Bootstrap Protocol. An Internet protocol that enables a diskless workstation to discover its own IP address, the IP address of a BootP server on the network, and a file to be loaded into memory to boot the machine. This enables the workstation to boot without requiring a hard or floppy disk drive.

Bridge Protocol Data Unit. BPDU is the IEEE 802.1D MAC Bridge Management protocol that is the standard implementation of STP (Spanning Tree Protocol). It uses the STP algorithm to insure that physical loops in the network topology do not result in logical looping of network traffic. Using one bridge configured as root for reference, the BPDU switches one of two bridges forming a network loop into standby mode, so that only one side of a potential loop passes traffic. By examining frequent 802.1d configuration updates, a bridge in the standby mode can switch automatically into the forward mode if the other bridge forming the loop fails.

C

Checksum. A simple error-detection scheme in which each transmitted message is identified with a numerical value based on the number of set bits in the message. The receiving station then applies a formula to the message and checks to make sure the accompanying numerical value is the same. If not, the receiver can assume that the message has been corrupted.

CLI. See “Command Line Interface” on page 123.

Command Line Interface. CLI is a line-item interface for configuring systems. (In the case of D-Link, it is one of the user interfaces they have programmed for allowing programmers to configure their system).

D

DHCP. See “Dynamic Host Configuration Protocol.” on page 123.

Dynamic Host Configuration Protocol. DHCP is a protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network.

In some systems, the device's IP address can even change while it is still connected. DHCP also supports a mix of static and dynamic IP addresses. Dynamic addressing simplifies network administration because the software tracks IP addresses rather than requiring an administrator to manage the task. A new computer can be added to a network without the hassle of manually assigning it a unique IP address.

E

EEPROM. See “Electronically Erasable Programmable Read Only Memory” on page 124.

Electronically Erasable Programmable Read Only Memory. EEPROM is also known as Flash memory. This is re-programmable memory.

F

FRU. The field replaceable unit number.

Fast STP. A high-performance Spanning Tree Protocol.See “STP” on page 127 for more information.

FIFO. First In First Out.

Flash Memory. See “EEPROM” on page 124.

Flow Control. The process of adjusting the flow of data from one network device to another to ensure that the receiving device can handle all of the incoming data. This is particularly important where the sending device is capable of sending data much faster than the receiving device can receive it. There are many flow control mechanisms. One of the most common flow control protocols for asynchronous communication is called xon-xoff. In this case, the receiving device sends a an “xoff” message to the sending device when its buffer is full. The sending device then stops sending data. When the receiving device is ready to receive more data, it sends an “xon” signal.

Forwarding. When a frame is received on an input port on a switch, the address is checked against the lookup table. If the lookup table has recorded the destination address, the frame is automatically forwarded on an output port.

Frame Check Sequence. The extra characters added to a frame for error detection and correction. FCS is used in X.25, HDLC, Frame Relay, and other data link layer protocols.

G

GE. See “Gigabit Ethernet” on page 124.

Gigabit Ethernet. A high-speed Ethernet connection.

H

hop count. The number of routers that a data packet passes through on its way to its destination.

I

ICMP. See “Internet Control Message Protocol” on page 124.

IGMP. See “Internet Group Management Protocol” on page 124.

IGMP Snooping. A series of operations performed by intermediate systems to add logic to the network to optimize the flow of multicast traffic; these intermediate systems (such as Layer 2 switches) listen for IGMP messages and build mapping tables and associated forwarding filters, in addition to reducing the IGMP protocol traffic. See “Internet Group Management Protocol” on page 124 for more information.

Internet Control Message Protocol. ICMP is an extension to the Internet Protocol (IP) that supports packets containing error, control, and informational messages. The PING command, for example, uses ICMP to test an Internet connection.

Internet Group Management Protocol. IGMP is the standard for IP Multicasting on the Internet. IGMP is used to establish host memberships in particular multicast groups on a single network. The mechanisms of the protocol allow a host to inform its local router, using Host Membership Reports, that it wants to receive messages addressed to a specific multicast group. All hosts conforming to Level 2 of the IP Multicasting specification require IGMP.

IP. See “Internet Protocol” on page 125.

IP Multicasting. Sending out data to distributed servers on the MBone (Multicast Backbone). For large amounts of data, IP Multicast is more efficient than normal Internet transmissions because the server can broadcast a message to many recipients simultaneously. Unlike traditional Internet traffic that requires separate connections for each source-destination pair, IP Multicasting allows many recipients to share the same source. This means that just one set of packets is transmitted for all the destinations.

Internet Protocol. The method or protocol by which data is sent from one computer to another on the Internet. Each computer (known as a host) on the Internet has at least one IP address that uniquely identifies it among all other computers on the Internet. When you send or receive data (for example, an e-mail note or a Web page), the message gets divided into little chunks called packets. Each of these packets contains both the sender's Internet address and the receiver's address. Any packet is sent first to a gateway computer that understands a small part of the Internet. The gateway computer reads the destination address and forwards the packet to an adjacent gateway that in turn reads the destination address and so forth across the Internet until one gateway recognizes the packet as belonging to a computer within its immediate neighborhood or domain. That gateway then forwards the packet directly to the computer whose address is specified.

Because a message is divided into a number of packets, each packet can, if necessary, be sent by a different route across the Internet. Packets can arrive in a different order than they were sent. The Internet Protocol just delivers them. It's up to another protocol, the Transmission Control Protocol (TCP) to put them back in the right order. IP is a connectionless protocol, which means that there is no continuing connection between the end points that are communicating. Each packet that travels through the Internet is treated as an independent unit of data without any relation to any other unit of data. (The reason the packets do get put in the right order is because of TCP, the connection-oriented protocol that keeps track of the packet sequence in a message.) In the Open Systems Interconnection (OSI) communication model, IP is in Layer 3, the Networking Layer. The most widely used version of IP today is IP version 4 (IPv4). However, IP version 6 (IPv6) is also beginning to be supported. IPv6 provides for much longer addresses and therefore for the possibility of many more Internet users. IPv6 includes the capabilities of IPv4 and any server that can support IPv6 packets can also support IPv4 packets.

IVL. Independent VLAN Learning (IVL) allows unicast address-to-port mappings to be created based on a MAC Address in conjunction with a VLAN ID.

L

LAN. See “Local Area Network” on page 125.

Learning. The bridge examines the Layer 2 source addresses of every frame on the attached networks (called listening) and then maintains a table, or cache, of which MAC addresses are attached to each of its ports.

Local Area Network. A group of computers that are located in one area and are connected by less than 1,000 feet of cable. A typical LAN might interconnect computers and peripherals on a single floor or in a single building. LANs can be connected together, but if modems and telephones connect two or more LANs, the larger network constitutes what is called a WAN or Wide Area Network.

M

MAC. (1) Medium Access Control. In LANs, the sublayer of the data link control layer that supports medium-dependent functions and uses the services of the physical layer to provide services to the logical link control (LLC) sublayer. The MAC sublayer includes the method of determining when a device has access to the transmission medium. (2) Message Authentication Code. In computer security, a value that is a part of a message or accompanies a message and is used to determine that the contents, origin, author, or other attributes of all or part of the message are as they appear to be. (*IBM Glossary of Computing Terms*)

Management Information Base. When SNMP devices send SNMP messages to the management console (the device managing SNMP messages), it stores information in the MIB.

MDC. Management Data Clock.

MDI. Management Data Interface.

MDIO. Management Data Input/Output.

MDIX. Management Dependent Interface Crossover.

MIB. See “Management Information Base” on page 125.

Multicasting. To transmit a message to specific recipients across a network. A simple example of multicasting is sending an e-mail message to a mailing list. Teleconferencing and videoconferencing also use multicasting, but require more robust protocols and networks. Standards are being developed to support multicasting over a TCP/IP network such as the Internet. These standards, IP Multicast and Mbone, will allow users to easily join multicast groups. Note that multicasting refers to sending a message to a select group whereas broadcasting refers to sending a message to everyone connected to a network. The terms multicast and narrowcast are often used interchangeably, although narrowcast usually refers to the business model whereas multicast refers to the actual technology used to transmit the data.

Multiplexing. A function within a layer that interleaves the information from multiple connections into one connection.

MUX. See “Multiplexing” on page 126.

N

NAT. See “Network Address Translation” on page 126.

Network Address Translation. Sometimes referred to as Transparent Proxying, IP Address Overloading, or IP Masquerading. Involves use of a device called a Network Address Translator, which assigns a contrived, or logical, IP address and port number to each node on an organization's internal network and passes packets using these assigned addresses.

Network Layer Reachability Information. Information that is carried in BGP packets which reveals the IP addresses of the destination systems.

NLRI. Network Layer Reachability Information

NM. Network Module.

nm. Nanometer (1 x $10e^9$) meters.

NP. Network Processor.

O

Open Systems Interconnection. OSI is a seven (7) layer architecture model for communications systems developed by the ISO for the interconnection of data communications systems. Each layer uses and builds on the services provided by those below it.

Operating System Application Programming Interface. OSAPI is a module within the System Support software that provides a set of interfaces to OS support functions.

OS. Operating System.

OSAPI. See “Operating System Application Programming Interface” on page 126.

OSI. See “Open Systems Interconnection” on page 126.

P

PDU. See “Protocol Data Unit” on page 126.

PMC. Packet Mode Channel.

Port Mirroring. Also known as a roving analysis port. This is a method of monitoring network traffic that forwards a copy of each incoming and outgoing packet from one port of a network switch to another port where the packet can be studied. A network administrator uses port mirroring as a diagnostic tool or debugging feature, especially when fending off an attack. It enables the administrator to keep close track of switch performance and alter it if necessary. Port mirroring can be managed locally or remotely. An administrator configures port mirroring by assigning a port from which to copy all packets and another port where those packets will be sent. A packet bound for or heading away from the first port will be forwarded onto the second port as well. The administrator places a protocol analyzer on the port receiving the mirrored data to monitor each segment separately. The analyzer captures and evaluates the data without affecting the client on the original port. The monitor port may be a port on the same SwitchModule with an attached RMON probe, a port on a different SwitchModule in the same hub, or the SwitchModule processor. Port mirroring can consume significant CPU resources while active. Better choices for long-term monitoring may include a passive tap like an optical probe or an Ethernet repeater.

Protocol Data Unit. PDU is a packet of data passed across a network. The term implies a specific layer of the OSI model and a specific protocol.

Q

QoS. See “Quality of Service” on page 126.

Quality of Service. QoS is a networking term that specifies a guaranteed level of throughput. Throughput is the amount of data transferred from one device to another or processed in a specified amount of time - typically, throughputs are measured in bytes per second (Bps).

R

Real-Time Operating System. RTOS is a component of the OSAPI module that abstracts operating systems with which other systems can interface.

RFC. Request For Comment.

RMON. Short for remote monitoring, a network management protocol that allows network information to be gathered at a single workstation. Whereas SNMP gathers network data from a single type of Management Information Base (MIB), RMON 1 defines nine additional MIBs that provide a much richer set of data about network usage. For RMON to work, network devices, such as hubs and switches, must be designed to support it. The newest version of RMON, RMON 2, provides data about traffic at

the network layer in addition to the physical layer. This allows administrators to analyze traffic by protocol.

RP. Rendezvous Point. Used with IP Multicast.

RPF. Reverse Path Forwarding is the fundamental concept in multicast routing that enables routers to correctly forward multicast messages down the distribution tree.

RPU. Remote Power Unit.

RTOS. See “Real-Time Operating System” on page 126.

S

SDL. Synchronous Data Link.

Simple Network Management Protocol. SNMP is the protocol governing network management and the monitoring of network devices and their functions. It is not necessarily limited to TCP/IP networks. The versions have the following differences:

SNMPv1 (full): Security is based on community strings.

SNMPsec (historic): Security is based on parties. Few, if any, vendors implemented this version of the protocol, which is now largely forgotten.

SNMPv2p (historic): For this version, much work was done to update the SNMPv1 protocol and the SMIv1, and not just security. The result was updated protocol operations, new protocol operations and data types, and party-based security from SNMPsec.

SNMPv2c (experimental): This version of the protocol is called community string-based SNMPv2. It is an update of the protocol operations and data types of SNMPv2p, and uses community-based security from SNMPv1.

SNMPv2u (experimental): This version of the protocol uses the protocol operations and data types of SNMPv2c and security based on users.

*SNMPv2** (experimental): This version combined the best features of SNMPv2p and SNMPv2u. (It is also called SNMPv2star.) The documents defing this version were never published as RFCs.

SNMPv3 (proposed): This version of the protocol is a combination of user-based security and the protocol operations and data types from SNMPv2p and support for proxies. The security is based on that found in SNMPv2u and SNMPv2*, and updated after much review. The documents defing this protocol will soon be published as RFCs.

.**SNMP.** See “Simple Network Management Protocol” on page 127.

SODIMM. Small Outline Dual Inline Memory Module.

SRAM. Static Random Access Memory.

STP. Spanning Tree Protocol. See “802.1D” on page 123 for more information.

SVL. Most switches support Independent learning, wherein traffic from one VLAN will not be forwarded to another VLAN. Hence if some limited form of forwarding needs to be supported, the switch should implement Shared VLAN learning.

T

TBI. Ten Bit Interface.

Telnet. A character-based UNIX application that enables users with a Telnet server account to log on to a UNIX computer and utilize its resources.

TFTP. See “Trivial File Transfer Protocol” on page 127.

Trivial File Transfer Protocol. TFTP is a simple form of the File Transfer Protocol (FTP). TFTP uses the User Datagram Protocol (UDP, a direct protocol used to communicate datagrams over a network with little error recovery) and provides no security features. It is often used by servers to boot diskless workstations, X-terminals, and routers.

Trunking. The process of combing a set of trunks that are traffic-engineered as a unit for the establishment of connections between switching systems in which all of the communications paths are interchangeable.

V

Virtual Local Area Network. Operating at the Data Link Layer (Layer 2 of the OSI model), the VLAN is a means of parsing a single network into logical user groups or organizations, as if they physically resided on a dedicated LAN segment of their own. In reality, this virtually defined community may have individual members peppered across a large, extended LAN. The VLAN identifier is part of the 802.1Q tag, which is added to an Ethernet frame by an 802.1Q-compliant switch or router. Devices recognizing 802.1Q-tagged frames maintain appropriate tables to track VLANs. The first three bits of the 802.1Q tag are used by 802.1P to establish priority for the packet.

VLAN. See “Virtual Local Area Network” on page 127.

vMAN. Virtual Metropolitan Area Network.

VPN/CoS ID. Virtual Private Network/Cost of Service ID.

W

WAN. See “Wide Area Network” on page 128.

Web. Also known as World-Wide Web (WWW) or W3. An Internet client-server system to distribute information, based upon the hypertext transfer protocol (HTTP).

Wide Area Network. A WAN is a computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more local-area networks (LANs).

X

XModem. One of the most popular file transfer protocols (FTPs). Xmodem is fairly effective at detecting errors. It sends blocks of data together with a checksum and then waits for acknowledgment of the block's receipt. The waiting slows down the rate of data transmission considerably, but it ensures accurate transmission. Xmodem can be implemented either in software or in hardware. Many modems, and almost all communications software packages, support Xmodem. However, it is useful only at relatively slow data transmission speeds (less than 4,800 bps). Enhanced versions of Xmodem that work at higher transmission speeds are known as Ymodem and Zmodem.