Dell Force10 FTOS Command Line Reference Guide for the MXL 10/40GbE Switch IO Module

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Notes, Cautions, and Warnings

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

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

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

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About this Guide

This book provides information about the Dell Force10 operating software (FTOS) command line interface (CLI). It includes some information about the protocols and features found in FTOS and on the Dell Force10 systems supported by FTOS.

This chapter includes:

Objectives

This document is intended as a reference guide for the FTOS CLI commands, with detailed syntax statements, usage information, and sample output examples.

For details about when to use the commands, refer to the *FTOS Configuration Guide*. This guide contains an Appendix with a list of the request for comment (RFCs) and management information base files (MIBs) supported.

Audience

This document is intended for system administrators who are responsible for configuring or maintaining networks. This document assumes you are knowledgeable in Layer 2 and Layer 3 networking technologies.

Conventions

This document uses the following conventions to describe command syntax:

Convention	Description
keyword	Keywords are in bold and must be entered in the CLI as listed.
parameter	Parameters are in italics and require a number or word to be entered in the CLI.
{X}	Keywords and parameters within braces must be entered in the CLI.
[X]	Keywords and parameters within brackets are optional.

| x | y | Keywords and parameters separated by bar require you to choose one. |
| x \|\| y | Keywords and parameters separated by a double bar enables you to choose any or all of them. |

Information Symbols

Table 1-1 describes the symbols contained in this document.

Table 1-1. Information Symbols

Symbol	Brief	Description
	Note	This symbol signals important operational information.
	Caution	This symbol signals information about situations that could result in equipment damage or loss of data.
	Warning	This symbol signals information about hardware handling that could result in injury.

Related Documents

For more information about the system, refer to the following documents:

*   *FTOS Configuration Guide*
*   *Installation and maintenance guides* for the MXL 10/40GbE Switch system
*   *Release Notes* for the MXL 10/40GbE Switch system and FTOS version 8.3.16.4

CLI Basics

This chapter describes the command structure and command modes. The Dell Force10 operating software (FTOS) commands are in a text-based interface that allows you to use launch commands, change the command modes, and configure interfaces and protocols.

This chapter includes the following sections:

- Accessing the Command Line
- Multiple Configuration Users
- Navigating the Command Line Interface
- Obtaining Help
- Using the Keyword no
- Filtering show Commands
- Command Modes

Accessing the Command Line

When the system boots successfully, you are positioned on the command line in EXEC mode and *not* prompted to log in. You can access the commands through a serial console port or a Telnet session. When you Telnet into the switch, you are prompted to enter a login name and password.

Figure 2-1 is an example of a successful Telnet login session.

Figure 2-1. Login Example

```
telnet 172.31.1.53
Trying 172.31.1.53...
Connected to 172.31.1.53.
Escape character is '^]'.
Login: username
Password:
FTOS>
```

After you log into the switch, the prompt provides you with current command-level information (Table 2-1).

Multiple Configuration Users

When a user enters CONFIGURATION mode and another user(s) is already in that configuration mode, FTOS generates an alert warning message similar to Figure 2-2:

Figure 2-2.   Configuration Mode User Alert

```
FTOS#conf

% Warning: The following users are currently configuring the system:

User "" on line console0
User "admin" on line vty0 ( 123.12.1.123 )
User "admin" on line vty1 ( 123.12.1.123 )
User "Irene" on line vty3 ( 123.12.1.321 )

FTOS#conf
```

When another user enters CONFIGURATION mode, FTOS sends a message similar to the following, (the user in this case is "admin" on vty2):

```
% Warning: User "admin" on line vty2 "172.16.1.210" is in configuration
```

Navigating the Command Line Interface

The command line interface (CLI) prompt displayed by FTOS is comprised of:

- "hostname"— the initial part of the prompt, "FTOS" by default. You can change it with the hostname command, as described in hostname.
- The second part of the prompt, reflecting the current CLI mode, is shown in Table 2-1.

The CLI prompt changes as you move up and down the levels of the command structure.

Table 2-1 lists the prompts and their corresponding command levels, called *modes*. Starting with CONFIGURATION mode, the command prompt adds modifiers to further identify the mode. The command modes are explained in Command Modes.

Table 2-1.   Command Prompt and Corresponding Command Mode

Prompt	CLI Command Mode
FTOS>	EXEC
FTOS#	EXEC Privilege
FTOS(conf)#	CONFIGURATION
FTOS(conf-if)# FTOS(conf-if-te-0/0)# FTOS(conf-if-fo-0/0)# FTOS(conf-if-lo-0)# FTOS(conf-if-nu-0)# FTOS(conf-if-po-1)# FTOS(conf-if-vl-1)# FTOS(conf-if-ma-0/0)# FTOS(conf-if-range)#	INTERFACE

Table 2-1.   Command Prompt and Corresponding Command Mode

Prompt	CLI Command Mode
FTOS(conf-ext-nacl)# FTOS(conf-std-nacl)#	IP ACCESS LIST
FTOS(conf-line-console)# FTOS(conf-line-vty)#	LINE
FTOS(conf-ext-macl)# FTOS(conf-std-macl)#	MAC ACCESS LIST
FTOS(conf-mon-sess)#	MONITOR SESSION
FTOS(conf-stp)#	STP
FTOS(conf-mstp)#	MULTIPLE SPANNING TREE
FTOS(conf-pvst)#	Per-VLAN SPANNING TREE Plus
FTOS(conf-rstp)#	RAPID SPANNING TREE
FTOS(conf-gvrp)#	PROTOCOL GVRP
FTOS(conf-route-map)#	ROUTE-MAP
FTOS(conf-nprefixl)#	PREFIX-LIST
FTOS(conf-router_rip)#	ROUTER RIP
FTOS(conf-router_ospf)#	ROUTER OSPF
FTOS(conf-stp)#	SPANNING TREE

Obtaining Help

As soon as you are in a command mode, there are several ways to access help.

- To obtain a list of keywords at any command mode, do the following:
  - Enter a ? at the prompt or after a keyword. There must always be a space before the ?.
- To obtain a list of keywords with a brief functional description, do the following:
  - Enter help at the prompt.
- To obtain a list of available options, do the following:
  - Type a keyword followed by a space and a ?
- Type a partial keyword followed by a ?
  - A display of keywords beginning with the partial keyword is listed.

Figure 2-3 shows the results of entering ip ? at the prompt.

Figure 2-3. Partial Keyword Example

```
FTOS(conf)#ip ?
access-list                  Named access-list
control-plane                Control plane configuration
dhcp                         DHCP configuration commands
domain-list                  Domain name to complete unqualified host name
domain-lookup                Enable IP Domain Name System hostname translation
domain-name                  Define the default domain name
ftp                          FTP configuration commands
helper-address               DHCP relay agent configuration
host                         Add an entry to the ip hostname table
igmp                         Internet Group Management Protocol
max-frag-count               Max. fragmented packets allowed in IP re-assembly
mroute                       Multicast routes and counters
msdp                         Multicast source discovery protocol
multicast-limit              Max entries in Multicast TIB
multicast-msdp               Enable IP multicast MSDP protocol
multicast-routing            Enable IP multicast forwarding
name-server                  Specify addess of name server to use
pim                          Protocol Independent Multicast
prefix-list                  Build a prefix list
radius                       Interface configuration for RADIUS
route                        Establish static routes
scp                          SCP configuration commands
source-route                 Process packets with source routing header options
ssh                          SSH configuration commands
tacacs                       Interface configuration for TACACS+
telnet                       Specify telnet options
tftp                         TFTP configuration commands
```

When entering commands, you can take advantage of the following time saving features:

- The commands are not case sensitive.
- You can enter partial (truncated) command keywords. For example, you can enter int tengig *interface* for the interface tengigabitethernet *interface* command.
- Use the **TAB** key to complete keywords in commands.
- Use the **up arrow** key to display the last enabled command.
- Use either the **Backspace** key or the **Delete** key to erase the previous character.

Use the **left** and **right arrow** keys to navigate left or right in the FTOS command line. Table 2-2 defines the key combinations valid at the FTOS command line.

Table 2-2.   Short-cut Keys and their Actions

Key Combination	Action
CNTL-A	Moves the cursor to the beginning of the command line.
CNTL-B	Moves the cursor back one character.
CNTL-D	Deletes character at cursor.
CNTL-E	Moves the cursor to the end of the line.
CNTL-F	Moves the cursor forward one character.
CNTL-I	Completes a keyword.
CNTL-K	Deletes all characters from the cursor to the end of the command line.
CNTL-N	Return to more recent commands in the history buffer after recalling commands with Ctrl-P or the up arrow key
CNTL-P	Recalls commands, beginning with the last command
CNTL-U	Deletes the line.
CNTL-W	Deletes the previous word.
CNTL-X	Deletes the line.
CNTL-Z	Comes back to EXEC mode from any CONFIGURATION mode
Esc B	Moves the cursor back one word.
Esc F	Moves the cursor forward one word.
Esc D	Deletes all characters from the cursor to the end of the word.

Using the Keyword no

To disable, delete, or return to default values, use the no form of the commands. For most commands, if you type the keyword no in front of the command, you will disable that command or delete it from the running configuration. In this document, the no form of the command is described in the "Command Syntax" portion of the command description.

Filtering show Commands

You can filter the display output of a show command to find specific information, to display certain information only, or to begin the command output at the first instance of a regular expression or phrase.

When you execute a show command, followed by a pipe (|) and one of the parameters listed below and a regular expression, the resulting output either excludes or includes those parameters, as defined by the parameter:

*   except— display only text that does not match the pattern (or regular expression)
*   find — search for the first occurrence of a pattern
*   grep — display text that matches a pattern

- no-more — do not paginate the display output
- save — copy output to a file for future use

> **Note:** FTOS accepts a space before or after the pipe, no space before or after the pipe, or any combination. For example:
> FTOS#*command* | grep *tengigabit* |except *regular-expression* | find *regular-expression*

The grep command option has an ignore-case sub-option that makes the search case-insensitive. For example, the commands:

- show run | grep Ethernet returns a search result with instances containing a capitalized "Ethernet," such as interface TenGigabitEthernet 0/0.
- show run | grep ethernet does not return the search result above because it only searches for instances containing a non-capitalized "ethernet".
- show run | grep Ethernet ignore-case returns instances containing both "Ethernet" and "ethernet".

Displaying All Output

To display the output all at once (not one screen at a time), use the no-more command after the pipe. This is similar to the terminal length *screen-length* command except that the no-more option affects the output of just the specified command. For example:

FTOS#show running-config | no-more

Filtering Command Output Multiple Times

You can filter a single command output multiple times. To do this, place the save option as the last filter. For example:

FTOS# *command* | grep *regular-expression* | except *regular-expression* | grep *other-regular-expression* | find *regular-expression* | no-more | save

Command Modes

To navigate to various CLI modes, use specific commands to launch each mode. Navigation to these modes is described in the following sections.

EXEC Mode

When you initially log in to the switch, by default you are logged into EXEC mode. This mode allows you to view settings and to enter EXEC Privilege mode to configure the device. While you are in EXEC mode, the > prompt is displayed following the "hostname" prompt (which is "FTOS" by default). You can change this using the hostname command. For more information, refer to the hostname command. Each mode prompt is preceded by the hostname.

EXEC Privilege Mode

The enable command accesses EXEC Privilege mode. If an administrator has configured an *Enable* password, you are prompted to enter the password here.

EXEC Privilege mode allows you to access all commands accessible in EXEC mode, plus other commands, such as to clear ARP entries and IP addresses. In addition, you can access CONFIGURATION mode to configure interfaces, routes, and protocols on the switch. While you are logged in to EXEC Privilege mode, the # prompt displays.

CONFIGURATION Mode

In EXEC Privilege mode, use the configure command to enter CONFIGURATION mode and configure routing protocols and access interfaces.

To enter CONFIGURATION mode:

1. Verify that you are logged in to EXEC Privilege mode.
2. Enter the configure command. The prompt changes to include (conf).

From this mode, you can enter INTERFACE mode by using the interface command.

INTERFACE Mode

Use INTERFACE mode to configure interfaces or IP services on those interfaces. An interface can be physical (for example, a TenGigabit Ethernet port) or virtual (for example, the Null interface).

To enter INTERFACE mode:

1. Verify that you are logged into CONFIGURATION mode.
2. Enter the interface command followed by an interface type and interface number that is available on the switch.
3. The prompt changes to include the designated interface and slot/port number (Table 2-3).

Table 2-3.   Interface prompts

Prompt	Interface Type
FTOS(conf-if)#	INTERFACE mode
FTOS(conf-if-te-0/0)#	Ten Gigabit Ethernet interface followed by slot/port information
FTOS(conf-if-fo-0/0)#	Forty Gigabit Ethernet interface followed by slot/port information
FTOS(conf-if-lo-0)#	Loopback interface number.
FTOS(conf-if-nu-0)#	Null Interface followed by zero
FTOS(conf-if-po-1)#	Port-channel interface number
FTOS(conf-if-vl-1)#	VLAN Interface followed by VLAN number (range 1 to 4094)
FTOS(conf-if-ma-0/0)#	Management Ethernet interface followed by slot/port information
FTOS(conf-if-range)#	Designated interface range (used for bulk configuration; refer to interface range).

LINE Mode

Use LINE mode to configure console or virtual terminal parameters.

To enter LINE mode:

1. Verify that you are logged in to CONFIGURATION mode.
2. Enter the line command. You must include the keywords console or vty and their line number available on the switch.The prompt changes to include (config-line-console) or (config-line-vty).

You can exit this mode by using the exit command.

MAC ACCESS LIST Mode

While in CONFIGURATION mode, use the mac access-list standard or mac access-list extended commands to enter MAC ACCESS LIST mode and configure either standard or extended access control lists (ACL).

To enter MAC ACCESS LIST mode:

1. Verify that you are logged in to CONFIGURATION mode.
2. Use the mac access-list standard or mac access-list extended command. You must include a name for the ACL.The prompt changes to include (conf-std-macl) or (conf-ext-macl).

You can return to CONFIGURATION mode by using the exit command.

IP ACCESS LIST Mode

While in CONFIGURATION mode, use the ip access-list standard or ip access-list extended commands to enter IP ACCESS LIST mode and configure either standard or extended access control lists (ACL).

To enter IP ACCESS LIST mode:

1. Verify that you are logged in to CONFIGURATION mode.
2. Use the ip access-list standard or ip access-list extended command. You must include a name for the ACL.The prompt changes to include (conf-std-nacl) or (conf-ext-nacl).

You can return to CONFIGURATION mode by using the exit command.

ROUTE-MAP Mode

While in CONFIGURATION mode, use the route-map command to enter ROUTE-MAP mode and configure a route map.

To enter ROUTE-MAP mode:

1. Verify that you are logged in to CONFIGURATION mode.
2. Use the route-map *map-name* [permit | deny] [*sequence-number*] command. The prompt changes to include (route-map).

You can return to CONFIGURATION mode by using the exit command.

PREFIX-LIST Mode

While in CONFIGURATION mode, use the ip prefix-list command to enter PREFIX-LIST mode and configure a prefix list.

To enter PREFIX-LIST mode:

1. Verify that you are logged in to CONFIGURATION mode.
2. Enter the ip prefix-list command. You must include a name for the prefix list. The prompt changes to include (conf-nprefixl).

You can return to CONFIGURATION mode by use the exit command.

SPANNING TREE Mode

Use STP mode to enable and configure the spanning tree protocol (STP), as described in Spanning Tree Protocol (STP).

To enter STP mode:

1. Verify that you are logged into CONFIGURATION mode.
2. Enter the protocol spanning-tree 0 command.

You can return to CONFIGURATION mode by using the exit command.

Per-VLAN SPANNING TREE Plus Mode

Use PVST+ mode to enable and configure the per-VLAN spanning tree (PVST+) protocol, as described in Per-VLAN Spanning Tree Plus (PVST+).

✍ **Note:** The protocol is PVST+, but the plus sign is dropped at the CLI prompt.

To enter PVST+ mode:

1. Verify that you are logged into CONFIGURATION mode.
2. Enter the protocol spanning-tree pvst command.

You can return to CONFIGURATION mode by using the exit command.

RAPID SPANNING TREE Mode

Use RSTP mode to enable and configure the rapid spanning tree protocol (RSTP), as described in Rapid Spanning Tree Protocol (RSTP).

To enter RSTP mode:

1. Verify that you are logged into CONFIGURATION mode.
2. Enter the protocol spanning-tree rstp command.

You can return to CONFIGURATION mode by using the exit command.

MULTIPLE SPANNING TREE Mode

Use MULTIPLE SPANNING TREE mode to enable and configure the multiple spanning tree protocol (MSTP), as described in Multiple Spanning Tree Protocol (MSTP).

To enter MULTIPLE SPANNING TREE mode:

1. Verify that you are logged into CONFIGURATION mode.
2. Enter the protocol spanning-tree mstp command.

You can return to CONFIGURATION mode by using the exit command.

PROTOCOL GVRP Mode

Use the PROTOCOL GVRP mode to enable and configure generic attribute registration protocol (GARP) virtual LAN (VLAN) registration protocol (GVRP), as described in GARP VLAN Registration (GVRP).

To enter PROTOCOL GVRP mode:

1. Verify that you are logged into CONFIGURATION mode.
2. Enter the protocol gvrp command syntax.

You can return to CONFIGURATION mode by using the exit command.

ROUTER OSPF Mode

Use the ROUTER OSPF mode to configure open shortest path first (OSPF), as described in Open Shortest Path First (OSPFv2).

To enter ROUTER OSPF mode:

1. Verify that you are logged into CONFIGURATION mode.
2. Use the router ospf {*process-id*} command.The prompt changes to include (conf-router_ospf-id).

You can switch to INTERFACE mode by using the interface command or you can switch to ROUTER RIP mode by using the router rip command.

ROUTER RIP Mode

Use the ROUTER RIP mode to configure routing information protocol (RIP), as described in Routing Information Protocol (RIP).

To enter ROUTER RIP mode:

1. Verify that you are logged into CONFIGURATION mode.
2. Enter the router rip command.The prompt changes to include (conf-router_rip).

You can switch to INTERFACE mode by using the interface command or you can switch to ROUTER OSPF mode by using the router ospf command.

3

File Management

Overview

This chapter contains commands needed to manage the configuration files and includes other file management commands found in the Dell Force10 operating software (FTOS).

Basic File Management Commands

The commands included in this chapter are:

- cd
- copy
- copy running-config startup-config
- delete
- dir
- format flash
- logging coredump
- logging coredump server
- pwd
- rename
- show boot system
- show file
- show file-systems
- show os-version
- show running-config
- show startup-config
- show version
- upgrade boot
- upgrade system

cd

Change to a different working directory.

Syntax	cd *directory*

Parameters

directory	(OPTONAL) Enter one of the following:
	• flash: (internal Flash) or any sub-directory
	• usbflash: (external Flash) or any sub-directory

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

copy

Copy one file to another location. FTOS supports IPv4 addressing for FTP, TFTP, and SCP (in the *hostip* field).

Syntax	copy *source-file-url destination-file-url*

Parameters

file-url	Enter the following location keywords and information:
	• To copy a file from the internal FLASH, enter flash:// followed by the filename.
	• To copy the running configuration, enter the keyword running-config.
	• To copy the startup configuration, enter the keyword startup-config.
	• To copy a file on the external FLASH, enter usbflash:// followed by the filename.

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

FTOS supports a maximum of 100 files, at the root directory level, on both the internal and external Flash.

The usbflash commands are supported. For a list of approved USB vendors, refer to the FTOS Release Notes.

When copying a file to a remote location (for example, using Secure Copy [SCP]), enter only the keywords and FTOS prompts you for the rest of the information.

For example, when using SCP, you can enter copy running-config scp:
The running-config is the source, and the target is specified in the ensuing prompts. FTOS prompts you to enter any required information, as needed for the named destination—remote destination, destination filename, user ID and password, etc.

When you use the copy running-config startup-config command to copy the running configuration (the startup configuration file amended by any configuration changes made since the system was started) to the startup configuration file, FTOS creates a backup file on the internal flash of the startup configuration.

FTOS supports copying the running-configuration to a TFTP server or to an FTP server:

copy running-config tftp:

copy running-config ftp:

Example   **Figure 3-1.   copy running-config scp: Command Example**

```
FTOS#copy running-config scp:
Address or name of remote host []: 10.10.10.1
Port number of the server [22]: 99
Destination file name [startup-config]: old_running
User name to login remote host: sburgess
Password to login remote host:

Password to login remote host? dilling
```

In this example — copy scp: flash: — specifying SCP in the first position indicates that the target is to be specified in the ensuing prompts. Entering flash: in the second position means that the target is the internal Flash. In this example the source is on a secure server running SSH, so the user is prompted for the UDP port of the SSH server on the remote host.

Example   **Figure 3-2.   Using scp to copy from an SSH Server**

```
FTOS#copy scp: flash:
Address or name of remote host []: 10.11.199.134
Port number of the server [22]: 99
Source file name []: test.cfg
User name to login remote host: admin
Password to login remote host:
Destination file name [test.cfg]: test1.cfg
```

Related Commands

| cd | Changes the working directory. |

copy running-config startup-config

Copy running configuration to the startup configuration.

Syntax   copy running-config startup-config {*duplicate*}

Command Modes   EXEC Privilege

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information   This command is useful for quickly making a changed configuration on one chassis available on external flash in order to move it to another chassis.

delete

Delete a file from the flash. Once deleted, files cannot be restored.

Syntax   delete *flash: ([flash://]filepath) usbflash ([usbflash://]filepath)*

Parameters

flash-url	Enter the following location and keywords: • For a file or directory on the internal Flash, enter flash:// followed by the filename or directory name. • For a file or directory on the external Flash, enter usbflash:// followed by the filename or directory name.
no-confirm	(OPTIONAL) Enter the keyword no-confirm to specify that FTOS does not require user input for each file prior to deletion.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

dir

Display the files in a file system. The default is the current directory.

Syntax   dir [*filename* | *directory name:*]

Parameters

filename | *directory name:*	(OPTIONAL) Enter one of the following: • For a file or directory on the internal Flash, enter flash:// followed by the filename or directory name. • For a file or directory on the external Flash, enter usbflash:// followed by the filename or directory name:

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 3-3.   dir for the Internal Flash Command Example**

```
FTOS#dir
Directory of flash:

  1  drwx        4096   Jan 01 1980 00:00:00 +00:00 .
  2  drwx        2048   Mar 06 2010 00:36:21 +00:00 ..
  3  drwx        4096   Feb 25 2010 23:32:50 +00:00 TRACE_LOG_DIR
  4  drwx        4096   Feb 25 2010 23:32:50 +00:00 CORE_DUMP_DIR
  5  d---        4096   Feb 25 2010 23:32:50 +00:00 ADMIN_DIR
  6  -rwx   720969768   Mar 05 2010 03:25:40 +00:00 6gb
  7  -rwx        4260   Mar 03 2010 22:04:50 +00:00 prem-23-5-12
  8  -rwx    31969685   Mar 05 2010 17:56:26 +00:00
FTOS-XL-8-3-16-148.bin
  9  -rwx        3951   Mar 06 2010 00:36:18 +00:00 startup-config

flash: 2143281152 bytes total (1389801472 bytes free)
FTOS#
```

Related Commands

cd	Changes the working directory.

format flash

Erase all existing files and reformat the filesystem in the internal flash memory. After the filesystem is formatted, files cannot be restored.

Syntax	format {flash: | usbflash:}
Default	flash memory
Command Modes	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

You must include the colon (:) when entering this command.

⚠ **Caution:** This command deletes all files, including the startup configuration file. So, after executing this command, consider saving the running config as the startup config (use the write memory command or the copy run start command).

Related Commands

copy	Copies the current configuration to either the startup-configuration file or the terminal.
show file	Displays the contents of a text file in the local filesystem.
show file-systems	Displays information about the file systems on the system.

logging coredump

Enable coredump.

Syntax	logging coredump stack-unit all
Command Modes	CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The Kernel core dump can be large and may take up to five to 30 minutes to upload. FTOS does not overwrite application core dumps so delete them as necessary to conserve space on the flash; if the flash is out of memory, the coredump is aborted. FTOS completes the coredump process and waits until the upload is complete before rebooting the system.

Related Commands

logging coredump server	Designates a sever to upload kernel core-dumps.

logging coredump server

Designate a server to upload core dumps.

Syntax   logging coredump server {*ipv4-address*} username *name* password [*type*] *password*

Parameters

{*ipv4-address*}	Enter the server IPv4 address (A.B.C.D)
name	Enter a username to access the target server.
type	Enter the password type: • Enter 0 to enter an unencrypted password. • Enter 7 to enter a password that has already been encrypted using a Type 7 hashing algorithm.
password	Enter a password to access the target server.

Defaults   Crash kernel files are uploaded to flash by default.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Because flash space may be limited, using this command ensures your entire crash kernel files are uploaded successfully and completely. Only a single coredump server can be configured. Configuration of a new coredump server over-writes any previously configured server.

> **Note:** You must disable logging coredump before you designate a new server destination for your core dumps.

Related Commands

logging coredump	Disables the kernel coredump

pwd

Display the current working directory.

Syntax   pwd

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 3-4.   pwd Command Example**

```
FTOS#pwd
flash:
FTOS#
```

Related Commands

cd	Changes the directory.

rename

Rename a file in the local file system.

Syntax   rename *url url*

Parameters

url	Enter the following keywords and a filename:
	• For a file on the internal Flash, enter flash:// followed by the filename.
	• For a file on the external Flash, enter usbflash:// followed by the filename.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show boot system

Displays information about boot images currently configured on the system.

Syntax   show boot system stack-unit {0-5 | all}

Parameters

0-5	Enter this information to display the boot image information of only the entered stack-unit
all	Enter this keyword to display the boot image information of all the stack-units in the stack

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 3-5.   show boot system Command Example**

```
FTOS#show boot system stack-unit all

Current system image information in the system:
==============================================

Type          Boot Type     A                             B
--------------------------------------------------------------
Stack-unit 0 is not present.
Stack-unit 1 is not present.
Stack-unit 2 is not present.
Stack-unit 3 is not present.
Stack-unit 4 is not present.
Stack-unit 5  DOWNLOAD BOOT 9-1-0-675               9-1-0-684
```

show file

Display contents of a text file in the local filesystem.

Syntax	show file *url*

Parameters

url	Enter one of the following:
	• For a file on the internal Flash, enter flash:// followed by the filename.
	• For a file on the external Flash, enter usbflash:// followed by the filename.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 3-6.   show file Command Example (Partial)**

```
FTOS#show file flash://startup-config
! Version E8-3-16-29
! Last configuration change at Thu Apr 26 19:19:02 2012 by default
! Startup-config last updated at Thu Apr 26 19:19:04 2012 by default
!
boot system stack-unit 0 primary system: A:
boot system stack-unit 0 secondary tftp://10.11.200.241/dt-m1000e-5-c2
boot system gateway 10.11.209.254
!
redundancy auto-synchronize full
redundancy disable-auto-reboot stack-unit
!
redundancy disable-auto-reboot stack-unit 0
redundancy disable-auto-reboot stack-unit 1
redundancy disable-auto-reboot stack-unit 2
redundancy disable-auto-reboot stack-unit 3
redundancy disable-auto-reboot stack-unit 4
redundancy disable-auto-reboot stack-unit 5
!
service timestamps log datetime
logging coredump stack-unit all
!
hostname FTOS
--More--
```

Related Commands

format flash	Erases all existing files and reformats the filesystem in the internal flash memory.
show file-systems	Displays information about the file systems on the system.

show file-systems

Display information about the file systems on the system.

Syntax	show file-systems

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 3-7. show file-system Command Example

```
FTOS#show file-systems

      Size(b)      Free(b)       Feature        Type    Flags   Prefixes
   2143281152   2000936960         FAT32   USERFLASH      rw    flash:
  15848660992    831594496         FAT32    USBFLASH      rw    usbflash:
           -            -             -      network      rw    ftp:
           -            -             -      network      rw    tftp:
           -            -             -      network      rw    scp:
FTOS#
```

Table 3-1. show file-systems Command Output Fields

Field	Description
Size(b)	Lists the size in bytes of the storage location. If the location is remote, no size is listed.
Free(b)	Lists the available size in bytes of the storage location. If the location is remote, no size is listed.
Feature	Displays the formatted DOS version of the device.
Type	Displays the type of storage. If the location is remote, the word network is listed.
Flags	Displays the access available to the storage location. The following letters indicate the level of access: • r = read access • w = write access
Prefixes	Displays the name of the storage location.

Related Commands

format flash	Erases all existing files and reformats the filesystem in the internal flash memory.
show file	Displays the contents of a text file in the local filesystem.
show startup-config	Displays the current SFM status.

show os-version

Display the release and software image version information of the image file specified.

Syntax   show os-version [*file-url*]

Parameters

file-url	(OPTIONAL) Enter the following location keywords and information: • For a file on the internal Flash, enter flash:// followed by the filename. • For a file on an FTP server, enter ftp://*user:password@hostip/filepath* • For a file on a TFTP server, enter tftp://*hostip/filepath* • For a file on the external Flash, enter usbflash:// followed by the filename.

Defaults   none

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

> **Note:** A filepath that contains a dot (**.**) is not supported.

Example

Figure 3-8.   show os-version Command Example

```
FTOS#show os-version

RELEASE IMAGE INFORMATION :
--------------------------------------------------------------------
     Platform          Version        Size          ReleaseTime
 IOM-Series:  XL        9-1-0-848     31962011    Mar 20 2012 09:26:46

TARGET IMAGE INFORMATION :
--------------------------------------------------------------------
         Type           Version                   Target     checksum
      runtime          9-1-0-848          Control Processor    passed

BOOT IMAGE INFORMATION :
--------------------------------------------------------------------
         Type           Version                   Target     checksum
     boot flash        4.0.1.0bt          Control Processor    passed

BOOTSEL IMAGE INFORMATION :
--------------------------------------------------------------------
         Type           Version                   Target     checksum
  boot selector        4.0.0.0bt          Control Processor    passed

CPLD IMAGE INFORMATION :
--------------------------------------------------------------------
        Card                      CPLD Name     Version
 Stack-unit 5                  IOM SYSTEM CPLD        5
FTOS#
```

show running-config

Display the current configuration and display changes from the default values.

Syntax   show running-config [*entity*] [configured] [status]

Parameters

entity	(OPTIONAL) Enter one of the keywords listed below to display that entity's current (non-default) configuration. Note that, if nothing is configured for that entity, nothing is displayed and the prompt returns:

- **aaa** for the current AAA configuration
- **acl** for the current ACL configuration
- **arp** for the current static ARP configuration
- **boot** for the current boot configuration
- **class-map** for the current class-map configuration
- **fefd** for the current FEFD configuration
- **ftp** for the current FTP configuration
- **fvrp** for the current FVRP configuration
- **host** for the current host configuration
- **hardware-monitor** for hardware-monitor action-on-error settings
- **igmp** for the current IGMP configuration
- **interface** for the current interface configuration
- **line** for the current line configuration
- **load-balance** for the current port-channel load-balance configuration
- **logging** for the current logging configuration
- **mac** for the current MAC ACL configuration
- **mac-address-table** for the current MAC configuration
- **management-route** for the current Management port forwarding configuration
- **mroute** for the current Mroutes configuration
- **ntp** for the current NTP configuration
- **ospf** for the current OSPF configuration
- **pim** for the current PIM configuration
- **policy-map-input** for the current input policy map configuration
- **policy-map-output** for the current output policy map configuration
- **prefix-list** for the current prefix-list configuration
- **privilege** for the current privilege configuration
- **radius** for the current RADIUS configuration
- **resolve** for the current DNS configuration
- **rip** for the current RIP configuration
- **route-map** for the current route map configuration
- **snmp** for the current SNMP configuration
- **spanning-tree** for the current spanning tree configuration
- **static** for the current static route configuration
- **tacacs+** for the current TACACS+ configuration
- **tftp** for the current TFTP configuration
- **users** for the current users configuration
- **wred-profile** for the current wred-profile configuration

configured	(OPTIONAL) Enter the keyword **configuration** to display line card interfaces with non-default configurations only.
status	(OPTIONAL) Enter the keyword **status** to display the checksum for the running configuration and the start-up configuration.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 3-9.   show running-config Command Example (Partial)**

```
FTOS#show running-config
Current Configuration ...
! Version E8-3-16-29
! Last configuration change at Thu Apr 26 19:19:21 2012 by admin
! Startup-config last updated at Thu Apr 26 19:19:04 2012 by default
!
boot system stack-unit 0 primary system: A:
boot system stack-unit 0 secondary tftp://10.11.200.241/dt-m1000e-5-c2
boot system gateway 10.11.209.254
!
redundancy auto-synchronize full
redundancy disable-auto-reboot stack-unit
!
redundancy disable-auto-reboot stack-unit 0
redundancy disable-auto-reboot stack-unit 1
redundancy disable-auto-reboot stack-unit 2
redundancy disable-auto-reboot stack-unit 5
!--More--
service timestamps log datetime
logging coredump stack-unit all
!
hostname FTOS
!
...
```

Example   **Figure 3-10.   show running-config Command Example**

```
FTOS#show running-config status

running-config bytes 4306, checksum 0x4D55EE70
startup-config bytes 4344, checksum 0x6472C5E
FTOS#
```

Usage Information   The **status** option allows you to display the size and checksum of the running configuration and the startup configuration.

show startup-config

Display the startup configuration.

Syntax   show startup-config

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 3-11.   show startup-config Command Example (Partial)

```
FTOS#show startup-config
! Version E8-3-16-29
! Last configuration change at Thu Apr 26 19:19:02 2012 by default
! Startup-config last updated at Thu Apr 26 19:19:04 2012 by default
!
boot system stack-unit 0 primary system: A:
boot system stack-unit 0 secondary tftp://10.11.200.241/
dt-m1000e-5-c2
boot system gateway 10.11.209.254
!
redundancy auto-synchronize full
redundancy disable-auto-reboot stack-unit
!
redundancy disable-auto-reboot stack-unit 0
redundancy disable-auto-reboot stack-unit 1
redundancy disable-auto-reboot stack-unit 2
redundancy disable-auto-reboot stack-unit 3
--More--
```

Related Commands

show running-config	Displays the current (running) configuration.

show version

Display the current FTOS version information on the system.

Syntax   show version

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 3-12.   show version Command Example**

```
FTOS#show version
Dell Force10 Real Time Operating System Software
Dell Force10 Operating System Version: 1.0
Dell Force10 Application Software Version: E8-3-16-29
Copyright (c) 1999-2012 by Dell Inc. All Rights Reserved.
Build Time: Thu Apr 26 05:41:48 PDT 2012
Build Path: /sites/sjc/work/build/buildSpaces/build03/E8-3-16/SW/SRC/Cp_src/
Tacacs
FTOS uptime is 13 hour(s), 29 minute(s)

System image file is "system://A"

System Type: MXL-10/40GbE
Control Processor: MIPS RMI XLP with 2147483648 bytes of memory.

256M bytes of boot flash memory.

  1 34-port GE/TE/FG (XL)
 48 Ten GigabitEthernet/IEEE 802.3 interface(s)
  2 Forty GigabitEthernet/IEEE 802.3 interface(s)
```

Table 3-2.   show version Command Fields

Lines beginning with	Description
Dell Force10 Network...	Name of the operating system
Dell Force10 Operating...	OS version number

Table 3-2.   show version Command Fields

Lines beginning with	Description
Dell Force10 Application...	Software version
Copyright (c)...	Copyright information
Build Time...	Software build's date stamp
Build Path...	Location of the software build files loaded on the system
Dell Force10 uptime is...	Amount of time the system has been up
System image...	Image file name
Chassis Type:	System type (MXL 10/40GbE)
Control Processor:...	Control processor information and amount of memory on processor.
256M bytes...	Amount of boot flash memory on the system.
1 34-Port...	Hardware configuration of the system, including the number and type of physical interfaces available.

upgrade boot

Upgrade the bootflash image or bootselector image.

Syntax   upgrade boot {all | bootflash-image | bootselector-image} stack-unit {0-5 | all} {booted | flash: |ftp: | tftp: | usbflash:} (A: | B:}

Parameters

all	Enter this keyword to change both the bootflash and bootselecter images.
bootflash-image	Enter this keyword to change the bootflash image.
bootselector-image	Enter this keyword to change the bootselector image
0-5	Enter this keyword to upgrade only the mentioned stack-unit
all	Enter this keyword to upgrade all the member stack-units
booted	Enter this keyword to upgrade from the current image in the MXL 10/40GbE Switch.
ftp	After entering this keyword you can either follow it with the location of the source file in this form: *//userid:password@hostip/filepath*, or press **Enter** to launch a prompt sequence.
tftp	After entering this keyword you can either follow it with the location of the source file in this form: *//hostlocation/filepath*, or press **Enter** to launch a prompt sequence.
flash	After entering this keyword you can either follow it with the location of the source file in this form:*//filepath*, or press **Enter** to launch a prompt sequence.
usbflash	After entering this keyword you can either follow it with the location of the source file in this form:*//filepath*, or press **Enter** to launch a prompt sequence..
A	Enter this keyword to upgrade the bootflash partition A
B	Enter this keyword to upgrade the bootflash partition B

Defaults	none

Command Modes	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information You must reload FTOS after executing this command.

Example **Figure 3-13. upgrade boot Command Example**

```
FTOS#upgrade boot ?
all                     Upgrade both boot flash image and selector image
bootflash-image         Upgrade boot flash image
bootselector-image      Upgrade boot selector image
FTOS#
```

upgrade system

Upgrade the bootflash image or system image.

Syntax upgrade system {flash: | ftp: | scp: | tftp: | usbflash: | stack-unit {0-5 | all} {A: | B:}

Parameters

0-5	Enter this keyword to upgrade only the mentioned stack-unit
all	Enter this keyword to upgrade all the member units of the stack
ftp	After entering this keyword you can either follow it with the location of the source file in this form: *//userid:password@hostip/filepath*, or press **Enter** to launch a prompt sequence.
scp	After entering this keyword you can either follow it with the location of the source file in this form: *//userid:password@hostip/filepath*, or press **Enter** to launch a prompt sequence.
tftp	After entering this keyword you can either follow it with the location of the source file in this form: *//hostlocation/filepath*, or press **Enter** to launch a prompt sequence.
flash	After entering this keyword you can either follow it with the location of the source file in this form:*//filepath*, or press **Enter** to launch a prompt sequence.
usbflash	After entering this keyword you can either follow it with the location of the source file in this form:*//filepath*, or press **Enter** to launch a prompt sequence..
A	Enter this keyword to upgrade the bootflash partition A
B	Enter this keyword to upgrade the bootflash partition B

Defaults	none

Command Modes	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You must reload FTOS after executing this command. Use the command upgrade system stack-unit to copy FTOS from the management unit to one or more stack members.

Example   **Figure 3-14.   upgrade system Command Example**

```
FTOS#upgrade system ?
flash:                    Copy from flash file system (flash://filepath)
ftp:                      Copy from remote file system, IPv4 or IPv6, (ftp:/
/userid:password@hostip/filepath)
scp:                      Copy from remote file system, IPv4 or IPv6, (scp:/
/userid:password@hostip/filepath)
stack-unit                Sync image to the stack-unit
tftp:                     Copy from remote file system, IPv4 or IPv6, (tftp:/
/hostip/filepath)
usbflash:                 Copy from usbflash file system (usbflash://
filepath)
FTOS#
```

4

Control and Monitoring

This chapter describes control and monitoring for the MXL 10/40GbE Switch IO Module.

Commands

This chapter includes the following commands:

asf-mode	ip tftp source-interface
banner exec	line
banner login	motd-banner
banner motd	ping
clear alarms	reload
clear command history	send
clear line	service timestamps
configure	show alarms
debug cpu-traffic-stats	show command-history
debug ftpserver	show command-tree
disable	show cpu-traffic-stats
do	show debugging
enable	show environment
enable optic-info-update interval	show inventory
end	show memory
exec-banner	show processes cpu
exec-timeout	show processes ipc flow-control
exit	show processes memory
ftp-server enable	show software ifm
ftp-server topdir	show system
ftp-server username	telnet
hostname	terminal length
ip ftp password	traceroute
ip ftp source-interface	undebug all
ip ftp username	virtual-ip
ip telnet server enable	write
ip telnet source-interface	

asf-mode

Enable alternate store and forward (ASF) mode and forward packets as soon as a threshold is reached.

Syntax   **asf-mode stack-unit** {*unit-id* / *all*} queue size

To return to standard store and forward mode, use the **no asf-mode stack-unit** command.

Parameters

unit-id	Enter the stack member unit identifier of the stack member to reset. **Range**: 0 - 5 all
queue size	Enter the queue size of the stack member. Range: 1 - 15

Defaults   Not configured.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You *must* save the configuration and reload the system to implement ASF. When you enter the command, the system sends a message stating that the new mode is enabled when the system reloads.

banner exec

Configure a message that is displayed when a user enters EXEC mode.

Syntax   banner exec *c line c*

Parameters

c	Enter the keywords banner exec, and then enter a character delineator, represented here by the letter *c*, and press ENTER.
line	Enter a text string for your banner message ending the message with your delineator. In the example below, the delineator is a percent character (%); the banner message is "testing, testing".

Defaults   No banner is displayed.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Optionally, use the banner exec command to create a text string that is displayed when the user accesses EXEC mode. The exec-banner command toggles that display.

Figure 4-1.   banner exec Command Example

```
FTOS(conf)#banner exec ?
LINE                    c banner-text(max length 255) c, where 'c' is a delimiting
character

FTOS(conf)#banner exec %
Enter TEXT message.   End with the character '%'.
This is the banner%
FTOS(conf)#end
FTOS#exit
4d21h5m: %STKUNIT0-M P:CP %SEC-5-LOGOUT: Exec session is terminated for user on
line console

This is the banner

Dell Force10 con0 now available

Press RETURN to get started.

This is the banner
```

Related Commands

banner login	Sets a banner for login connections to the system.
banner motd	Sets a Message of the Day banner.
exec-banner	Enables the display of a text string when the user enters EXEC mode.
line	Enables and configures the console and virtual terminal lines to the system.

banner login

Set a banner to be displayed when logging on to the system.

Syntax   banner login {keyboard-interactive | no keyboard-interactive} [*c line c*]

Parameters

keyboard-interactive	Enter this keyword to require a carriage return (CR) to get the message banner prompt.
c	Enter a delineator character to specify the limits of the text banner. In Figure 4-2, the % character is the delineator character.
line	Enter a text string for your text banner message ending the message with your delineator. In the example in Figure 4-2, the delineator is a percent character (%). Ranges: • maximum of 50 lines • up to 255 characters per line

Defaults   No banner is configured and the CR is required when creating a banner.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   A login banner message is displayed only in EXEC Privilege mode after entering the enable command followed by the password. These banners are not displayed to users in EXEC mode.

Example   **Figure 4-2. banner login Command Example**

```
FTOS(conf)#banner login ?
keyboard-interactive    Press enter key to get prompt
LINE                    c banner-text(max length 255) c, where 'c' is a delimiting
character
FTOS(conf)#no banner login ?
keyboard-interactive    Prompt will be displayed by default
<cr>
FTOS(conf)#banner login keyboard-interactive

Enter TEXT message.  End with the character '%'.
This is the banner%
FTOS(conf)#end
FTOS#exit

13d21h9m: %STKUNIT0-M:CP %SEC-5-LOGOUT: Exec session is terminated for user on
line console
This is the banner
Dell Force10 con0 now available
Press RETURN to get started.
13d21h10m: STKUNIT0-M:CP %SEC-5-LOGIN_SUCCESS: Login successful for user  on line
console
This is the banner
```

Related Commands

banner exec	Sets a banner to be displayed when you enter EXEC Privilege mode.
banner motd	Sets a Message of the Day banner.

banner motd

Set a Message of the Day (MOTD) banner.

Syntax   banner motd *c line c*

Parameters

c	Enter a delineator character to specify the limits of the text banner. In the above figures, the % character is the delineator character.
line	Enter a text string for your message of the day banner message ending the message with your delineator.
	In the example figures above, the delineator is a percent character (%).

Defaults   No banner is configured.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   A MOTD banner message is displayed only in EXEC Privilege mode after entering the enable command followed by the password. These banners are not displayed to users in EXEC (non-privilege) mode.

Related Commands

banner exec	Sets a banner to be displayed when you enter the EXEC Privilege mode.
banner login	Sets a banner to be displayed after successful login to the system.

clear alarms

Clear alarms on the system.

Syntax	clear alarms
Command Modes	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information This command clears alarms that are no longer active. If an alarm situation is still active, it is seen in the system output.

clear command history

Clear the command history log.

Syntax	clear command history
Command Modes	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show command-history	Displays a buffered log of all commands entered by all users along with a time stamp.

clear line

Reset a terminal line.

Syntax clear line {*line-number* | console 0 | vty *number*}

Parameters

line-number	Enter a number for one of the 12 terminal lines on the system. Range: 0 to 11.
console 0	Enter the keyword console 0 to reset the Console port.
vty *number*	Enter the keyword vty followed by a number to clear a Terminal line. Range: 0 to 9

Command Modes	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

configure

Enter CONFIGURATION mode from EXEC Privilege mode.

Syntax   configure [terminal]

Parameters

terminal	(OPTIONAL) Enter the keyword terminal to specify that you are configuring from the terminal.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 4-3.   configure Command Example**

```
FTOS#configure
FTOS(conf)#
```

debug cpu-traffic-stats

Enable the collection of CPU traffic statistics.

Syntax   debug cpu-traffic-stats

Defaults   Disabled

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   This command enables (and disables) the collection of CPU traffic statistics from the time this command is executed (not from system boot). However, excessive traffic received by a CPU automatically triggers (turns on) the collection of CPU traffic statistics. Use the show cpu-traffic-stats to view the traffic statistics.

If excessive traffic is received by CPU, traffic is rate controlled

> **Note:** This command must be enabled before the show cpu-traffic-stats command displays traffic statistics. Dell Force10 recommends disabling debugging (no debug cpu-traffic-stats) after troubleshooting is complete.

Related Commands

show cpu-traffic-stats	Displays the cpu traffic statistics

debug ftpserver

View transactions during an FTP session when a user is logged into the FTP server.

Syntax	debug ftpserver
Command Modes	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

disable

Return to EXEC mode.

Syntax	disable [*level*]

Parameters

level	(OPTIONAL) Enter a number for a privilege level of the FTOS.
	Range: 0 to 15.
	Default: 1

Defaults	1
Command Modes	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

do

Allows the execution of most EXEC-level commands from all CONFIGURATION levels without returning to the EXEC level.

Syntax	do *command*

Parameters

command	Enter an EXEC-level command.

Defaults	none
Command Modes	CONFIGURATION
	INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The following commands are *not* supported by the do command:

- enable
- disable
- exit
- config

Example   **Figure 4-4.   do Command Example**

```
FTOS(conf-if-te-5/0)#do clear counters
Clear counters on all interfaces [confirm]
FTOS(conf-if-te-5/0)#
FTOS(conf-if-te-5/0)#do clear logging
Clear logging buffer [confirm]
FTOS(conf-if-te-5/0)#
FTOS(conf-if-te-5/0)#do reload
System configuration has been modified. Save? [yes/no]: n
Proceed with reload [confirm yes/no]: n
FTOS(conf-if-te-5/0)#
```

enable

Enter EXEC Privilege mode or any other privilege level configured. After entering this command, you may need to enter a password.

Syntax   enable [*level*]

Parameters

level	(OPTIONAL) Enter a number for a privilege level of FTOS.
	Range: 0 to 15.
	Default: 15

Defaults   15

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Users entering EXEC Privilege mode or any other configured privilege level can access configuration commands. To protect against unauthorized access, use the enable password command to configure a password for the enable command at a specific privilege level. If no privilege level is specified, the default is privilege level 15.

Related Commands

enable password	Configures a password for the enable command and to access a privilege level.

enable optic-info-update interval

Enable polling intervals of optical information updates for SNMP.

Syntax   enable optical-info-update interval *seconds*

To disable optical power information updates, use the no enable optical-info-update interval command.

Parameters

interval *seconds*	Enter the keyword interval followed by the polling interval in seconds.
	Range: 120 to 6000 seconds
	Default: 300 seconds (5 minutes)

Defaults   Disabled

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Replaces the enable xfp-power-updates command.

Usage Information The default interval for the polling is 300 seconds (5 minutes). Use this command to enable the polling and to configure the polling frequency.

end

Return to EXEC Privilege mode from other command modes (for example, CONFIGURATION or ROUTER OSPF modes).

Syntax end

Command Modes
- CONFIGURATION
- SPANNING TREE
- MULTIPLE SPANNING TREE
- LINE
- INTERFACE
- VRRP
- ACCESS-LIST
- PREFIX-LIST
- ROUTER OSPF
- ROUTER RIP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	exit	Returns to the lower command mode.

exec-banner

Enable the display of a text string when the user enters EXEC mode.

Syntax exec-banner

Defaults Enabled on all lines (if configured, the banner appears).

Command Modes LINE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Optionally, use the banner exec command to create a text string that is displayed when the user accesses EXEC mode. This command toggles that display.

Related Commands	banner exec	Configures a banner to display when entering EXEC mode.
	line	Enables and configures console and virtual terminal lines to the system.

exec-timeout

Set a time interval for the system to wait for input on a line before disconnecting the session.

Syntax exec-timeout *minutes* [*seconds*]

To return to default settings, enter no exec-timeout.

Parameters

minutes	Enter the number of minutes of inactivity on the system before disconnecting the current session.
	Range: 0 to 35791
	Default: 10 minutes for console line; 30 minutes for VTY line.
seconds	(OPTIONAL) Enter the number of seconds
	Range: 0 to 2147483
	Default: 0 seconds

Defaults 10 minutes for console line; 30 minutes for VTY lines; 0 seconds

Command Modes LINE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information To remove the time interval, use the exec-timeout 0 0 command.

Example **Figure 4-5. FTOS time-out display**

```
FTOS con0 is now available

Press RETURN to get started.
FTOS>
```

exit

Return to the lower command mode.

Syntax exit

Command Modes
- EXEC Privilege
- CONFIGURATION
- LINE
- INTERFACE
- PROTOCOL GVRP
- SPANNING TREE
- MULTIPLE SPANNING TREE
- MAC ACCESS LIST
- ACCESS-LIST
- PREFIX-LIST
- ROUTER OSPF
- ROUTER RIP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	end	Returns to EXEC Privilege command mode.

ftp-server enable

Enable FTP server functions on the system.

Syntax   ftp-server enable

Defaults   Disabled.

Command Modes   CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 4-6.   Logging on to an FTP Server Example**

```
morpheus% ftp 10.31.1.111
Connected to 10.31.1.111.
220 Dell Force10 (1.0) FTP server ready
Name (10.31.1.111:dch): dch
331 Password required
Password:
230 User logged in
ftp> pwd
257 Current directory is "flash:"
ftp> dir
200 Port set okay
150 Opening ASCII mode data connection
   size         date        time         name
--------       ------      ------      --------
     512     Jul-20-2004 18:15:00   tgtimg
     512     Jul-20-2004 18:15:00   diagnostic
     512     Jul-20-2004 18:15:00   other
     512     Jul-20-2004 18:15:00   tgt
226 Transfer complete
329 bytes received in 0.018 seconds (17.95 Kbytes/s)
ftp>
```

Related Commands	ftp-server topdir	Sets the directory to be used for incoming FTP connections.
	ftp-server username	Sets a username and password for incoming FTP connections.

ftp-server topdir

Specify the top-level directory to be accessed when an incoming FTP connection request is made.

Syntax   ftp-server topdir *directory*

Parameters

directory	Enter the directory path.

Defaults   The internal flash is the default directory.

Command Modes   CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

After you enable FTP server functions with the ftp-server enable command, Dell Force10 recommends specifying a top-level directory path. Without a top-level directory path specified, the FTOS directs users to the flash directory when they log in to the FTP server.

Related Commands

ftp-server enable	Enables FTP server functions on the MXL 10/40GbE Switch IO Module.
ftp-server username	Sets a username and password for incoming FTP connections to the MXL 10/40GbE Switch IO Module.

ftp-server username

Create a user name and associated password for incoming FTP server sessions.

Syntax

ftp-server username *username* password [*encryption-type*] *password*

Parameters

username	Enter a text string up to 40 characters long as the user name.
password *password*	Enter the keyword password followed by a string up to 40 characters long as the password.
	Without specifying an encryption type, the password is unencrypted.
encryption-type	(OPTIONAL) After the keyword password enter one of the following numbers:
	• 0 (zero) for an unecrypted (clear text) password
	• 7 (seven) for hidden text password.

Defaults

Not enabled.

Command Modes

CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

hostname

Set the host name of the system.

Syntax

hostname *name*

Parameters

name	Enter a text string, up to 32 characters long.

Defaults

FTOS

Command Modes

CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

| **Usage Information** | The hostname is used in the prompt. |

ip ftp password

Specify a password for outgoing FTP connections.

| **Syntax** | ip ftp password [*encryption-type*] *password* |

Parameters		
encryption-type	(OPTIONAL) Enter one of the following numbers:
	• 0 (zero) for an unecrypted (clear text) password
	• 7 (seven) for hidden text password
password	Enter a string up to 40 characters as the password.

| **Defaults** | Not configured. |

| **Command Modes** | CONFIGURATION |

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

| **Usage Information** | The password is listed in the configuration file; you can view the password using the show running-config ftp command in EXEC mode. |
| | Use the password configured by the ip ftp password command when you use the ftp: parameter in the copy command. |

Related Commands		
copy	Copies the files.
ip ftp username	Sets the user name for the FTP sessions.

ip ftp source-interface

Specify an interface's IP address as the source IP address for FTP connections.

| **Syntax** | ip ftp source-interface *interface* |

Parameters		
interface	Enter the following keywords and slot/port or number information:
	• For Loopback interfaces, enter the keyword loopback followed by a number from zero (0) to 16383.
	• For a Port Channel interface, enter the keyword port-channel followed by a number: **Range**: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.

| **Defaults** | The IP address on the system that is closest to the Telnet address is used in the outgoing packets. |

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	copy	Copies files from and to the switch.

ip ftp username

Assign a user name for outgoing FTP connection requests.

Syntax	ip ftp username *username*

Parameters	*username*	Enter a text string as the user name up to 40 characters long.

Defaults	No user name is configured.

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	You must also configure a password with the ip ftp password command.

Related Commands	ip ftp password	Sets the password for the FTP connections.

ip telnet server enable

Enable the Telnet server on the switch.

Syntax	ip telnet server enable

To disable the Telnet server, use the no ip telnet server enable command.

Defaults	Enabled

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	ip ssh server	Enables the SSH server on the system.

ip telnet source-interface

Set an interface's IP address as the source address in outgoing packets for Telnet sessions.

Syntax   ip telnet source-interface *interface*

Parameters

interface	Enter the following keywords and slot/port or number information:

- For Loopback interfaces, enter the keyword loopback followed by a number from zero (0) to 16383.
- For a Port Channel, enter the keyword port-channel followed by a number:
  Range: 1-128
- For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
- For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
- For VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.

Defaults   The IP address on the system that is closest to the Telnet address is used in the outgoing packets.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

telnet	Telnets to another device.

ip tftp source-interface

Assign an interface's IP address in outgoing packets for TFTP traffic.

Syntax   ip tftp source-interface *interface*

Parameters

interface	Enter the following keywords and slot/port or number information:

- For Loopback interfaces, enter the keyword loopback followed by a number from zero (0) to 16383.
- For a Port Channel, enter the keyword port-channel followed by a number:1-128
- For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
- For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
- For a VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.

Defaults   The IP address on the system that is closest to the Telnet address is used in the outgoing packets.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

line

Enable and configure console and virtual terminal lines to the system. This command accesses LINE mode, where you can set the access conditions for the designated line.

Syntax   line {console 0 | vty *number* [*end-number*]}

Parameters

console 0	Enter the keyword console 0 to configure the console port. The console option is <0-0>.
vty *number*	Enter the keyword vty followed by a number from 0 to 9 to configure a virtual terminal line for Telnet sessions. The system supports 10 Telnet sessions.
end-number	(OPTIONAL) Enter a number from 1 to 9 as the last virtual terminal line to configure. You can configure multiple lines at one time.

Defaults   Not configured

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You cannot delete a terminal connection.

Related Commands

access-class	Restricts incoming connections to a particular IP address in an IP access control list (ACL).
password	Specifies a password for users on terminal lines.
show memory	View current memory usage on the MXL switch.

motd-banner

Enable a Message of the Day (MOTD) banner to appear when you log in to the system.

Syntax   motd-banner

Defaults   Enabled on all lines.

Command Modes   LINE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ping

Test connectivity between the system and another device by sending echo requests and waiting for replies.

Syntax   ping [*host* / *ip-address*] [count {*number* / continuous}] [*datagram-size*] [*timeout*] [*source (ip src-ipv4-address) / interface*] [*tos*] [*df-bit (y/n)*] [*validate-reply(y/n)*] [pattern *pattern*] [*sweep-min-size*] [*sweep-max-size*] [*sweep-interval*] [*ointerface (ip src-ipv4-address) / interface*]

Parameter		
	host	(OPTIONAL) Enter the host name of the devices to which you are testing connectivity.
	ip-address	(OPTIONAL) Enter the IPv4 address of the device to which you are testing connectivity. The address must be in the dotted decimal format.
	count	Enter the number of echo packets to be sent. *number*: 1- 2147483647 *Continuous*: transmit echo request continuously Default: 5
	datagram size	Enter the ICMP datagram size. Range: 36 - 15360 bytes Default: 100
	timeout	Enter the interval to wait for an echo reply before timing out. Range: 0 -3600 seconds Default: 2 seconds
	source	Enter the IPv4 source ip address or the source interface. • Enter the IP address in A.B.C.D format • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information. • For a VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.
	tos	Enter the type of service required. Range: 0-255 Default: 0
	df-bit	Enter Y or N for the **don't fragment** bit in IPv4 header • N: Do not set the **don't fragment** bit • Y: Do set **don't fragmen**t bit Default is No.
	validate-reply	Enter Y or N for reply validation. • N: Do not validate reply data • Y: Do validate reply data Default is No.
	pattern *pattern*	Enter the IPv4 data pattern. Range: 0-FFFF Default: 0xABCD
	sweep-min-size	Enter the minimum size of datagram in sweep range. Range: 52-15359 bytes
	sweep-max-size	Enter the maximum size of datagram in sweep range. Range: 53-15359 bytes

sweep-interval	Enter the incremental value for sweep size.
	1-15308 seconds
ointerface	Enter the outgoing interface for multicast packets.
	• Enter the IP address in A.B.C.D format
	• For a Port Channel, enter the keyword port-channel followed by a number: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.

Defaults   See parameters above.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   When you enter the ping command without specifying an IP address (Extended Ping), you are prompted for a target IP address, a repeat count, a datagram size (up to 1500 bytes), a timeout in seconds, and for Extended Commands. For information on the ICMP message codes that return from a ping command, refer to Appendix , .

Figure 4-7.   ping (IPv4) Command Example

```
FTOS#ping 172.31.1.255

Type Ctrl-C to abort.

Sending 5, 100-byte ICMP Echos to 172.31.1.255, timeout is 2 seconds:
Reply to request 1 from 172.31.1.208     0 ms
Reply to request 1 from 172.31.1.216     0 ms
Reply to request 1 from 172.31.1.205     16 ms
:
:
Reply to request 5 from 172.31.1.209     0 ms
Reply to request 5 from 172.31.1.66      0 ms
Reply to request 5 from 172.31.1.87      0 ms

FTOS#
```

reload

Reboot FTOS.

Syntax   reload

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

If there is a change in the configuration, FTOS prompts you to save the new configuration. Or you can save your running configuration with the copy running-config command.

redundancy disable-auto-reboot	Resets any designated stack member except the management unit.

send

Send messages to one or all terminal line users.

Syntax   send [*] | [*line*] | [console] | [vty]

Parameters

*	Enter the asterisk character * to send a message to all tty lines.
line	Send a message to a specific line. Range: 0 to 11
console	Enter the keyword console to send a message to the Primary terminal line.
vty	Enter the keyword vty to send a message to the Virtual terminal

Defaults   none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Messages can contain an unlimited number of lines; however, each line is limited to 255 characters. To move to the next line, use the <CR>. To send the message use CTR-Z, to abort a message use CTR-C.

service timestamps

Add time stamps to debug and log messages. This command adds either the uptime or the current time and date.

Syntax   service timestamps [debug | log] [datetime [localtime] [msec] [show-timezone] | uptime]

Parameters

debug	(OPTIONAL) Enter the keyword debug to add timestamps to debug messages.
log	(OPTIONAL) Enter the keyword log to add timestamps to log messages with severity 0 to 6.
datetime	(OPTIONAL) Enter the keyword datetime to have the current time and date added to the message.
localtime	(OPTIONAL) Enter the keyword localtime to include the localtime in the timestamp.
msec	(OPTIONAL) Enter the keyword msec to include milliseconds in the timestamp.
show-timezone	(OPTIONAL) Enter the keyword show-timezone to include the time zone information in the timestamp.
uptime	(OPTIONAL) Enter the keyword uptime to have the timestamp based on time elapsed since system reboot.

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information If you do not specify parameters and enter service timestamps, it appears as service timestamps debug uptime in the running-configuration.

Use the show running-config command to view the current options set for the service timestamps command.

show alarms

View alarms.

Syntax show alarms

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 4-8.   show alarms Command Example**

```
FTOS# show alarms

--  Minor Alarms  --
Alarm Type                                              Duration
------------------------------------------------------------------------
No minor alarms

--  Major Alarms  --
Alarm Type                                              Duration
------------------------------------------------------------------------
No major alarms

FTOS#
```

show command-history

Display a buffered log of all commands entered by all users along with a time stamp.

Syntax show command-history

Defaults None.

Command Mode EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

One trace log message is generated for each command. No password information is saved to this file.

Example

Figure 4-9.   show command-history Command Example

```
FTOS#show command-history
[4/20 10:27:23]: CMD-(CLI):[enable]by default from console
[4/20 10:27:23]: CMD-(CLI):[configure terminal]by default from console
        - Repeated 1 time.
[4/20 10:27:23]: CMD-(CLI):[snmp-server community public ro]by default from
console
[4/20 10:27:23]: CMD-(CLI):[logging 172.16.1.162]by default from console
[4/20 10:27:23]: CMD-(CLI):[logging 10.10.10.4]by default from console
[4/20 10:27:24]: CMD-(CLI):[logging 10.1.2.4]by default from console
[4/20 10:27:24]: CMD-(CLI):[logging 172.31.1.4]by default from console
[4/20 10:27:24]: CMD-(CLI):[logging 133.33.33.4]by default from console
[4/20 10:27:24]: CMD-(CLI):[management route 172.16.1.0 /24 10.11.209.4]by default
from console
[4/20 10:27:24]: CMD-(CLI):[service timestamps log datetime]by default from
console
[4/20 10:27:24]: CMD-(CLI):[line console 0]by default from console
[4/20 10:27:24]: CMD-(CLI):[exec-timeout 0]by default from console
[4/20 10:27:24]: CMD-(CLI):[exit]by default from console
[4/20 10:27:29]: CMD-(CLI):[show version]by default from console
[4/20 10:27:56]: CMD-(CLI):[show interfaces tengigabitethernet 0/3]by default from
console
[4/20 10:55:8]: CMD-(CLI):[show lldp neighbors]by default from console
[4/20 15:17:6]: CMD-(CLI):[show cam-acl]by default from console
[4/20 16:34:59]: CMD-(CLI):[show running-config interface tengigabitethernet 0/
55]by default from console
[4/20 16:38:14]: CMD-(CLI):[show vlan]by default from console
[5/4 9:11:52]: CMD-(TEL0):[show version]by admin from vty0 (10.11.68.14)
[5/4 9:12:9]: CMD-(TEL0):[show hosts]by admin from vty0 (10.11.68.14)
[5/4 9:14:38]: CMD-(TEL0):[show arp]by admin from vty0 (10.11.68.14)
[5/4 9:19:29]: CMD-(TEL0):[enable]by admin from vty0 (10.11.68.14)
[5/4 9:19:35]: CMD-(TEL0):[configure]by admin from vty0 (10.11.68.14)
        - Repeated 1 time.
[5/4 9:19:50]: CMD-(TEL0):[interface tengigabitethernet 0/16]by admin from vty0
(10.11.68.14)
[5/4 9:20:11]: CMD-(TEL0):[exit]by admin from vty0 (10.11.68.14)
FTOS#
```

Related
Commands

clear command history	Clears the command history log.

show command-tree

Display the entire CLI command tree, and optionally, display the utilization count for each command and its options.

Syntax   show command-tree [count | no]

Parameters

count	Display the command tree with a usage counter for each command.
no	Display all of the commands that may be preceded by the keyword no, which is the keyword used to remove a command from the running-configuration.

Defaults   None

Command Mode   EXEC

EXEC Privilege

Command
History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Reload the system to reset the command-tree counters.

Example **Figure 4-10.   show command-tree Command Example**

```
FTOS#show command-tree count
!
Enable privilege mode:

calendar                                     command usage:5
  set                                              option usage:     0
  hh:mm:ss                                         option usage:     0
   <1-31>                                          option usage:     0
    <MONTH>                                        option usage:     0
     <1993-2035>                                   option usage:     0
   <MONTH>                                         option usage:     0
    <1-31>                                         option usage:     0
     <1993-2035>                                   option usage:     0

clear arp-cache                              command usage:2

clear ip dhcp                                command usage:1
  binding                                          option usage:     0
  A.B.C.D                                          option usage:     0
 client                                            option usage:     0
  statistics                                       option usage:     0
   interface                                       option usage:     0
    fastethernet                                   option usage:     0
     SLOT/PORT                                     option usage:     0
    fortyGigE                                      option usage:     0
     SLOT/PORT                                     option usage:     0
     SLOT/PORT                                     option usage:     0
    managementethernet                             option usage:     0
     SLOT/PORT                                     option usage:     0
    port-channel                                   option usage:     0
     <1-128>                                       option usage:     0
    tengigabitethernet                             option usage:     0
     SLOT/PORT                                     option usage:     0
    vlan                                           option usage:     0
     <1-4094>                                      option usage:     0
 conflict                                          option usage:     0
  A.B.C.D                                          option usage:     0
 server                                            option usage:     0
  statistics                                       option usage:     0
 snooping                                          option usage:     0
  binding                                          option usage:     0

clear ip fib                                 command usage:4

clear ip route                               command usage:1
FTOS#
```

show cpu-traffic-stats

View the CPU traffic statistics.

Syntax show cpu-traffic-stats [*port number* | all]

Parameters

port number	(OPTIONAL) Enter the port number to display traffic statistics on that port only. Range: 1 to 1568
all	(OPTIONAL) Enter the keyword all to display traffic statistics on all the interfaces receiving traffic, sorted based on traffic.

Defaults all

Command Modes EXEC

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example

Figure 4-11. show cpu-traffic-stats Command Example

```
FTOS#show cpu-traffic-stats
Processor : CP
--------------
   Received 100% traffic on TenGigabitEthernet 8/2   Total packets:100
        LLC:0, SNAP:0, IP:100, ARP:0, other:0
        Unicast:100, Multicast:0, Broadcast:0

FTOS#
```

Usage Information

Traffic statistics are sorted on a per-interface basis; the interface receiving the most traffic is displayed first. All CPU and port information is displayed unless a specific port or CPU is specified. Traffic information is displayed for router ports only; not for management interfaces. The traffic statistics are collected only after the debug cpu-traffic-stats command is executed; not from the system bootup.

> ✎ **Note:** After debugging is complete, use the no debug cpu-traffic-stats command to shut off traffic statistics collection.

Related Commands

debug cpu-traffic-stats	Enables CPU traffic statistics for debugging.

show debugging

View a list of all enabled debugging processes.

Syntax   show debugging

Command Mode   EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example

Figure 4-12. show debugging Command Example

```
FTOS#show debug
Generic IP:  (Access List: test)
   IP packet debugging is on for  (Access List: test)
     TenGigabitEthernet 0/16
   ICMP packet debugging is on for
     TenGigabitEthernet 0/16
OSPF:1
     OSPF packet debugging is on
DHCP:
   DHCP debugging is on
FTOS#
```

show environment

View system component status (for example, temperature, voltage).

Syntax   show environment [all | stack-unit *unit-id*]

Parameters

all	Enter the keyword all to view all components.
stack-unit *unit-id*	Enter the keyword stack-unit followed by the *unit-id* to display information on a specific stack member. Range: 0 to 5.
thermal sensor	Enter the keyword thermal-sensor to view all components.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Figure 4-13 shows the output of the show environment fan command as it appears prior to FTOS 7.8.1.0.

Example   Figure 4-13.   show environment all Command Example

```
FTOS#show environment all

-- Unit Environment Status  --
Unit   Status          Temp   Voltage
-------------------------------------------------------------------------------
* 0    online          47C    ok

 * Management Unit

--  Thermal Sensor Readings (deg C)  --
Unit  Sensor0  Sensor1  Sensor2  Sensor3  Sensor4  Sensor5  Sensor6  Sensor7
Sensor8  Sensor9
-------------------------------------------------------------------------------
----------------
  0     50      52       53       53       54      48       57       57       53
56

FTOS#
```

Example   Figure 4-14.   show environment stack-unit Command Example

```
FTOS#show environment stack-unit 0

 -- Unit Environment Status  --
Unit   Status          Temp   Voltage
-------------------------------------------------------------------------------
  0*    online          49C    ok

 * Management Unit
```

Example   Figure 4-15.   show environment thermal-sensor Command Example

```
FTOS#show environment thermal-sensor

--  Thermal Sensor Readings (deg C)  --
Unit  Sensor0  Sensor1  Sensor2  Sensor3  Sensor4  Sensor5  Sensor6  Sensor7
Sensor8  Sensor9
-------------------------------------------------------------------------------
----------------
  0     50      52       53       53       54      48       57       57       53
56

 * Management Unit
FTOS#
```

show inventory

Displays the switch type, components (including media), FTOS version including hardware
identification numbers and configured protocols.

Syntax

show inventory [media *slot*]

Parameters

media *slot*	(OPTIONAL) Enter the keyword media followed by the stack ID of the stack member for which you want to display pluggable media inventory.

Defaults

Command Modes

EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage

If there are no fibre ports in the unit, only the header under show inventory media is displayed. If
there are fibre ports but no optics inserted, the output displays the message "Media not present or
accessible".

Example 1

Figure 4-16.   show inventory for MXL 10/40GbE Switch IO Module Command Example

```
FTOS#show inventory

System Type          : MXL-10/40GbE
System Mode          : 1.0
Software Version     : NAVASOTA-DEV-9-1-0-917

Unit Type               Serial Number  Part Number  Revision
---------------------------------------------------------------
* 1  MXL-10/40GbE       TW282921F00048 0NVH81       2.0

 * - Management Unit


Software Protocol Configured
---------------------------------------------------------------
  SNMP
  LLDP
FTOS#
```

Example 2

Figure 4-17.   show inventory media Command Example

```
FTOS#show inv media
Slot   Port    Type      Media               Serial Number       F10Qualid
------------------------------------------------------------------------------
   0    33     QSFP      40GBASE-CR4-1M      APF11490011J2Q          Yes
   0    37     QSFP      40GBASE-SR4         MLJ004V                 No
   0    41     QSFP      40GBASE-SR4         MLJ003P                 No
   0    42     QSFP      40GBASE-SR4         MLJ003P                 No
   0    43     QSFP      40GBASE-SR4         MLJ003P                 No
   0    44     QSFP      40GBASE-SR4         MLJ003P                 No
   0    45     QSFP      40GBASE-SR4         MLJ004Y                 No
   0    46     QSFP      40GBASE-SR4         MLJ004Y                 No
   0    47     QSFP      40GBASE-SR4         MLJ004Y                 No
   0    48     QSFP      40GBASE-SR4         MLJ004Y                 No
   0    49               Media not present or accessible
   0    50               Media not present or accessible
   0    51               Media not present or accessible
   0    52               Media not present or accessible
   0    53     QSFP      40GBASE-SR4         MK50012                 No
   0    54     QSFP      40GBASE-SR4         MK50012                 No
   0    55     QSFP      40GBASE-SR4         MK50012                 No
   0    56     QSFP      40GBASE-SR4         MK50012                 No

FTOS#
```

Related Commands	show interfaces	Display information on a specific physical interface or virtual interface.
	show interfaces transceiver	Displays the physical status and operational status of an installed transceiver. The output also displays the transceiver's serial number.

show memory

View current memory usage on the MXL switch.

Syntax   show memory [stack-unit *0-5*]

Parameters

stack-unit *0-5*	(OPTIONAL) Enter the keyword **stack-unit** followed by the stack unit ID of the stack member to display memory information on the designated stack member.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The output for the show memory command displays the memory usage of LP part (sysdlp) of the system. The Sysdlp is an aggregate task that handles all the tasks running on the CPU.

Example   **Figure 4-18.   show memory Command Example**

```
FTOS#show memory stack-unit 0
     Statistics On Unit 0 Processor
     ===========================
  Total(b)        Used(b)        Free(b)        Lowest(b)        Largest(b)
  268435456       4010354        264425102      264375410        264425102
```

show processes cpu

Display CPU usage information based on running processes.

Syntax   show processes cpu [management-unit *1-99* [details] | stack-unit *0-5* | summary | ipc | memory [stack-unit *0-5*]]

Parameters

management-unit *1-99* [details]	(OPTIONAL) Display processes running in the control processor. The *1-99* variable sets the number of tasks to display in order of the highest CPU usage in the past five (5) seconds. Add the **details** keyword to display all running processes (except sysdlp). See Example 3.
stack-unit *0-5*	(OPTIONAL) Enter the keyword **stack-unit** followed by the stack member ID (Range 0 to 5).
	As an option of **show processes cpu**, this option displays CPU usage for the designated stack member. See Example 2.
	Or, as an option of **memory**, this option limits the output of memory statistics to the designated stack member. See Example 5.

summary	(OPTIONAL) Enter the keyword summary to view a summary view of CPU usage for all members of the stack. See Example 1.
ipc	(OPTIONAL) Enter the keyword ipc to display inter-process communication statistics.
memory	(OPTIONAL) Enter the keyword memory to display memory statistics. See Example 4.

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1 **Figure 4-19.   show processes cpu summary Command Example**

```
FTOS#show processes cpu summary

CPU utilization       5Sec     1Min     5Min
   -----------------------------------------
Unit0                  0%        0%       0%

CPU utilization       5Sec     1Min     5Min
  ----------------------------------------
 Unit1*                1%        0%       0%
 Unit2                 0%        0%       0%
 Unit3                 0%        0%       0%

* Mgmt Unit
```

Example 2 **Figure 4-20.   show processes cpu management-unit Command Example**

```
FTOS#show proc cpu management-unit 5

CPU utilization for five seconds: 6%/0%; one minute: 6%; five minutes: 7%
PID          Runtime(ms)     Invoked       uSecs    5Sec   1Min   5Min  TTY
Process
0x00000000       4650          465         10000   4.43%  4.43%   4.43%   0
system
0x00000112     56372590      5637259       10000    1.58%  1.78%   1.89%   0
sysdlp
0x00000107     9630080       963008        10000   0.79%  0.28%   0.33%   0
sysd
0x00000172     1435540       143554        10000   0.00%  0.10%   0.05%   0
igmp
0x000001fc     1366570       136657        10000   0.00%  0.08%   0.05%   0
frrp
FTOS#
```

Example 3   **Figure 4-21.   show processes cpu stack-unit Command Example**

```
FTOS#show process cpu stack-unit 0

CPU utilization for five seconds: 4%/0%; one minute: 3%; five minutes: 2%
PID          Runtime(ms)     Invoked       uSecs     5Sec   1Min   5Min  TTY
Process
0x763a7000    96806080      9680608       10000     3.00%  3.25%   2.93%   0
KP
0x760d5000    26384050      2638405       10000     1.00%  0.50%   0.32%   0
frrpagt
0x762da000      491370        49137       10000     0.00%  0.00%   0.00%   0
F10StkMgr
0x762f9000      665580        66558       10000     0.00%  0.00%   0.00%   0
lcMgr
0x7631d000       37580         3758       10000     0.00%  0.00%   0.00%   0
dla
0x76348000      452110        45211       10000     0.00%  0.00%   0.00%   0
sysAdmTsk
0x76367000     1751990       175199       10000     0.00%  0.00%   0.00%   0
timerMgr
0x76385000       14460         1446       10000     0.00%  0.00%   0.00%   0
PM
0x7629d000      347970        34797       10000     0.00%  0.00%   0.00%   0
diagagt
0x763c7000           0            0           0     0.00%  0.00%   0.00%   0
evagt
0x763eb000       90800         9080       10000     0.00%  0.00%   0.00%   0
ipc
0x77ee9000          50            5       10000     0.00%  0.00%   0.00%   0
tme
0x77eec000           0            0           0     0.00%  0.00%   0.00%   0
ttraceIpFlow
0x77eee000          20            2       10000     0.00%  0.00%   0.00%   0
linkscan_user_threa
0x77ff6000           0            0           0     0.00%  0.00%   0.00%   0
isrTask
0x7811a000           0            0           0     0.00%  0.00%   0.00%   0
tDDB
0x7811c000       22980         2298       10000     0.00%  0.00%   0.00%   0
GC
0x7811e000           0            0           0     0.00%  0.00%   0.00%   0
bshell_reaper_threa
0x78365000          10            1       10000     0.00%  0.00%   0.00%   0
tSysLog
0x78367000     1106980       110698       10000     0.00%  0.00%   0.00%   0
tTimerTask
0x78369000    13131160      1313116       10000     0.00%  0.08%   0.00%   0
tExcTask
0x7836b000          30            3       10000     0.00%  0.00%   0.00%   0
tLogTask
0x785bb000      147650        14765       10000     0.00%  0.00%   0.00%   0
tUsrRoot
```

Example 4   **Figure 4-22.   show processes memory Command Example**

```
FTOS#show processes memory

Memory Statistics Of Stack Unit 0 (bytes)
   =============================================================
Total:  2147483648, MaxUsed:   378417152, CurrentUsed:  378417152, CurrentFree:
1769066496
     TaskName     TotalAllocated       TotalFreed       MaxHeld      CurrentHolding
     f10appioserv       225280               0              0            208896
           ospf         573440               0              0           8716288
     f10appioserv       225280               0              0            208896
        fcoecntrl       262144               0              0           7917568
         dhclient       548864               0              0           1310720
     f10appioserv       225280               0              0            208896
            ndpm        618496               0              0           7512064
     f10appioserv       225280               0              0            208896
            vrrp        335872               0              0           8048640
     f10appioserv       225280               0              0            208896
            frrp        180224               0              0           7512064
     f10appioserv       225280               0              0            208896
            xstp       2740224               0              0           9801728
     f10appioserv       225280               0              0            208896
             pim       1007616               0              0           7757824
     f10appioserv       225280               0              0            208896
            igmp        401408               0              0           7639040
     f10appioserv       225280               0              0            208896
            mrtm       5496832               0              0          11124736
     f10appioserv       225280               0              0            208896
           l2mgr       1036288               0              0          16134144
     f10appioserv       225280               0              0            208896
            l2pm        172032               0              0           7483392
     f10appioserv       225280               0              0            208896
            arpm        192512               0              0           7057408
FTOS#
```

Example 5   **Figure 4-23.   show processes memory stack-unit Command Example**

```
FTOS#show process memory stack-unit 0
Total:  2147483648, MaxUsed:   378433536, CurrentUsed:  378433536, CurrentFree:
1769050112
     TaskName     TotalAllocated       TotalFreed       MaxHeld      CurrentHolding
     f10appioserv       225280               0              0            208896
           ospf         573440               0              0           8716288
     f10appioserv       225280               0              0            208896
        fcoecntrl       262144               0              0           7917568
         dhclient       548864               0              0           1310720
     f10appioserv       225280               0              0            208896
            ndpm        618496               0              0           7512064
     f10appioserv       225280               0              0            208896
            vrrp        335872               0              0           8048640
     f10appioserv       225280               0              0            208896
            frrp        180224               0              0           7512064
     f10appioserv       225280               0              0            208896
            xstp       2740224               0              0           9801728
     f10appioserv       225280               0              0            208896
             pim       1007616               0              0           7757824
     f10appioserv       225280               0              0            208896
FTOS#
```

Related Commands

show hardware layer2 acl	Displays Layer 2 ACL data for the selected stack member and stack member port-pipe.
show hardware layer3	Displays Layer 3 ACL or QoS data for the selected stack member and stack member port-pipe.
show hardware stack-unit	Displays the data plane or management plane input and output statistics of the designated component of the designated stack member.
show hardware system-flow	Displays Layer 3 ACL or QoS data for the selected stack member and stack member port-pipe.

| show interfaces stack-unit | Displays information on all interfaces on a specific stack member. |
| show processes memory | Displays CPU usage information based on running processes |

show processes ipc flow-control

Display the Single window protocol queue (SWPQ) statistics.

Syntax   show processes ipc flow-control [cp]

Parameters

| cp | (OPTIONAL) Enter the keyword cp to view the Control Processor's SWPQ statistics. |

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Example 1   **Figure 4-24.   show processes ipc flow-control Command Example**

```
FTOS#show processes ipc flow-control

Q Statistics on CP Processor
   TxProcess       RxProcess        Cur      High     Time     Retr      Msg      Ack  Aval   Max
                                    Len      Mark     Out      ies      Sent     Rcvd Retra Retra
       ACL0            RTM0          0        0        0        0        0        0    10    10
       ACL0        DIFFSERV0         0        0        0        0        0        0    10    10
       ACL0           IGMP0          0        0        0        0        0        0    10    10
       ACL0            PIM0          0        0        0        0        0        0    10    10
     ARPMGR0          MRTM0          0        0        0        0        0        0   100   100
      LACP0          IFMGR0          0        0        0        0        0        0    25    25
       RTM0            OTM0          0        0        0        0        0        0    60    60
       RTM0            OTM0          0        0        0        0        0        0    60    60
FTOS#
```

Table 4-1 lists the definitions of the fields shown in Figure 4-24.

Table 4-1.   Description of the show processes ipc flow-control cp output Command

Field	Description
Source QID /Tx Process	Source Service Identifier
Destination QID/Rx Process	Destination Service Identifier
Cur Len	Current number of messages enqueued
High Mark	Highest number of packets in the queue at any point of time
#of to / Timeout	Timeout count
#of Retr /Retries	Number of retransmissions
#msg Sent/Msg Sent/	Number of messages sent
#msg Ackd/Ack Rcvd	Number of messages acknowledged

Table 4-1. Description of the show processes ipc flow-control cp output Command

Field	Description
Retr /Available Retra	Number of retries left
Total/ Max Retra	Number of retries allowed

Usage Information

The Single window protocol (SWP) provides flow control-based reliable communication between the sending and receiving software tasks.

Important Points to Remember

- A sending task enqueues messages into the SWP queue3 for a receiving task and waits for an acknowledgement.
- If no response is received within a defined period of time, the SWP timeout mechanism resubmits the message at the head of the FIFO queue.
- After retrying a defined number of times, the following timeout message is generated:

  SWP-2-NOMORETIMEOUT

- In the display output in Figure 4-24, a retry (Retries) value of zero indicates that the SWP mechanism reached the maximum number of retransmissions without an acknowledgement.

show processes memory

Display memory usage information based on processes running in the system.

Syntax

show processes memory {management-unit | stack unit {0–5 | all | summary}}

Parameters

management-unit	Enter the keyword management-unit for CPU memory usage of the stack management unit.
stack unit 0–5	Enter the keyword stack unit followed by a stack unit ID of the member unit for which to display memory usage on the forwarding processor.
all	Enter the keyword all for detailed memory usage on all stack members.
summary	Enter the keyword summary for a brief summary of memory availability and usage on all stack members.

Command Modes

EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The output for the show process memory command displays the memory usage statistics running on CP part (sysd) of the system. The Sysd is an aggregate task that handles all the tasks running on MXL 10/40GbE Switch IO Module's CP.

The output of show memory and this command will differ based on which FTOS processes are counted.

- In the show memory display output, the memory size is equal to the size of the application processes.
- In the output of this command, the memory size is equal to the size of the application processes *plus* the size of the system processes.

Example   **Figure 4-25.   show processes memory Command Example**

```
FTOS#show processes memory stack-unit 0
Total:  2147483648, MaxUsed:   378433536, CurrentUsed:  378433536, CurrentFree:
1769050112
    TaskName      TotalAllocated        TotalFreed       MaxHeld       CurrentHolding
    f10appioserv        225280                 0             0              208896
          ospf          573440                 0             0             8716288
    f10appioserv        225280                 0             0              208896
       fcoecntrl        262144                 0             0             7917568
        dhclient        548864                 0             0             1310720
    f10appioserv        225280                 0             0              208896
            ndpm        618496                 0             0             7512064
    f10appioserv        225280                 0             0              208896
            vrrp        335872
```

Example   **Figure 4-26.   show processes memory management-unit Command Example**

```
FTOS#show processes memory management-unit
 Total     :  2147483648, MaxUsed    :    378470400 [05/23/2012 09:49:39]
 CurrentUsed:   378470400, CurrentFree:  1769013248
 SharedUsed :     18533952, SharedFree :     2437592

  PID   Process          ResSize       Size       Allocs       Frees         Max
Current
  472 ospf              8716288      573440        94952           0        94952
94952
  529 fcoecntrl         7917568      262144       916736      844764       187920
71972
  225 dhclient          1310720      548864            0                        0
0            0
  360 ndpm              7512064      618496         4848           0         4848
4848
  160 vrrp              8048640      335872        83700           0        83700
83700
  508 frrp              7512064      180224      1445898     1341684       137342
104214
  186 xstp              9801728     2740224        54986       16564        38422
38422
  374 pim               7757824     1007616       111860           0       111860
111860
--More--
```

Table 4-2 defines the fields that appear in the show processes memory output.

Table 4-2.   Descriptions of show processes memory output

Field	Description
Total:	Total system memory available
MaxUsed:	Total maximum memory used ever (history indicated with time stamp)
CurrentUsed:	Total memory currently in use
CurrentFree:	Total system memory available
SharedUsed:	Total used shared memory
SharedFree:	Total free shared memory

Table 4-2.   Descriptions of show processes memory output

Field	Description
PID	Process ID
Process	Process Name
ResSize	Actual resident size of the process in memory
Size	Process test, stack, and data size
Allocs	Total dynamic memory allocated
Frees	Total dynamic memory freed
Max	Maximum dynamic memory allocated
Current	Current dynamic memory in use

show software ifm

Display interface management (IFM) data.

Syntax   show software ifm {clients [summary] | ifagt *number* | ifcb *interface* | stack-unit *unit-ID* | trace-flags}

Parameters

clients	Enter the keyword clients to display IFM client information.
summary	(OPTIONAL) Enter the keyword **summary** to display brief information about IFM clients.
ifagt *number*	Enter the keyword ifagt followed by the number of an interface agent to display software pipe and IPC statistics.
ifcb *interface*	Enter the keyword ifcb followed by one of the following interface IDs followed by the slot/port information to display interface control block information for that interface: • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128 • For a 10G Ethernet interface, enter the keyword TenGigabitEthernet. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE.
stack-unit *unit-ID*	Enter the keyword stack-unit followed by the stack member number to display IFM information for that unit. Range: 0-5
trace-flags	Enter the keyword trace-flags to display IFM information for internal trace flags.

Defaults   None

Command Mode   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 4-27.   show software ifm clients summary Command Example**

```
FTOS#show software ifm clients summary
ClntType  Inst     svcMask      subSvcMask     tlvSvcMask    tlvSubSvc swp
IPM       0        0x00000000 0x00000000 0x90ff71f3 0xb98784a1 22
RTM       0        0x00000000 0x00000000 0x800010ff 0x0064c798 56
RIP       0        0x00000dfe 0x00000000 0x00000000 0x00000000 0
ISIS      0        0x00000002 0x00000000 0x00000000 0x00000000 0
VRRP      0        0x00000000 0x00000000 0x803330f3 0x0013c480 38
L2PM      0        0x00000000 0x00000000 0x87ff79ff 0xdb80c800 64
ACL       0        0x00000000 0x00000000 0x867f50c3 0x0103c018 81
OSPF      0        0x00000dfa 0x00100338 0x00000000 0x00000000 0
PIM       0        0x000e00f3 0x0000c000 0x00000000 0x00000000 0
IGMP      0        0x000e027f 0x00000000 0x00000000 0x00000000 0
SNMP      0        0x00000000 0x00000000 0x8000c2c0 0x00000002 21
EVTTERM   0        0x00000000 0x00000000 0x800002c0 0x0003c000 20
MRTM      0        0x00000000 0x00000000 0x81f7103f 0xc0600000 30
DSM       0        0x00000000 0x00000000 0x80771033 0x00000000 58
Mirror    0        0x00000000 0x00000000 0x80770003 0x00000000 25
LACP      0        0x00000000 0x00000000 0x8000383f 0x01000000 33
SFL_CP    0        0x00000000 0x00000000 0x807739ff 0x00000000 24
DHCP      0        0x00000000 0x00000000 0x807040f3 0x18001000 35
V6RAD     0        0x00000433 0x0000c000 0x00000000 0x00000000 0
Unidentified Client0      0x006e0002 0x00000000 0x00000000 0x00000000 0
Unidentified Client0      0x6066003f 0x00000000 0x6066003f 0x00000000 95
LLDP      0        0x007f2433 0x0408c000 0x007f2433 0x0408c000 60
--More--
```

show system

Display the current status of all stack members or a specific member.

Syntax   show system [brief | stack-unit *unit-id*]

Parameters

brief	(OPTIONAL) Enter the keyword brief to view an abbreviated list of system information.
stack-unit *unit-id*	(OPTIONAL) Enter the keyword stack-unit followed by the stack member ID for information on that stack member. Range: 0 to 5.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage   Figure 4-28 shows the output from the show system brief command.
Figure 4-29 shows the output from the show system stack-unit command.

Example **Figure 4-28.   show system brief Command Example**

```
FTOS#show system brief

Stack MAC : 00:1e:c9:f1:03:1a

Reload Type : normal-reload [Next boot : normal-reload]

--  Stack Info  --
Unit  UnitType     Status       ReqTyp          CurTyp           Version       Ports
-----------------------------------------------------------------------------------
----
  0   Member       not present
  1   Management   online       MXL-10/40GbE    MXL-10/40GbE     9-1-0-917     56
  2   Member       not present
  3   Member       not present
  4   Member       not present
  5   Member       not present

FTOS#
```

Example **Figure 4-29.   show system stack-unit Command Example**

```
FTOS#show system stack-unit 0

--  Unit 0 --
Unit Type       : Management Unit
Status          : online
Next Boot       : online
Required Type   : MXL-10/40GbE - 34-port GE/TE/FG (XL)
Current Type    : MXL-10/40GbE - 34-port GE/TE/FG (XL)
Master priority : 0
Hardware Rev    : X01
Num Ports       : 56
Up Time         : 3 hr, 35 min
FTOS Version    : 8-3-16-160
Jumbo Capable   : yes
POE Capable     : no
Boot Flash      : A: 4.0.1.0bt1    B: 4.0.1.0bt1 [booted]
Boot Selector   : 4.0.0.0bt1
Memory Size     : 2147483648 bytes
Temperature     : 44C
Voltage         : ok
Switch Power    : GOOD
Product Name    : Force10 MXL 10/40GbE
Mfg By          : DELL
Mfg Date        : 2012-01-05
Serial Number   : DELL123456
Part Number     : 0NVH81X01
Piece Part ID   : N/A
PPID Revision   : N/A
Service Tag     : N/A
Expr Svc Code   : N/A
PSOC FW Rev     : 0xb
ICT Test Date   : 0-0-0
ICT Test Info   : 0x0
Max Power Req   : 31488
Fabric Type     : 0x3
Fabric Maj Ver  : 0x1
Fabric Min Ver  : 0x0
SW Manageability: 0x4
HW Manageability: 0x1
Max Boot Time   : 6 minutes
Link Tuning     : unsupported
Auto Reboot     : enabled
Burned In MAC   : 00:01:e8:43:de:e1
No Of MACs      : 3

FTOS#
```

Related Commands	show version	Displays the FTOS version.
	show processes memory	Displays the memory usage based on the running processes.
	show system stack-ports	Displays information about the stack ports on all switches in the stack.
	show hardware stack-unit	Displays the data plane and management plane input and output statistics of a particular stack member.
	stack-unit priority	Configures the ability of the switch to become the management unit of a stack.

show tech-support

Display a collection of data from other show commands, necessary for Dell Force10 technical support to perform troubleshooting on MXL switches.

Syntax show tech-support [stack-unit *unit-id* | page]

Parameters

stack-unit	(OPTIONAL) Enter the keyword stack-unit to view CPU memory usage for the stack member designated by *unit-id.* Range: 0 to 5
page	(OPTIONAL) Enter the keyword page to view 24 lines of text at a time. Press the SPACE BAR to view the next 24 lines. Press the ENTER key to view the next line of text.
	When using the pipe command (	), enter one of these keywords to filter command output. Refer to Chapter 2, CLI Basics for details on filtering commands.
save	Enter the save keyword to save the command output. flash: Save to local flash drive (flash://filename (max 20 chars))

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 4-30.   show tech-support save Command Example (Partial)

```
FTOS#show tech-support ?
page                      Page through output
stack-unit                Unit Number
|                         Pipe through a command
<cr>
FTOS#show tech-support stack-unit 1 ?
page                      Page through output
|                         Pipe through a command
<cr>
FTOS#show tech-support stack-unit 1 | ?
except                    Show only text that does not match a pattern
find                      Search for the first occurrence of a pattern
grep                      Show only text that matches a pattern
no-more                   Don't paginate output
save                      Save output to a file

FTOS#show tech-support stack-unit 1 | save ?
flash:               Save to local file system (flash://filename (max 20 chars) )

FTOS#show tech-support stack-unit 1 | save flash://LauraSave
Start saving show command report .......
FTOS#

FTOS#dir
Directory of flash:

Directory of flash:

  1  drwx       4096    Jan 01 1980 01:00:00 +01:00 .
  2  drwx       2048    May 16 2012 10:49:01 +01:00 ..
  3  drwx       4096    Jan 24 2012 19:38:32 +01:00 TRACE_LOG_DIR
  4  drwx       4096    Jan 24 2012 19:38:32 +01:00 CORE_DUMP_DIR
  5  d---       4096    Jan 24 2012 19:38:34 +01:00 ADMIN_DIR
  6  -rwx      10303    Mar 15 2012 18:37:20 +01:00 startup-config.bak
  7  -rwx       7366    Apr 20 2012 10:57:02 +01:00 startup-config
  8  -rwx          4    Feb 19 2012 07:05:02 +01:00 dhcpBindConflict
  9  -rwx      12829    Feb 18 2012 02:24:14 +01:00 startup-config.backup
 10  drwx       4096    Mar 08 2012 22:58:54 +01:00 WJ_running-config
 11  -rwx       7689    Feb 21 2012 04:45:40 +01:00 stbkup

flash: 2143281152 bytes total (2131476480 bytes free)

FTOS#
```

Figure 4-31. show tech-support Command Example (Partial)

```
FTOS#show tech-support stack-unit 0
Required Type   :       -

--  Unit 5 --
Unit Type       : Member Unit
Status          : not present
Required Type   :       -


 --------------------------------- show environment ------------------

-- Unit Environment Status  --
Unit   Status         Temp   Voltage
--------------------------------------------------------------------------
* 1    online         41C    ok

 * Management Unit

--  Thermal Sensor Readings (deg C)  --
Unit   Sensor0   Sensor1
--------------------------
  1       39       41


 ---------------------------------- show ip traffic ------------------
IP statistics:
 Rcvd: 894390 total, 415557 local destination
    0 format errors, 0 checksum errors, 0 bad hop count
    0 unknown protocol, 0 not a gateway
    15 security failures, 0 bad options
 Frags: 0 reassembled, 0 timeouts, 0 too big
    0 fragmented, 0 couldn't fragment
 Bcast: 402 received, 0 sent; Mcast: 37 received, 0 sent
 Sent: 468133 generated, 0 forwarded
    42 encapsulation failed, 0 no route

ICMP statistics:
 Rcvd: 0 format errors, 0 checksum errors, 0 redirects, 2 unreachable
    0 echo, 0 echo reply, 0 mask requests, 0 mask replies, 0 quench
    0 parameter, 0 timestamp, 0 info request, 0 other
 Sent: 0 redirects, 0 unreachable, 0 echo, 0 echo reply
    0 mask requests, 0 mask replies, 0 quench, 0 timestamp
    0 info reply, 0 time exceeded, 0 parameter problem

UDP statistics:
 Rcvd: 396516 total, 0 checksum errors, 0 no port
    0 short packets, 0 bad length, 28746 no port broadcasts, 0 socket full
 Sent: 16460 total, 28746 forwarded broadcasts

TCP statistics:
 Rcvd: 4618 total, 0 checksum errors, 0 no port
 Sent: 5023 total

ARP statistics:
 Rcvd: 43988 requests, 24518 replies, 10 wrong interface
 Sent: 42 requests, 6 replies (0 proxy)
```

Usage Information

Without the page or stack-unit option, the command output is continuous, use **Ctrl-z** to interrupt the command output.

The save option works with other filtering commands. This allows you to save specific information of a show command. The save entry must always be the last option.

For example: FTOS#*show tech-support* |grep *regular-expression* |except *regular-expression* | find *regular-expression* | save flash://result*

This display output is an accumulation of the same information that is displayed when you execute one of the following show commands:

- show cam
- show clock
- show environment
- show file
- show interfaces
- show inventory
- show ip protocols
- show ip route summary
- show processes cpu
- show processes memory
- show redundancy
- show running-conf
- show version

Related Commands

show version	Displays the FTOS version.
show system	Displays the current switch status.
show environment	Displays system component status.
show processes memory	Displays memory usage based on the running processes.

telnet

Connect through Telnet to a server. The Telnet client and server in FTOS supports IPv4 connections. You can establish a Telnet session directly to the router, or a connection can be initiated from the router.

Syntax   telnet {*host* | *ip-address*} [/source-interface]

Parameters

host	Enter the name of a server.
ip-address	Enter the IPv4 address in dotted decimal format of the server.
source-interface	(OPTIONAL) Enter the keywords /source-interface followed by the interface information to include the interface's IP address.
	Enter the following keywords and slot/port or number information:
	• For a Loopback interface, enter the keyword loopback followed by a number from zero (0) to 16383.
	• For the Null interface, enter the keyword null followed by 0.
	• For a Port Channel interface, enter the keyword port-channel followed by a number:
	Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.

Defaults   Not configured.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Telnet to link-local addresses is not supported.

terminal length

Configure the number of lines displayed on the terminal screen.

Syntax   terminal length *screen-length*

To return to the default values, use the terminal no length command.

Parameters

screen-length	Enter a number of lines. Entering zero will cause the terminal to display without pausing.
	Range: 0 to 512.
	Default: 24 lines.

Defaults   24 lines

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

terminal xml

Enable XML mode in Telnet and SSH client sessions.

Syntax   terminal xml

To exit the XML mode, use the terminal no xml command.

Defaults   Disabled

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	This command enables XML input mode where you can either cut and paste XML requests or enter the XML requests line-by-line. For more information about using the XML feature, refer to the XML chapter in the *FTOS Configuration Guide*.

traceroute

View the packet path to a specific device.

Syntax	traceroute { *host*	*ip-address* }

Parameters

host	Enter the name of device.
ip-address	Enter the IP address of the device in dotted decimal format.

Defaults	Timeout = 5 seconds; Probe count = 3; 30 hops max; 40 byte packet size; UDP port = 33434

Command Modes	EXEC
	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	When you enter the traceroute command without specifying an IP address (Extended Traceroute), you are prompted for a target and source IP address, timeout in seconds (default is 5), a probe count (default is 3), minimum TTL (default is 1), maximum TTL (default is 30), and port number (default is 33434). To keep the default setting for those parameters, press the ENTER key.

Example

Figure 4-32. traceroute (IPv4) Command Example

```
FTOS#traceroute www.force10networks.com

Translating "www.force10networks.com"...domain server (10.11.0.1) [OK]
Type Ctrl-C to abort.

-----------------------------------------------------------------------------
---------
Tracing the route to www.force10networks.com (10.11.84.18), 30 hops max, 40 byte
packets
-----------------------------------------------------------------------------
---------

 TTL Hostname            Probe1      Probe2      Probe3
  1  10.11.199.190           001.000 ms  001.000 ms  002.000 ms
  2  gwegress-sjc-02.force10networks.com (10.11.30.126) 005.000 ms  001.000 ms
001.000 ms
  3  fw-sjc-01.force10networks.com (10.11.127.254) 000.000 ms  000.000 ms  000.000
ms
```

Related Commands	

ping	Tests the connectivity to a device.

undebug all

Disable all debug operations on the system.

Syntax	undebug all
Defaults	none
Command Modes	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

virtual-ip

Configure a virtual IP address for the active management interface. You can configure virtual addresses for IPv4 independently.

Syntax   virtual-ip {*ipv4-address*}

Parameters

{*ipv4-address*}	Enter the IPv4 address (A.B.C.D) of the active management interface.

Defaults	none
Command Modes	CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Each time this command is issued, it replaces the previously configured address of the same family. The no virtual-ip command now takes an address/prefix-length argument, so that the desired address only is removed. If you use the no virtual-ip command without any specified address, the IPv4 virtual addresses are removed.

Example   **Figure 4-33.   virtual ip (IPv4) Command Example**

```
FTOS#virtual-ip 10.11.197.99/16
```

write

Copy the current configuration to either the startup-configuration file or the terminal.

Syntax   write {memory | terminal}

Parameters

memory	Enter the keyword memory to copy the current running configuration to the startup configuration file. This command is similar to the copy running-config startup-config command.
terminal	Enter the keyword terminal to copy the current running configuration to the terminal. This command is similar to the show running-config command.

Command Modes   EXEC Privilege

**Command
History**

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

**Usage
Information**
The write memory command saves the running-configuration to the file labeled startup-configuration.
When using a LOCAL CONFIG FILE other than the startup-config not named "startup-configuration",
the running-config is not saved to that file; use the copy command to save any running-configuration
changes to that local file.

u-Boot

Overview

All commands in this chapter are in u-Boot mode. These commands are supported on the Dell Force10 MXL 10/40GbE Switch Module platform only.

To access this mode, hit any key when the following line appears on the console during a system boot:

`Hit any key to stop autoboot:`

You enter u-Boot immediately, as indicated by the `BOOT_USER#` prompt.

> **Note:** This chapter describes only a few commands available in uBoot mode.

Commands

- boot change
- boot selection
- boot show net config retries
- boot write net config retries
- boot zero
- default gateway
- enable
- help
- ignore enable password
- ignore startup config
- interface management ethernet ip address
- no default-gateway
- no interface management ethernet ip address
- reload
- show boot blc
- show boot selection
- show bootflash
- show bootvar
- show default-gateway
- show interface management Ethernet
- show interface management port config
- syntax help

✐ **Note:** You cannot use the Tab key to complete commands in this mode.

boot change

Change the operating system boot parameters.

Syntax **boot change** [primary | secondary | default]

Command Modes uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

boot selection

Change the ROM bootstrap bootflash partition.

Syntax **boot selection** [a | b]

Command Modes uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

boot show net config retries

Show the number of retries for network boot configuration failure.

Syntax **boot show net config retries**

Command Modes uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 5-1.** boot show net config retries Command Example

```
BOOT_USER# boot show net config retries

Number of Network Boot Config Retries is : 0

BOOT_USER #
```

boot write net config retries

Set the number of retries for network boot configuration failure.

Syntax	**boot write net config retries** \<int\>
Command Modes	uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 5-2.** boot write net config retries Command Example

```
BOOT_USER # boot write net config retries 2
Updated number of Network Boot Config retries to 2.
BOOT_USER #
```

boot zero

Clears the primary, secondary, or default boot parameters.

Syntax	**boot zero** [primary	secondary	default]
Command Modes	uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

default gateway

Set the default gateway IP address.

Syntax	**default-gateway** \<ip-address\>
Command Modes	uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

enable

Change the access privilege level.

Syntax	**enable** [user	admin]
Command Modes	uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

help

Display help menu.

Syntax   **help**

Command Modes   uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 5-3.**   help Command Example

```
BOOT_USER # help
***** Dell Force10 Boot Interface Help Information *****
Current access level: USER LEVEL
Use "syntax help" for more information on syntax.
Available command list (22 commands total):
  boot change [primary|secondary|default]
      change operating system boot parameters
  boot selection [a|b]
      change the rom bootstrap bootflash partition
  boot show net config retries
      show number of retries for network boot config failure
  boot write net config retries <int>
      write number of retries for network boot config failure
  boot zero [primary|secondary|default]
      zero operating system boot parameters
  default-gateway <ip-address>
      default-gateway - set the default gateway ip address
  enable [user|admin]
      change access privilege level
  help
      display help menu
-(36%)-Use <CR> to continue, q to stop:
BOOT_USER #
```

ignore enable password

Ignore the enabled password.

Syntax   **ignore enable-password**

Command Modes   uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ignore startup config

Ignore system startup configuration.

Syntax   **ignore startup-config**

Command Modes   uBoot

interface management ethernet ip address

Set the management port IP address and mask.

Syntax **interface management ethernet ip address** <ip/mask>

Command Modes uBoot

| Command History | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

no default-gateway

Clear the default gateway IP address.

Syntax **no default-gateway**

Command Modes uBoot

| Command History | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

no interface management ethernet ip address

Clear the management port IP address and mask.

Syntax **no interface management ethernet ip address**

Command Modes uBoot

| Command History | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

reload

Reload the MXL Switch.

Syntax **reload**

Command Modes uBoot

| Command History | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

show boot blc

Show the boot loop counter value.

Syntax **show boot blc**

Command Modes uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 5-4.** show boot blc Command Example

```
BOOT_USER # show boot blc ?
Total 1 possible command found.
Possible command list:
  show boot blc
      show the boot loop counter value
BOOT_USER # show boot blc
Boot Loop Counter : 10

BOOT_USER #
```

show boot selection

Display ROM bootstrap bootflash partition.

Syntax **show boot selection**

Command Modes uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 5-5.** show boot selection Command Example

```
BOOT_USER # show boot selection

ROM BOOTSTRAP SELECTOR PARMETERS:
=================================
Next ROM bootstrap set to occur from Bootflash partition A.

Last ROM bootstrap occurred from Bootflash partition B.

BOOT_USER #
```

show bootflash

Show summary of boot flash information.

Syntax **show bootflash**

Command Modes uBoot

Version 8.3.16.1   Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 5-6.**   show bootflash Command Example

```
BOOT_USER # show bootflash

GENERAL BOOTFLASH INFO
======================
Bootflash Partition A:
  Dell Force10 Networks System Boot
  Official IOM_LP_IMG_BOOT_LOADER, BSP Release 4.0.1.0bt1
  Created Tue May  1 10:56:16 2012 by build on login-sjc-01

Bootflash Partition B:
  Dell Force10 Networks System Boot
  Official IOM_LP_IMG_BOOT_LOADER, BSP Release 4.0.1.0bt1
  Created Tue May  1 10:56:16 2012 by build on login-sjc-01

Boot Selector Partition:
  Dell Force10 Networks System Boot
  Official IOM_XLOAD_LP_IMG_BOOT_SELECTOR, BSP Release 4.0.0.0bt1
  Created Tue May  1 10:56:34 2012 by build on login-sjc-01

BOOT_USER #
```

show bootvar

Show summary of operating system boot parameters.

Syntax   **show bootvar**

Command Modes   uBoot

Command History

Version 8.3.16.1   Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 5-7.**   show bootvar Command Example

```
BOOT_USER # show bootvar

PRIMARY OPERATING SYSTEM BOOT PARAMETERS:
=========================================
boot device                    : tftp
file name                      : premnath
Management Etherenet IP address  : 10.16.130.134/16
Server IP address              : 10.16.127.35
Default Gateway IP address     : 15.0.0.1
Management Etherenet MAC address : 00:01:E8:43:DE:DF

SECONDARY OPERATING SYSTEM BOOT PARAMETERS:
=========================================
No Operating System boot parameters specified!

DEFAULT OPERATING SYSTEM BOOT PARAMETERS:
=========================================
boot device                    : tftp
file name                      : FTOS-XL-8-3-16-99.bin
Management Etherenet IP address  : 10.16.130.134/16
Server IP address              : 10.16.127.53
Default Gateway IP address     : 15.0.0.1
Management Etherenet MAC address : 00:01:E8:43:DE:DF

BOOT_USER #
```

show default-gateway

Display the default gateway IP address.

Syntax   **show default-gateway**

Command Modes   uBoot

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 5-8.**   show default-gateway Command Example

```
BOOT_USER # show default-gateway

Gateway IP address: 15.0.0.1

BOOT_USER #
```

show interface management Ethernet

Show the management port IP address and mask.

Syntax   **show interface management ethernet**

Command Modes   uBoot

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 5-9.**   show interface management ethernet Command Example

```
BOOT_USER # show interface management ethernet

Management ethernet IP address: 10.16.130.134/16


BOOT_USER #
```

show interface management port config

Show the management port boot characteristics.

Syntax   **show interface management port config**

Command Modes   uBoot

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 5-10.**   show interface management port config Command Example

```
BOOT_USER # show interface management port config

Management ethernet Port Configuration: no Auto Negotiate

Management ethernet Port Configuration: 100M

Management ethernet Port Configuration: full duplex

BOOT_USER #
```

syntax help

Show syntax information.

Syntax   **help**

Command Modes   uBoot

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 5-11.** help Command Example

```
BOOT_USER # help
***** Dell Force10 Boot Interface Help Information *****
Current access level: USER LEVEL
Use "syntax help" for more information on syntax.
Available command list (22 commands total):
  boot change [primary|secondary|default]
      change operating system boot parameters
  boot selection [a|b]
      change the rom bootstrap bootflash partition
  boot show net config retries
      show number of retries for network boot config failure
  boot write net config retries <int>
      write number of retries for network boot config failure
  boot zero [primary|secondary|default]
      zero operating system boot parameters
  default-gateway <ip-address>
      default-gateway - set the default gateway ip address
  enable [user|admin]
      change access privilege level
  help
      display help menu
-(36%)-Use <CR> to continue, q to stop:
BOOT_USER #
```

6

Access Control Lists (ACL)

Overview

The Dell Force10 operating software (FTOS) supports the following types of access control lists (ACLs), IP prefix lists, and route maps:

- Commands Common to all ACL Types
- Common IP ACL Commands
- Standard IP ACL Commands
- Extended IP ACL Commands
- Common MAC Access List Commands
- Standard MAC ACL Commands
- Extended MAC ACL Commands
- IP Prefix List Commands
- Route Map Commands

> **Note:** For ACL commands used in the Trace function, refer to the Secure DHCP Commands section in the chapter Security.

Commands Common to all ACL Types

The following commands are available within each ACL mode and do not have mode-specific options. Some commands may use similar names, but require different options to support the different ACL types (for example, deny).

- description
- remark
- resequence access-list
- resequence prefix-list ipv4
- show config

description

Configure a short text string describing the ACL.

Syntax	description *text*

Parameters

text	Enter a text string up to 80 characters long.

Defaults	Not enabled.

Command Modes
CONFIGURATION-IP ACCESS-LIST-STANDARD

CONFIGURATION-IP ACCESS-LIST-EXTENDED

CONFIGURATION-MAC ACCESS LIST-STANDARD

CONFIGURATION-MAC ACCESS LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

remark

Enter a description for an ACL entry.

Syntax	remark [*remark-number*] [*description*]

Parameters

remark-number	Enter the remark number. Note that you can use the same sequence number for the remark and an ACL rule. Range: 0 to 4294967290
description	Enter a description of up to 80 characters.

Defaults	Not configured

Command Modes
CONFIGURATION-IP ACCESS-LIST-STANDARD

CONFIGURATION-IP ACCESS-LIST-EXTENDED

CONFIGURATION-MAC ACCESS LIST-STANDARD

CONFIGURATION-MAC ACCESS LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information
The remark command is available in each ACL mode. You can configure up to 4294967290 remarks in a given ACL.

The following example shows the use of the remark command twice within CONFIGURATION-IP ACCESS-LIST-STANDARD mode. Here, the same sequence number was used for the remark and for an associated ACL rule. The remark precedes the rule in the running-config because it is assumed that the remark is for the rule with the same sequence number, or the group of rules, that follow the remark.

Figure 6-1.   remark Command Example

```
FTOS(conf-std-nacl)#remark 10 Deny rest of the traffic
FTOS(conf-std-nacl)#remark 5 Permit traffic from XYZ Inc.
FTOS(conf-std-nacl)#show config
!
ip access-list standard test
remark 5 Permit traffic from XYZ Inc.
seq 5 permit 1.1.1.0/24
remark 10 Deny rest of the traffic
seq 10 Deny any
FTOS(conf-std-nacl)#
```

Related Commands

resequence access-list	Re-assign sequence numbers to entries of an existing access-list.

resequence access-list

Re-assign sequence numbers to entries of an existing access-list.

Syntax   resequence access-list {ipv4 | mac} {*access-list-name StartingSeqNum Step-to-Increment*}

Parameters

ipv4	mac	Enter the keyword ipv4 or mac to identify the access list type to resequence.
access-list-name	Enter the name of a configured IP access list.
StartingSeqNum	Enter the starting sequence number to resequence. Range: 0 to 4294967290
Step-to-Increment	Enter the step to increment the sequence number. Range: 1 to 4294967290

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   When all sequence numbers have been exhausted, this feature permits re-assigning of a new sequence number to entries of an existing access-list.

Related Commands

resequence prefix-list ipv4	Resequences a prefix list

resequence prefix-list ipv4

Re-assign sequence numbers to entries of an existing prefix list.

Syntax   resequence prefix-list ipv4 {*prefix-list-name StartingSeqNum Step-to-increment*}

Parameters		
prefix-list-name	Enter the name of configured prefix list, up to 140 characters long.	
StartingSeqNum	Enter the starting sequence number to resequence. Range: 0 to 65535	
Step-to-Increment	Enter the step to increment the sequence number. Range: 1 to 65535	

Defaults none

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information When all sequence numbers have been exhausted, this feature permits re-assigning new sequence numbers to entries of an existing prefix list.

Related Commands

seq	Assign a sequence number to a deny or permit filter in an IP access list while creating the filter.

show config

Display the current ACL configuration.

Syntax show config

Command Modes CONFIGURATION-IP ACCESS-LIST-STANDARD

CONFIGURATION-IP ACCESS-LIST-EXTENDED

CONFIGURATION-MAC ACCESS LIST-STANDARD

CONFIGURATION-MAC ACCESS LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 6-2.   show config Command Example**

```
FTOS(conf-ext-nacl)#show conf
!
ip access-list extended patches
FTOS(conf-ext-nacl)#
```

Common IP ACL Commands

The following commands are available within both IP ACL modes (Standard and Extended) and do not have mode-specific options. When an access-list (ACL) is created without any rule and then applied to an interface, ACL behavior reflects an implicit permit.

The MXL 10/40GbE Switch IO Module platform supports both ingress and egress IP ACLs.

The following commands allow you to clear, display, and assign IP ACL configurations.

- access-class
- clear counters ip access-group
- ip access-group
- show ip access-lists
- show ip accounting access-list

> Note: See also Commands Common to all ACL Types.

access-class

Apply a standard ACL to a terminal line.

Syntax access-class *access-list-name*

Parameters

access-list-name	Enter the name of a configured Standard ACL, up to 140 characters.

Defaults Not configured.

Command Modes LINE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

clear counters ip access-group

Erase all counters maintained for access lists.

Syntax clear counters ip access-group [*access-list-name*]

Parameters

access-list-name	(OPTIONAL) Enter the name of a configured access-list, up to 140 characters.

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip access-group

Assign an IP access list (IP ACL) to an interface.

Syntax ip access-group *access-list-name* {in | out} [implicit-permit] [vlan *vlan-id*]

Parameters

access-list-name	Enter the name of a configured access list, up to 140 characters.
in	Enter the keyword in to apply the ACL to incoming traffic.
out	Enter the keyword out to apply the ACL to outgoing traffic.

implicit-permit	(OPTIONAL) Enter the keyword **implicit-permit** to change the default action of the ACL from implicit-deny to implicit-permit (that is, if the traffic does not match the filters in the ACL, the traffic is permitted instead of dropped).
vlan *vlan-id*	(OPTIONAL) Enter the keyword **vlan** followed by the ID numbers of the VLANs.

Defaults Not enabled.

Command Modes INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information You can assign one ACL (standard or extended ACL) to an interface.

> ✎ **Note:** This command is *not* supported on the MXL Switch loopback interfaces.

When you apply an ACL that filters IGMP traffic, all IGMP traffic is redirected to the CPUs and soft-forwarded, if required, in the following scenarios:

- on a Layer 2 interface - if a Layer 3 ACL is applied to the interface.
- on a Layer 3 port or on a Layer 2/Layer 3 port

Related Commands

ip access-list standard	Configures a standard ACL.
ip access-list extended	Configures an extended ACL.

show ip access-lists

Display all of the IP ACLs configured in the system, whether or not they are applied to an interface, and the count of matches/mismatches against each ACL entry displayed.

Syntax show ip access-lists [*access-list-name*] [interface *interface*] [in]

Parameters

access-list-name	Enter the name of a configured MAC ACL, up to 140 characters.
interface *interface*	Enter the keyword **interface** followed by the one of the following keywords and slot/port or number information:
	• For a Port Channel interface, enter the keyword **port-channel** followed by a number: Range: 1 to 128
	• For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEtherne**t followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.
in	Identify whether ACL is applied on ingress side.

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show ip accounting access-list

Display the IP access-lists created on the switch and the sequence of filters.

Syntax   show ip accounting {access-list *access-list-name* | cam_count} interface *interface*

Parameters

access-list-name	Enter the name of the ACL to be displayed.
cam_count	List the count of the CAM rules for this ACL.
interface *interface*	Enter the keyword **interface** followed by the interface type and slot/port or number information: • For a Port Channel interface, enter the keyword **port-channel** followed by a number: Range: 1-128 • For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 6-3.   show ip accounting access-lists Command Example**

```
FTOS#show ip accounting access FILTER1 interface tengig 1/6
Extended IP access list FILTER1
seq 5 deny ip any 191.1.0.0 /16 count (0x00 packets)
seq 10 deny ip any 191.2.0.0 /16 order 4
seq 15 deny ip any 191.3.0.0 /16
seq 20 deny ip any 191.4.0.0 /16
seq 25 deny ip any 191.5.0.0 /16
```

Table 6-1 defines the information in Figure 6-3.

Table 6-1.   show ip accounting access-lists Command Example Field

Field	Description
"Extended IP..."	Displays the name of the IP ACL.
"seq 5..."	Displays the filter. If the keywords count or byte were configured in the filter, the number of packets or bytes processed by the filter is displayed at the end of the line.
"order 4"	Displays the QoS order of priority for the ACL entry.

Standard IP ACL Commands

When an ACL is created without any rule and then applied to an interface, ACL behavior reflects an implicit permit.

The MXL 10/40GbE Switch IO Module platform supports both ingress and egress IP ACLs.

The commands needed to configure a Standard IP ACL are:

- deny
- ip access-list standard
- permit

> ✎ **Note:** See also Commands Common to all ACL Types and Common IP ACL Commands.

deny

Configure a filter to drop packets with a certain IP address.

Syntax   deny {*source* [*mask*] | any | host *ip-address*} [count [byte]] [dscp *value*] [order] [fragments]

To remove this filter, you have two choices:

- Use the no seq *sequence-number* command if you know the filter's sequence number.
- Use the no deny {*source* [*mask*] | any | host *ip-address*} command.

Parameters

source	Enter the IP address in dotted decimal format of the network from which the packet was sent.
mask	(OPTIONAL) Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous (discontiguous).
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address only.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.
dscp	(OPTIONAL) Enter the keyword dscp to match to the IP DSCP values.
order	(OPTIONAL) Enter the keyword order to specify the QoS order of priority for the ACL entry. Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority) Default: If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.

Defaults   Not configured.

Command Modes   CONFIGURATION-IP ACCESS-LIST-STANDARD

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The order option is relevant in the context of the Policy QoS feature only. For more information, refer to the Quality of Service (QoS) chapter of the *FTOS Configuration Guide*.

In the MXL Switch, you can configure either count (packets) or count (bytes). However, for an ACL with multiple rules, you can configure some ACLs with count (packets) and others as count (bytes) at any given time.

Related Commands

ip access-list standard	Configures a standard ACL.
permit	Configures a permit filter.

ip access-list standard

Create a standard IP access list (IP ACL) to filter based on IP address.

Syntax

ip access-list standard *access-list-name*

Parameters

access-list-name	Enter a string up to 140 characters long as the ACL name.

Defaults

All IP access lists contain an implicit *deny any*, that is, if no match occurs, the packet is dropped.

Command Modes

CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

FTOS supports one ingress and one egress IP ACL per interface.

The number of entries allowed per ACL is hardware-dependent. For detailed specification on entries allowed per ACL, refer to your switch documentation.

Example

Figure 6-4.   ip access-list standard Command Example

```
FTOS(conf)#ip access-list standard TestList
FTOS(conf-std-nacl)#
```

Related Commands

ip access-list extended	Creates an extended access list.
resequence access-list	Displays the current configuration.

permit

Configure a filter to permit packets from a specific source IP address to leave the switch.

Syntax

permit {*source* [*mask*] | any | host *ip-address*} [count [byte]] [dscp *value*] [order]

To remove this filter, you have two choices:

- Use the no seq *sequence-number* command if you know the filter's sequence number.

- Use the no permit {*source* [*mask*] | any | host *ip-address*} command.

Parameters

source	Enter the IP address in dotted decimal format of the network from which the packet was sent.
mask	(OPTIONAL) Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address or hostname.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
dscp	(OPTIONAL) Enter the keyword dscp to match to the IP DSCP values.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.
order	(OPTIONAL) Enter the keyword order to specify the QoS priority for the ACL entry. Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority) Default: If the order keyword is not used, the ACLs have the lowest order by default (255).

Defaults　　Not configured.

Command Modes　　CONFIGURATION-IP ACCESS-LIST-STANDARD

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information　　The order option is relevant in the context of the Policy QoS feature only. For more information, refer to the Quality of Service (QoS) chapter of the *FTOS Configuration Guide*.

In the MXL Switch, you can configure either count (packets) or count (bytes). However, for an ACL with multiple rules, you can configure some ACLs with count (packets) and others as count (bytes) at any given time.

Related Commands

deny	Assign an IP ACL filter to deny IP packets.
ip access-list standard	Create a standard ACL.

seq

Assign a sequence number to a deny or permit filter in an IP access list while creating the filter.

Syntax　　seq *sequence-number* {deny | permit} {*source* [*mask*] | any | host *ip-address*}} [count [byte] [dscp *value*] [order] [fragments]

Parameters

sequence-number	Enter a number from 0 to 4294967290. Range: 0 to 65534
deny	Enter the keyword deny to configure a filter to drop packets meeting this condition.
permit	Enter the keyword permit to configure a filter to forward packets meeting this criteria.

source	Enter an IP address in dotted decimal format of the network from which the packet was received.
mask	(OPTIONAL) Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address or hostname.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.
dscp	(OPTIONAL) Enter the keyword dscp to match to the IP DSCP values.
order	(OPTIONAL) Enter the keyword order to specify the QoS order for the ACL entry. Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority) Default: If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.

Defaults Not configured

Command Modes CONFIGURATION-IP ACCESS-LIST-STANDARD

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The order option is relevant in the context of the Policy QoS feature only. The following applies:

- The seq *sequence-number* is applicable only in an ACL group.
- The order option works across ACL groups that have been applied on an interface via QoS policy framework.
- The order option takes precedence over the seq *sequence-number*.
- If *sequence-number* is **not** configured, then rules with the same order value are ordered according to their configuration order.
- If the *sequence-number* is configured, then the *sequence-number* is used as a tie breaker for rules with the same order.

Related Commands

deny	Configures a filter to drop packets.
permit	Configures a filter to forward packets.
seq	Assigns a sequence number to a deny or permit filter in an IP access list while creating the filter.

Extended IP ACL Commands

When an ACL is created without any rule and then applied to an interface, ACL behavior reflects an implicit permit.

The following commands configure extended IP ACLs, which in addition to the IP address also examine the packet's protocol type.

The MXL 10/40GbE Switch IO Module platform supports both ingress and egress IP ACLs.

* deny
* deny icmp
* deny tcp
* deny udp
* ip access-list extended
* permit
* permit icmp
* permit tcp
* permit udp
* seq

> ✎ **Note:** See also Commands Common to all ACL Types and Common IP ACL Commands.

deny

Configure a filter that drops IP packets meeting the filter criteria.

Syntax deny {ip | *ip-protocol-number*} {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} [count [byte]] [dscp *value*] [order] [fragments]

To remove this filter, you have two choices:

* Use the no seq *sequence-number* command if you know the filter's sequence number.
* Use the no deny {ip | *ip-protocol-number*} {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} command.

Parameters

ip	Enter the keyword ip to configure a generic IP access list. The keyword ip specifies that the access list will deny all IP protocols.
ip-protocol-number	Enter a number from 0 to 255 to deny based on the protocol identified in the IP protocol header.
source	Enter the IP address of the network or host from which the packets were sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address.
destination	Enter the IP address of the network or host to which the packets are sent.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.

byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.
dscp	(OPTIONAL) Enter the keyword dscp to match to the IP DSCP values.
order	(OPTIONAL) Enter the keyword order to specify the QoS priority for the ACL entry.
	Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority)
	Default: If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.

Defaults Not configured.

Command Modes CONFIGURATION-IP ACCESS-LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The order option is relevant in the context of the Policy QoS feature only. For more information, refer to the Quality of Service (QoS) chapter of the *FTOS Configuration Guide*.

In the MXL Switch, you can configure either count (packets) or count (bytes). However, for an ACL with multiple rules, you can configure some ACLs with count (packets) and others as count (bytes) at any given time.

Related Commands

deny tcp	Assigns a filter to deny TCP packets.
deny udp	Assigns a filter to deny UDP packets.
ip access-list extended	Creates an extended ACL.

deny icmp

Configure a filter to drop all or specific ICMP messages.

Syntax deny icmp {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} [dscp] [*message-type*] [count [byte]] [order] [fragments]

To remove this filter, you have two choices:

- Use the no seq *sequence-number* command if you know the filter's sequence number.
- Use the no deny icmp {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} command.

Parameters

source	Enter the IP address of the network or host from which the packets were sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address.
destination	Enter the IP address of the network or host to which the packets are sent.
dscp	Enter this keyword to deny a packet based on DSCP value. Range: 0-63

message-type	(OPTIONAL) Enter an ICMP message type, either with the type (and code, if necessary) numbers or with the name of the message type (ICMP message types are listed in Table 6-2).	
	Range: 0 to 255 for ICMP type; 0 to 255 for ICMP code	
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.	
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.	
order	(OPTIONAL) Enter the keyword order to specify the QoS priority for the ACL entry.	
	Range:	0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority)
	Default:	If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.	

Defaults   Not configured

Command Modes   CONFIGURATION-IP ACCESS-LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The order option is relevant in the context of the Policy QoS feature only. For more information, refer to the Quality of Service (QoS) chapter of the *FTOS Configuration Guide*.

Table 6-2 lists the keywords displayed in the CLI help and their corresponding ICMP message type name.

Table 6-2.   ICMP Message Type Keywords

Keyword	ICMP Message Type Name
administratively-prohibited	Administratively prohibited
alternate-address	Alternate host address
conversion-error	Datagram conversion error
dod-host-prohibited	Host prohibited
dod-net-prohibited	Net prohibited
echo	Echo
echo-reply	Echo reply
general-parameter-problem	Parameter problem
host-isolated	Host isolated
host-precedence-unreachable	Host unreachable for precedence
host-redirect	Host redirect
host-tos-redirect	Host redirect for TOS
host-tos-unreachable	Host unreachable for TOS
host-unknown	Host unknown
host-unreachable	Host unreachable
information-reply	Information replies
information-request	Information requests

Table 6-2. ICMP Message Type Keywords

Keyword	ICMP Message Type Name
mask-reply	Mask replies
mask-request	Mask requests
mobile-redirect	Mobile host redirect
net-redirect	Network redirect
net-tos-redirect	Network redirect for TOS
net-tos-unreachable	Network unreachable for TOS
net-unreachable	Network unreachable
network-unknown	Network unknown
no-room-for-option	Parameter required but no room
option-missing	Parameter required but not present
packet-too-big	Fragmentation needed and DF set
parameter-problem	All parameter problems
port-unreachable	Port unreachable
precedence-unreachable	Precedence cutoff
protocol-unreachable	Protocol unreachable
reassembly-timeout	Reassembly timeout
redirect	All redirects
router-advertisement	Router discovery advertisements
router-solicitation	Router discovery solicitations
source-quench	Source quenches
source-route-failed	Source route failed
time-exceeded	All time exceeded
timestamp-reply	Timestamp replies
timestamp-request	Timestamp requests
traceroute	Traceroute
ttl-exceeded	TTL exceeded
unreachable	All unreachables

deny tcp

Configure a filter that drops TCP packets meeting the filter criteria.

Syntax   deny tcp {*source mask* | any | host *ip-address*} [*bit*] [*operator port* [*port*]] {*destination mask* | any | host *ip-address*} [dscp] [*bit*] [*operator port* [*port*]] [count [byte]] [order] [fragments]

To remove this filter, you have two choices:

- Use the no seq *sequence-number* command if you know the filter's sequence number.
- Use the no deny tcp {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} command.

Parameters

source	Enter the IP address of the network or host from which the packets were sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address.
dscp	Enter this keyword to deny a packet based on DSCP value. Range: 0-63
bit	Enter a flag or combination of bits: • ack: acknowledgement field • fin: finish (no more data from the user) • psh: push function • rst: reset the connection • syn: synchronize sequence numbers • urg: urgent field
operator	(OPTIONAL) Enter one of the following logical operand: • eq = equal to • neq = not equal to • gt = greater than • lt = less than • range = inclusive range of ports (you must specify two ports for the *port* command parameter.
port port	Enter the application layer port number. Enter two port numbers if using the range logical operand. Range: 0 to 65535. The following list includes some common TCP port numbers: • 23 = Telnet • 20 and 21 = FTP • 25 = SMTP • 169 = SNMP
destination	Enter the IP address of the network or host to which the packets are sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.
order	(OPTIONAL) Enter the keyword order to specify the QoS priority for the ACL entry. Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority) Default: If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.

Defaults Not configured.

Command Modes CONFIGURATION-IP ACCESS-LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

The order option is relevant in the context of the Policy QoS feature only. For more information, refer to the Quality of Service (QoS) chapter of the *FTOS Configuration Guide*.

In the MXL Switch, you can configure either count (packets) or count (bytes). However, for an ACL with multiple rules, you can configure some ACLs with count (packets) and others as count (bytes) at any given time.

Most ACL rules require one entry in the CAM. However, rules with TCP and UDP port operators (gt, lt, range) may require more than one entry. The range of ports is configured in the CAM based on bit mask boundaries; the space required depends on exactly what ports are included in the range.

For example, an ACL rule with TCP port range 4000 - 8000 uses eight entries in the CAM:

```
Rule#       Data               Mask            From   To      #Covered

1       0000111110100000 1111111111100000  4000   4031   32
2       0000111111000000 1111111111000000  4032   4095   64
3       0001000000000000 1111100000000000  4096   6143   2048
4       0001100000000000 1111110000000000  6144   7167   1024
5       0001110000000000 1111111000000000  7168   7679   512
6       0001111000000000 1111111100000000  7680   7935   256
7       0001111100000000 1111111111000000  7936   7999   64
8       0001111101000000 1111111111111111  8000   8000   1

Total Ports: 4001
```

But an ACL rule with TCP port lt 1023 takes only one entry in the CAM:

```
Rule#       Data               Mask            From   To      #Covered

1       0000000000000000 1111110000000000  0      1023   1024

Total Ports: 1024
```

deny	Assigns a filter to deny IP traffic.
deny udp	Assigns a filter to deny UDP traffic.

deny udp

Configure a filter to drop UDP packets meeting the filter criteria.

deny udp { *source mask* | any | host *ip-address*} [*operator port* [*port*]] { *destination mask* | any | host *ip-address*} [dscp] [*operator port* [*port*]] [count [byte]] [order] [fragments]

To remove this filter, you have two choices:

*   Use the no seq *sequence-number* command if you know the filter's sequence number.
*   Use the no deny udp { *source mask* | any | host *ip-address*} { *destination mask* | any | host *ip-address*} command.

source	Enter the IP address of the network or host from which the packets were sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.

any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address.
dscp	Enter this keyword to deny a packet based on DSCP value. Range: 0-63
operator	(OPTIONAL) Enter one of the following logical operand: • eq = equal to • neq = not equal to • gt = greater than • lt = less than • range = inclusive range of ports
port port	(OPTIONAL) Enter the application layer port number. Enter two port numbers if using the range logical operand. Range: 0 to 65535
destination	Enter the IP address of the network or host to which the packets are sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.
order	(OPTIONAL) Enter the keyword order to specify the QoS priority for the ACL entry. Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority) Default: If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.

Defaults Not configured

Command Modes CONFIGURATION-IP ACCESS-LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The order option is relevant in the context of the Policy QoS feature only. For more information, refer to the Quality of Service (QoS) chapter of the *FTOS Configuration Guide*.

In the MXL Switch, you can configure either count (packets) or count (bytes). However, for an ACL with multiple rules, you can configure some ACLs with count (packets) and others as count (bytes) at any given time.

Most ACL rules require one entry in the CAM. However, rules with TCP and UDP port operators (gt, lt, range) may require more than one entry. The range of ports is configured in the CAM based on bit mask boundaries; the space required depends on exactly what ports are included in the range.

For example, an ACL rule with TCP port range 4000 - 8000 will use eight entries in the CAM:

```
Rule#        Data            Mask         From   To    #Covered

1     0000111110100000 1111111111100000 4000   4031  32
2     0000111111000000 1111111111000000 4032   4095  64
3     0001000000000000 1111100000000000 4096   6143  2048
4     0001100000000000 1111110000000000 6144   7167  1024
5     0001110000000000 1111111000000000 7168   7679  512
6     0001111000000000 1111111100000000 7680   7935  256
7     0001111100000000 1111111111000000 7936   7999  64
8     0001111101000000 1111111111111111 8000   8000  1

Total Ports: 4001
```

But an ACL rule with TCP port lt 1023 takes only one entry in the CAM:

```
Rule#        Data            Mask         From   To    #Covered

1     0000000000000000 1111110000000000 0      1023  1024

Total Ports: 1024
```

Related Commands		
	deny	Assigns a deny filter for IP traffic.
	deny tcp	Assigns a deny filter for TCP traffic.

ip access-list extended

Name (or select) an extended IP access list (IP ACL) based on IP addresses or protocols.

Syntax ip access-list extended *access-list-name*

To delete an access list, use the no ip access-list extended *access-list-name* command.

Parameters

	access-list-name	Enter a string up to 140 characters long as the access list name.

Defaults All access lists contain an implicit *deny any*; that is, if no match occurs, the packet is dropped.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The number of entries allowed per ACL is hardware-dependent. For detailed specification on entries allowed per ACL, refer to your switch documentation.

Example **Figure 6-5.   ip access-list extended Command Example**

```
FTOS(conf)#ip access-list extended TESTListEXTEND
FTOS(config-ext-nacl)#
```

Related Commands

ip access-list standard	Configures a standard IP access list.
resequence access-list	Displays the current configuration.

permit

Configure a filter to pass IP packets meeting the filter criteria.

Syntax

permit {ip | *ip-protocol-number*} {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} [count [byte] [dscp *value*] [order] [fragments]

To remove this filter, you have two choices:

- Use the no seq *sequence-number* command if you know the filter's sequence number.
- Use the no deny {ip | *ip-protocol-number*} {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} command.

Parameters

ip	Enter the keyword ip to configure a generic IP access list. The keyword ip specifies that the access list will permit all IP protocols.
ip-protocol-number	Enter a number from 0 to 255 to permit based on the protocol identified in the IP protocol header. Range: 0 to 128
source	Enter the IP address of the network or host from which the packets were sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address.
destination	Enter the IP address of the network or host to which the packets are sent.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.
dscp	(OPTIONAL) Enter the keyword dscp to match to the IP DSCP values.
order	(OPTIONAL) Enter the keyword order to specify the QoS order of priority for the ACL entry. Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority) Default: If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.

Defaults

Not configured.

Command Modes

CONFIGURATION-IP ACCESS-LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The order option is relevant in the context of the Policy QoS feature only. For more information, refer to the Quality of Service (QoS) chapter of the *FTOS Configuration Guide*.

In the MXL Switch, you can configure either count (packets) or count (bytes). However, for an ACL with multiple rules, you can configure some ACLs with count (packets) and others as count (bytes) at any given time

Related Commands	ip access-list extended	Creates an extended ACL.
	permit tcp	Assigns a permit filter for TCP packets.
	permit udp	Assigns a permit filter for UDP packets.

permit icmp

Configure a filter to allow all or specific ICMP messages.

Syntax   permit icmp {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} [dscp] [*message-type*] [count [byte]] [order] [fragments]

To remove this filter, you have two choices:

- Use the no seq *sequence-number* command if you know the filter's sequence number.
- Use the no permit icmp {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} command.

Parameters

source	Enter the IP address of the network or host from which the packets were sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address.
destination	Enter the IP address of the network or host to which the packets are sent.
dscp	Enter this keyword to deny a packet based on DSCP value. Range: 0-63
message-type	(OPTIONAL) Enter an ICMP message type, either with the type (and code, if necessary) numbers or with the name of the message type (ICMP message types are listed in Table 6-2). Range: 0 to 255 for ICMP type; 0 to 255 for ICMP code
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.
order	(OPTIONAL) Enter the keyword order to specify the QoS priority for the ACL entry. Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority) Default: If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.

Defaults   Not configured

Command Modes   CONFIGURATION-IP ACCESS-LIST-STANDARD

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The order option is relevant in the context of the Policy QoS feature only. For more information, refer to the Quality of Service chapter of the *FTOS Configuration Guide*.

permit tcp

Configure a filter to pass TCP packets meeting the filter criteria.

Syntax   permit tcp {*source mask* | any | host *ip-address*} [*bit*] [*operator port* [*port*]] {*destination mask* | any | host *ip-address*} [*bit*] [dscp] [*operator port* [*port*]] [count [byte]] [order] [fragments]

To remove this filter, you have two choices:

- Use the no seq *sequence-number* command if you know the filter's sequence number.
- Use the no permit tcp {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} command.

Parameters

source	Enter the IP address of the network or host from which the packets were sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address.
bit	Enter a flag or combination of bits: • ack: acknowledgement field • fin: finish (no more data from the user) • psh: push function • rst: reset the connection • syn: synchronize sequence numbers • urg: urgent field
dscp	Enter this keyword to deny a packet based on DSCP value. Range: 0-63
operator	(OPTIONAL) Enter one of the following logical operand: • eq = equal to • neq = not equal to • gt = greater than • lt = less than • range = inclusive range of ports (you must specify two port for the *port* parameter.)
port port	Enter the application layer port number. Enter two port numbers if using the range logical operand. Range: 0 to 65535. The following list includes some common TCP port numbers: • 23 = Telnet • 20 and 21 = FTP • 25 = SMTP • 169 = SNMP
destination	Enter the IP address of the network or host to which the packets are sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.

order	(OPTIONAL) Enter the keyword order to specify the QoS priority for the ACL entry.
	Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority)
	Default: If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.

Defaults

Not configured.

Command Modes

CONFIGURATION-IP ACCESS-LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The order option is relevant in the context of the Policy QoS feature only. For more information, refer to the Quality of Service chapter of the FTOS Configuration Guide.

The MXL 10/40GbE System IO Module cannot count both packets and bytes, so when you enter the count byte options, only bytes are incremented.

Most ACL rules require one entry in the CAM. However, rules with TCP and UDP port operators (gt, lt, range) may require more than one entry. The range of ports is configured in the CAM based on bit mask boundaries; the space required depends on exactly what ports are included in the range.

For example, an ACL rule with TCP port range 4000 - 8000 uses eight entries in the CAM:

```
Rule#       Data             Mask            From   To    #Covered

1      0000111110100000 1111111111100000 4000   4031  32
2      0000111111000000 1111111111000000 4032   4095  64
3      0001000000000000 1111100000000000 4096   6143  2048
4      0001100000000000 1111110000000000 6144   7167  1024
5      0001110000000000 1111111000000000 7168   7679  512
6      0001111000000000 1111111100000000 7680   7935  256
7      0001111100000000 1111111111000000 7936   7999  64
8      0001111101000000 1111111111111111 8000   8000  1

Total Ports: 4001
```

But an ACL rule with TCP port lt 1023 takes only one entry in the CAM:

```
Rule#       Data             Mask            From   To    #Covered

1      0000000000000000 1111110000000000 0      1023  1024

Total Ports: 1024
```

Related Commands

ip access-list extended	Creates an extended ACL.
permit	Assigns a permit filter for IP packets.
permit udp	Assigns a permit filter for UDP packets.

permit udp

Configure a filter to pass UDP packets meeting the filter criteria.

Syntax

permit udp {*source mask* | any | host *ip-address*} [*operator port* [*port*]] {*destination mask* | any | host *ip-address*} [dscp] [*operator port* [*port*]] [count [byte]] [order] [fragments]

To remove this filter, you have two choices:

* Use the no seq *sequence-number* command if you know the filter's sequence number.
* Use the no permit udp {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} command.

Parameters

source	Enter the IP address of the network or host from which the packets were sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address.
dscp	Enter this keyword to deny a packet based on DSCP value. Range: 0-63
operator	(OPTIONAL) Enter one of the following logical operand: • eq = equal to • neq = not equal to • gt = greater than • lt = less than • range = inclusive range of ports (you must specify two ports for the *port* parameter.)
port port	(OPTIONAL) Enter the application layer port number. Enter two port numbers if using the range logical operand. Range: 0 to 65535
destination	Enter the IP address of the network or host to which the packets are sent.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.
order	(OPTIONAL) Enter the keyword order to specify the QoS priority for the ACL entry. Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority) Default: If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.

Defaults

Not configured.

Command Modes

CONFIGURATION-IP ACCESS-LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The order option is relevant in the context of the Policy QoS feature only. For more information, refer to the Quality of Service chapter of the *FTOS Configuration Guide*.

In the MXL Switch, you can configure either count (packets) or count (bytes). However, for an ACL with multiple rules, you can configure some ACLs with count (packets) and others as count (bytes) at any given time.

Most ACL rules require one entry in the CAM. However, rules with TCP and UDP port operators (gt, lt, range) may require more than one entry. The range of ports is configured in the CAM based on bit mask boundaries; the space required depends on exactly what ports are included in the range.

For example, an ACL rule with TCP port range 4000 - 8000 uses eight entries in the CAM:

```
Rule#        Data              Mask          From   To    #Covered

1      0000111110100000 1111111111100000 4000   4031  32
2      0000111111000000 1111111111000000 4032   4095  64
3      0001000000000000 1111100000000000 4096   6143  2048
4      0001100000000000 1111110000000000 6144   7167  1024
5      0001110000000000 1111111000000000 7168   7679  512
6      0001111000000000 1111111100000000 7680   7935  256
7      0001111100000000 1111111111000000 7936   7999  64
8      0001111101000000 1111111111111111 8000   8000  1

Total Ports: 4001
```

But an ACL rule with TCP port lt 1023 takes only one entry in the CAM:

```
Rule#        Data              Mask          From   To    #Covered

1      0000000000000000 1111110000000000 0      1023  1024

Total Ports: 1024
```

Related Commands

ip access-list extended	Configures an extended ACL.
permit	Assigns a permit filter for IP packets.
permit tcp	Assigns a permit filter for TCP packets.

seq

Assign a sequence number to a deny or permit filter in an extended IP access list while creating the filter.

Syntax

seq *sequence-number* {deny | permit} {*ip-protocol-number* | icmp | ip | tcp | udp} {*source mask* | any | host *ip-address*} {*destination mask* | any | host *ip-address*} [*operator port* [*port*]] [count [byte]] [dscp *value*] [order] [fragments]

Parameters

sequence-number	Enter a number from 0 to 4294967290. Range: 1 to 65534
deny	Enter the keyword deny to configure a filter to drop packets meeting this condition.
permit	Enter the keyword permit to configure a filter to forward packets meeting this criteria.
ip-protocol-number	Enter a number from 0 to 255 to filter based on the protocol identified in the IP protocol header.
icmp	Enter the keyword icmp to configure an ICMP access list filter.

ip	Enter the keyword ip to configure a generic IP access list. The keyword ip specifies that the access list will permit all IP protocols.
tcp	Enter the keyword tcp to configure a TCP access list filter.
udp	Enter the keyword udp to configure a UDP access list filter.
source	Enter the IP address of the network or host from which the packets were sent.
mask	Enter a network mask in /prefix format (/x) or A.B.C.D. The mask, when specified in A.B.C.D format, may be either contiguous or non-contiguous.
any	Enter the keyword any to specify that all routes are subject to the filter.
host *ip-address*	Enter the keyword host followed by the IP address to specify a host IP address.
operator	(OPTIONAL) Enter one of the following logical operands: • eq = equal to • neq = not equal to • gt = greater than • lt = less than • range = inclusive range of ports (you must specify two ports for the *port* parameter.)
port port	(OPTIONAL) Enter the application layer port number. Enter two port numbers if using the range logical operand. Range: 0 to 65535 The following list includes some common TCP port numbers: • 23 = Telnet • 20 and 21 = FTP • 25 = SMTP • 169 = SNMP
destination	Enter the IP address of the network or host to which the packets are sent.
message-type	(OPTIONAL) Enter an ICMP message type, either with the type (and code, if necessary) numbers or with the name of the message type (ICMP message types are listed in Table 6-2). Range: 0 to 255 for ICMP type; 0 to 255 for ICMP code
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.
dscp	(OPTIONAL) Enter the keyword dscp to match to the IP DSCP values.
order	(OPTIONAL) Enter the keyword order to specify the QoS priority for the ACL entry. Range: 0-254 (where 0 is the highest priority and 254 is the lowest; lower order numbers have a higher priority) Default: If the order keyword is not used, the ACLs have the lowest order by default (255).
fragments	Enter the keyword fragments to use ACLs to control packet fragments.

Defaults Not configured

Command Modes CONFIGURATION-IP ACCESS-LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The order option is relevant in the context of the Policy QoS feature only. The following applies:

- The seq *sequence-number* is applicable only in an ACL group.
- The order option works across ACL groups that have been applied on an interface via QoS policy framework.
- The order option takes precedence over the seq *sequence-number*.
- If *sequence-number* is **not** configured, then rules with the same order value are ordered according to their configuration order.
- If the *sequence-number* is configured, then the *sequence-number* is used as a tie breaker for rules with the same order.

If the *sequence-number* is configured, then the *sequence-number* is used as a tie breaker for rules with the same order.

Related Commands

deny	Configures a filter to drop packets.
permit	Configures a filter to forward packets.

Common MAC Access List Commands

The following commands are available within both MAC ACL modes (Standard and Extended) and do not have mode-specific options.

The MXL 10/40GbE Switch IO Module platform supports both ingress and egress MAC ACLs.

The following commands allow you to clear, display and assign MAC ACL configurations.

- clear counters mac access-group
- mac access-group
- show mac access-lists
- show mac accounting access-list

clear counters mac access-group

Clear counters for all or a specific MAC ACL.

Syntax

clear counters mac access-group [*mac-list-name*]

Parameters

mac-list-name	(OPTIONAL) Enter the name of a configured MAC access list.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

mac access-group

Apply a MAC ACL to traffic entering or exiting an interface.

Syntax

mac access-group *access-list-name* {in [vlan *vlan-range*] | out}

Parameters

access-list-name	Enter the name of a configured MAC access list, up to 140 characters.
vlan *vlan-range*	(OPTIONAL) Enter the keyword vlan followed a range of VLANs. Note that this option is available only with the in keyword option.
	Range: 1 to 4094, 1-2094 for ExaScale (can used IDs 1-4094)
in	Enter the keyword in to configure the ACL to filter incoming traffic.
out	Enter the keyword out to configure the ACL to filter outgoing traffic.

Defaults

Command Modes

INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

You can assign one ACL (standard or extended) to an interface.

Related Commands

mac access-list standard	Configures a standard MAC ACL.
mac access-list extended	Configures an extended MAC ACL.

show mac access-lists

Displays all of the Layer 2 ACLs configured in the system, whether or not they are applied to an interface, and the count of matches/mismatches against each ACL entry.

Syntax

show mac access-lists [*access-list-name*] [interface *interface*] [in | out]

Parameters

access-list-name	Enter the name of a configured MAC ACL, up to 140 characters.
interface *interface*	Enter the keyword interface followed by the one of the following keywords and slot/port or number information:
	• For a Port Channel interface, enter the keyword port-channel followed by a number:
	Range: 1 to 128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
in	out	Identify whether ACL is applied on ingress or egress side.

Command Modes

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show mac accounting access-list

Display MAC access list configurations and counters (if configured).

Syntax show mac accounting access-list *access-list-name* interface *interface* in | out

Parameters

access-list-name	Enter the name of a configured MAC ACL, up to 140 characters.
interface *interface*	Enter the keyword **interface** followed by the one of the following keywords and slot/port or number information:
	• For a Port Channel interface, enter the keyword **port-channel** followed by a number: Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.
in	out	Identify whether ACL is applied ay Ingress (in) or egress (out) side.

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 6-6.   show mac accounting access-list Command Example**

```
FTOS#show mac accounting access-list mac-ext interface po 1
Extended mac access-list mac-ext on TenGigabitEthernet 0/11
 seq 5  permit host  00:00:00:00:00:11 host  00:00:00:00:00:19  count (393794576
packets)
 seq 10  deny host  00:00:00:00:00:21 host  00:00:00:00:00:29  count (89076777
packets)
 seq 15  deny host  00:00:00:00:00:31 host  00:00:00:00:00:39  count (0 packets)
 seq 20  deny host  00:00:00:00:00:41 host  00:00:00:00:00:49  count (0 packets)
 seq 25  permit any any  count (0 packets)
Extended mac access-list mac-ext on TenGigabitEthernet 0/12
 seq 5  permit host  00:00:00:00:00:11 host  00:00:00:00:00:19  count (57589834
packets)
 seq 10  deny host  00:00:00:00:00:21 host  00:00:00:00:00:29  count (393143077
packets)
 seq 15  deny host  00:00:00:00:00:31 host  00:00:00:00:00:39  count (0 packets)
 seq 20  deny host  00:00:00:00:00:41 host  00:00:00:00:00:49  count (0 packets)
 seq 25  permit any any  count (0 packets)
FTOS#
```

Usage Information The ACL hit counters in this command increment the counters for each matching rule, not just the first matching rule.

Standard MAC ACL Commands

When an access-list is created without any rule and then applied to an interface, ACL behavior reflects implicit permit.

The MXL 10/40GbE Switch IO Module platform supports both ingress and egress MAC ACLs.

The following commands configure standard MAC ACLs:

*   deny
*   mac access-list standard
*   permit
*   seq

> **Note:** See also Commands Common to all ACL Types and Common MAC Access List Commands.

deny

Configure a filter to drop packets with a the MAC address specified.

Syntax   deny {any | *mac-source-address* [*mac-source-address-mask*]} [count [byte]]

To remove this filter, you have two choices:

*   Use the no seq *sequence-number* command if you know the filter's sequence number.
*   Use the no deny {any | *mac-source-address mac-source-address-mask*} command.

Parameters

any	Enter the keyword any to specify that all traffic is subject to the filter.
mac-source-address	Enter a MAC address in nn:nn:nn:nn:nn:nn format.
mac-source-address-mask	(OPTIONAL) Specify which bits in the MAC address must match. If no mask is specified, a mask of 00:00:00:00:00:00 is applied (in other words, the filter allows only MAC addresses that match).
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.

Defaults   Not enabled.

Command Modes   CONFIGURATION-MAC ACCESS LIST-STANDARD

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

permit	Configures a MAC address filter to pass packets.
seq	Configures a MAC address filter with a specified sequence number.

mac access-list standard

Name a new or existing MAC access control list (MAC ACL) and enter the MAC ACCESS LIST mode to configure a standard MAC ACL. See Commands Common to all ACL Types and Common MAC Access List Commands.

Syntax   mac access-list standard *mac-list-name*

Parameters

mac-list-name	Enter a text string as the name of the standard MAC access list (140 character maximum).

Defaults   Not configured

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   FTOS supports one ingress and one egress MAC ACL per interface.

The number of entries allowed per ACL is hardware-dependent. For detailed specification on entries allowed per ACL, refer to your switch documentation.

The MXL Switch supports both ingress and egress ACLs.

Example   **Figure 6-7.   mac access-list standard Command Example**

```
FTOS(conf)#mac access-list standard TestMAC
FTOS(conf-std-macl)#?
deny                    Specify packets to reject
description             List description
exit                    Exit from access-list configuration mode
no                      Negate a command or set its defaults
permit                  Specify packets to forward
remark                  Specify access-list entry remark
seq                     Sequence numbers
show                    Show Standard ACL configuration
```

permit

Configure a filter to forward packets from a specific source MAC address.

Syntax   permit {any | *mac-source-address* [*mac-source-address-mask*]} [count [byte]]

To remove this filter, you have two choices:

- Use the no seq *sequence-number* command if you know the filter's sequence number.
- Use the no permit {any | *mac-source-address mac-source-address-mask*} command.

Parameters

any	Enter the keyword any to forward all packets received with a MAC address.
mac-source-address	Enter a MAC address in nn:nn:nn:nn:nn:nn format.
mac-source-address-mask	(OPTIONAL) Specify which bits in the MAC address must match. If no mask is specified, a mask of 00:00:00:00:00:00 is applied (in other words, the filter allows only MAC addresses that match).

count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.

Defaults Not configured.

Command Modes CONFIGURATION-MAC ACCESS LIST-STANDARD

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

deny	Configures a MAC ACL filter to drop packets.
seq	Configures a MAC ACL filter with a specified sequence number.

seq

Assign a sequence number to a deny or permit filter in a MAC access list while creating the filter.

Syntax seq *sequence-number* {deny | permit} {any | *mac-source-address* [*mac-source-address-mask*]} [count [byte]]

Parameters

sequence-number	Enter a number between 0 and 65535.
deny	Enter the keyword deny to configure a filter to drop packets meeting this condition.
permit	Enter the keyword permit to configure a filter to forward packets meeting this criteria.
any	Enter the keyword any to filter all packets.
mac-source-address	Enter a MAC address in nn:nn:nn:nn:nn:nn format.
mac-source-address-mask	(OPTIONAL) Specify which bits in the MAC address must match. If no mask is specified, a mask of 00:00:00:00:00:00 is applied (in other words, the filter allows only MAC addresses that match).
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.

Defaults Not configured.

Command Modes CONFIGURATION-MAC ACCESS LIST-STANDARD

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

deny	Configures a filter to drop packets.
permit	Configures a filter to forward packets.

Extended MAC ACL Commands

When an access-list is created without any rule and then applied to an interface, ACL behavior reflects implicit permit.

The MXL 10/40GbE Switch IO Module platform supports ingress and egress MAC ACLs.

The following commands configure Extended MAC ACLs.

*   deny
*   mac access-list extended
*   permit
*   seq

> **Note:** See also Commands Common to all ACL Types and Common MAC Access List Commands.

deny

Configure a filter to drop packets that match the filter criteria.

Syntax   deny {any | host *mac-address* | *mac-source-address mac-source-address-mask*} {any | host *mac-address* | *mac-destination-address mac-destination-address-mask*} [*ethertype-operator*] [count [byte]]

To remove this filter, you have two choices:

*   Use the no seq *sequence-number* command if you know the filter's sequence number.
*   Use the no deny {any | host *mac-address* | *mac-source-address mac-source-address-mask*} {any | host *mac-address* | *mac-destination-address mac-destination-address-mask*} command.

Parameters

any	Enter the keyword any to drop all packets.
host *mac-address*	Enter the keyword host followed by a MAC address to drop packets with that host address.
mac-source-address	Enter the source MAC address in nn:nn:nn:nn:nn:nn format.
mac-source-address-mask	Specify which bits in the MAC address must match. The MAC ACL supports an inverse mask, therefore, a mask of ff:ff:ff:ff:ff:ff allows entries that do not match and a mask of 00:00:00:00:00:00 only allows entries that match exactly.
mac-destination-address	Enter the destination MAC address and mask in nn:nn:nn:nn:nn:nn format.
mac-destination-address-mask	Specify which bits in the MAC address must match. The MAC ACL supports an inverse mask, therefore, a mask of ff:ff:ff:ff:ff:ff allows entries that do not match and a mask of 00:00:00:00:00:00 only allows entries that match exactly.

ethertype operator	(OPTIONAL) To filter based on protocol type, enter one of the following Ethertypes:
	• ev2 - is the Ethernet II frame format.
	• llc - is the IEEE 802.3 frame format.
	• snap - is the IEEE 802.3 SNAP frame format.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.

Defaults Not configured.

Command Modes CONFIGURATION-MAC ACCESS LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

permit	Configures a filter to forward based on MAC addresses.
seq	Configures a filter with specific sequence numbers.

mac access-list extended

Name a new or existing extended MAC access control list (extended MAC ACL).

Syntax mac access-list extended *access-list-name*

Parameters

access-list-name	Enter a text string as the MAC access list name, up to 140 characters.

Defaults No default configuration

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The number of entries allowed per ACL is hardware-dependent. For detailed specification on entries allowed per ACL, refer to your switch documentation.

Figure 6-8. mac access-list extended Command Example

```
FTOS(conf)#mac access-list extended TestMATExt
FTOS(conf-ext-macl)#remark 5 IPv4
FTOS(conf-ext-macl)#seq 10 permit any any  ev2 eq 800 count bytes
FTOS(conf-ext-macl)#remark 15 ARP
FTOS(conf-ext-macl)#seq 20 permit any any  ev2 eq 806 count bytes
FTOS(conf-ext-macl)#remark 25 IPv4
FTOS(conf-ext-macl)#seq 30 permit any any  ev2 eq 86dd count bytes
FTOS(conf-ext-macl)#seq 40 permit any any count bytes
FTOS(conf-ext-macl)#exit
FTOS(conf)#do show mac accounting access-list snickers interface tengig0/47 in

Extended mac access-list snickers on TenGigabitEthernet 0/47
seq 10  permit any any  ev2 eq 800  count bytes (559851886 packets 191402152148
bytes)
seq 20  permit any any  ev2 eq 806  count bytes (74481486 packets 5031686754
bytes)
seq 30  permit any any  ev2 eq 86dd  count bytes (7751519 packets 797843521 bytes)
```

Related Commands

mac access-list standard	Configures a standard MAC access list.
show mac accounting access-list	Displays MAC access list configurations and counters (if configured).

permit

Configure a filter to pass packets matching the criteria specified.

Syntax

permit {any | host *mac-address* | *mac-source-address mac-source-address-mask*} {any | host *mac-address* | *mac-destination-address mac-destination-address-mask*} [*ethertype operator*] [count [byte]]

To remove this filter, you have two choices:

- Use the no seq *sequence-number* command if you know the filter's sequence number.
- Use the no permit {any | host *mac-address* | *mac-source-address mac-source-address-mask*} {any | *mac-destination-address mac-destination-address-mask*} command.

Parameters

any	Enter the keyword any to forward all packets.
host	Enter the keyword host followed by a MAC address to forward packets with that host address.
mac-source-address	Enter the source MAC address in nn:nn:nn:nn:nn:nn format.
mac-source-address-mask	Specify which bits in the MAC address must be matched. The MAC ACL supports an inverse mask, therefore, a mask of ff:ff:ff:ff:ff:ff allows entries that do not match and a mask of 00:00:00:00:00:00 only allows entries that match exactly.
mac-destination-address	Enter the destination MAC address and mask in nn:nn:nn:nn:nn:nn format.
mac-destination-address-mask	Specify which bits in the MAC address must be matched. The MAC ACL supports an inverse mask, therefore, a mask of ff:ff:ff:ff:ff:ff allows entries that do not match and a mask of 00:00:00:00:00:00 only allows entries that match exactly.

ethertype operator	(OPTIONAL) To filter based on protocol type, enter one of the following Ethertypes:
	• ev2 - is the Ethernet II frame format.
	• llc - is the IEEE 802.3 frame format.
	• snap - is the IEEE 802.3 SNAP frame format.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.

Defaults   Not configured.

Command Modes   CONFIGURATION-MAC ACCESS LIST-EXTENDED

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

deny	Configures a filter to drop traffic based on the MAC address.
seq	Configures a filter with specific sequence numbers.

seq

Configure a filter with a specific sequence number.

Syntax   seq *sequence-number* {deny | permit} {any | host *mac-address* | *mac-source-address mac-source-address-mask*} {any | host *mac-address* | *mac-destination-address mac-destination-address-mask*} [*ethertype operator*] [count [byte]]

Parameters

sequence-number	Enter a number as the filter sequence number.
	Range: zero (0) to 65535.
deny	Enter the keyword deny to drop any traffic matching this filter.
permit	Enter the keyword permit to forward any traffic matching this filter.
any	Enter the keyword any to filter all packets.
host *mac-address*	Enter the keyword host followed by a MAC address to filter packets with that host address.
mac-source-address	Enter the source MAC address in nn:nn:nn:nn:nn:nn format.
	The MAC ACL supports an inverse mask, therefore, a mask of ff:ff:ff:ff:ff:ff allows entries that do not match and a mask of 00:00:00:00:00:00 only allows entries that match exactly.
mac-source-address-mask	Specify which bits in the MAC address must be matched.
mac-destination-address	Enter the destination MAC address and mask in nn:nn:nn:nn:nn:nn format.
mac-destination-address-mask	Specify which bits in the MAC address must be matched.
	The MAC ACL supports an inverse mask, therefore, a mask of ff:ff:ff:ff:ff:ff allows entries that do not match and a mask of 00:00:00:00:00:00 only allows entries that match exactly.

ethertype operator	(OPTIONAL) To filter based on protocol type, enter one of the following Ethertypes:
	• ev2 - is the Ethernet II frame format.
	• llc - is the IEEE 802.3 frame format.
	• snap - is the IEEE 802.3 SNAP frame format.
count	(OPTIONAL) Enter the keyword count to count packets processed by the filter.
byte	(OPTIONAL) Enter the keyword byte to count bytes processed by the filter.

Defaults   Not configured

Command Modes   CONFIGURATION-MAC ACCESS LIST-STANDARD

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

deny	Configures a filter to drop traffic.
permit	Configures a filter to forward traffic.

IP Prefix List Commands

When an access-list is created without any rule and then applied to an interface, ACL behavior reflects implicit permit.

Use these commands to configure or enable IP prefix lists.

- clear ip prefix-list
- deny
- ip prefix-list
- permit
- seq
- show config
- show ip prefix-list detail
- show ip prefix-list summary

clear ip prefix-list

Reset the number of times traffic met the conditions ("hit" counters) of the configured prefix lists.

Syntax   clear ip prefix-list [*prefix-name*]

Parameters

prefix-name	(OPTIONAL) Enter the name of the configured prefix list to clear only counters for that prefix list, up to 140 characters long.

Command Modes   EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Default   Clears "hit" counters for all prefix lists unless a prefix list is specified.

Related Commands	ip prefix-list	Configures a prefix list.

deny

Configure a filter to drop packets meeting the criteria specified.

Syntax   deny *ip-prefix* [ge *min-prefix-length*] [le *max-prefix-length*]

Parameters

ip-prefix	Specify an IP prefix in the network/length format. For example, 35.0.0.0/8 means match the first 8 bits of address 35.0.0.0.
ge *min-prefix-length*	(OPTIONAL) Enter the keyword ge followed by the minimum prefix length, which is a number from zero (0) to 32.
le *max-prefix-length*	(OPTIONAL) Enter the keyword le followed by the maximum prefix length, which is a number from zero (0) to 32.

Defaults   Not configured.

Command Modes   PREFIX-LIST

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Sequence numbers for this filter are automatically assigned starting at sequence number 5.

If you do not use the options ge or le, only packets with an exact match to the prefix are filtered.

Related Commands	permit	Configures a filter to pass packets.
	seq	Configures a drop or permit filter with a specified sequence number.

ip prefix-list

Enter PREFIX-LIST mode and configure a prefix list.

Syntax   ip prefix-list *prefix-name*

Parameters

prefix-name	Enter a string up to 16 characters long as the name of the prefix list, up to 140 characters long.

Command Modes   CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Prefix lists redistribute OSPF and RIP routes meeting specific criteria. For related RIP commands, refer to Chapter 26, Routing Information Protocol (RIP). For related OSPF commands supported, refer to *FTOS Command Line Reference Guide* Chapter 21, Open Shortest Path First (OSPFv2).

Related Commands

show ip route list	Displays IP routes in an IP prefix list.
show ip prefix-list summary	Displays a summary of the configured prefix lists.

permit

Configure a filter that passes packets meeting the criteria specified.

Syntax

permit *ip-prefix* [ge *min-prefix-length*] [le *max-prefix-length*]

Parameters

ip-prefix	Specify an IP prefix in the network/length format. For example, 35.0.0.0/8 means match the first 8 bits of address 35.0.0.0.
ge *min-prefix-length*	(OPTIONAL) Enter the keyword ge followed by the minimum prefix length, which is a number from zero (0) to 32.
le *max-prefix-length*	(OPTIONAL) Enter the keyword le followed by the maximum prefix length, which is a number from zero (0) to 32.

Command Modes   PREFIX-LIST

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

Sequence numbers for this filter are automatically assigned starting at sequence number 5.

If you do not use the options ge or le, only packets with an exact match to the prefix are filtered.

Related Commands

deny	Configures a filter to drop packets.
seq	Configures a drop or permit filter with a specified sequence number.

seq

Assign a sequence number to a deny or permit filter in a prefix list while configuring the filter.

Syntax

seq *sequence-number* {deny | permit} {any} | [*ip-prefix /nn* {ge *min-prefix-length*} {le *max-prefix-length*}] | [bitmask *number*]

Parameters

sequence-number	Enter a number. Range: 1 to 4294967294.
deny	Enter the keyword deny to configure a filter to drop packets meeting this condition.
permit	Enter the keyword permit to configure a filter to forward packets meeting this condition.
any	(OPTIONAL) Enter the keyword any to match any packets.
ip-prefix /nn	(OPTIONAL) Specify an IP prefix in the network/length format. For example, 35.0.0.0/8 means match the first 8 bits of address 35.0.0.0.

ge *min-prefix-length*	(OPTIONAL) Enter the keyword **ge** followed by the minimum prefix length, which is a number from zero (0) to 32.
le *max-prefix-length*	(OPTIONAL) Enter the keyword **le** followed by the maximum prefix length, which is a number from zero (0) to 32.
bitmask *number*	Enter the keyword **bitmask** followed by a bit mask number in dotted decimal format.

Defaults   Not configured.

Command Modes   PREFIX-LIST

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   If you do not use the options **ge** or **le**, only packets with an exact match to the prefix are filtered.

Related Commands

deny	Configures a filter to drop packets.
permit	Configures a filter to pass packets.

show config

Display the current PREFIX-LIST configurations.

Syntax   show config

Command Modes   PREFIX-LIST

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 6-9.   show config Command Example**

```
FTOS(conf-nprefixl)#show config
!
ip prefix-list snickers
FTOS(conf-nprefixl)#
```

show ip prefix-list detail

Display details of the configured prefix lists.

Syntax   show ip prefix-list detail [*prefix-name*]

Parameters

prefix-name	(OPTIONAL) Enter a text string as the name of the prefix list, up to 140 characters.

Command Modes   EXEC

EXEC Privilege

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 6-10.   show ip prefix-list detail Command Example**

```
FTOS#show ip prefix-list detail
Prefix-list with the last deletion/insertion: filter_ospf
ip prefix-list filter_in:
count: 3, range entries: 3, sequences: 5 - 10
   seq 5 deny 1.102.0.0/16 le 32 (hit count: 0)
   seq 6 deny 2.1.0.0/16 ge 23 (hit count: 0)
   seq 10 permit 0.0.0.0/0 le 32 (hit count: 0)
ip prefix-list filter_ospf:
count: 4, range entries: 1, sequences: 5 - 10
   seq 5 deny 100.100.1.0/24 (hit count: 5)
   seq 6 deny 200.200.1.0/24 (hit count: 1)
   seq 7 deny 200.200.2.0/24 (hit count: 1)
   seq 10 permit 0.0.0.0/0 le 32 (hit count: 132)
FTOS#
```

show ip prefix-list summary

Display a summary of the configured prefix lists.

Syntax   show ip prefix-list summary [*prefix-name*]

Parameters

prefix-name	(OPTIONAL) Enter a text string as the name of the prefix list, up to 140 characters long.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 6-11.   show ip prefix-list summary Command Example**

```
FTOS#show ip prefix summary
Prefix-list with the last deletion/insertion: test
ip prefix-list test:
count: 3, range entries: 1, sequences: 5 - 15
ip prefix-list test1:
count: 2, range entries: 2, sequences: 5 - 10
ip prefix-list test2:
count: 1, range entries: 1, sequences: 5 - 5
ip prefix-list test3:
count: 1, range entries: 1, sequences: 5 - 5
ip prefix-list test4:
count: 1, range entries: 1, sequences: 5 - 5
ip prefix-list test5:
count: 1, range entries: 1, sequences: 5 - 5
ip prefix-list test6:
count: 1, range entries: 1, sequences: 5 - 5
FTOS#
```

Route Map Commands

When an access-list is created without any rule and then applied to an interface, ACL behavior reflects implicit permit.

The following commands allow you to configure route maps and their redistribution criteria.

continue

Configure a route-map to go to a route-map entry with a higher sequence number.

Syntax continue [*sequence-number*]

Parameters

sequence-number	(OPTIONAL) Enter the route map sequence number.
	Range: 1 - 65535
	Default: no sequence number

Defaults Not Configured

Command Modes ROUTE-MAP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The continue feature allows movement from one route-map entry to a specific route-map entry (the sequence number). If you do not specify the sequence number, the continue feature simply moves to the next sequence number (also known as an implied continue). If a match clause exists, the continue feature executes only after a successful match occurs. If there are no successful matches, continue is ignored.

Match clause with Continue clause

The continue feature can exist without a match clause. A continue clause without a match clause executes and jumps to the specified route-map entry.

With a match clause and a continue clause, the match clause executes first and the continue clause next in a specified route map entry. The continue clause launches only after a successful match. The behavior is:

- A successful match with a continue clause, the route map executes the set clauses and then goes to the specified route map entry upon execution of the continue clause.
- If the next route map entry contains a continue clause, the route map executes the continue clause if a successful match occurs.
- If the next route map entry does not contain a continue clause, the route map evaluates normally. If a match does not occur, the route map does not continue and falls through to the next sequence number, if one exists.

Set clause with continue clause

If the route-map entry contains sets with the continue clause, set actions are performed first followed by the continue clause jump to the specified route map entry.

- If a set action occurs in the first route map entry and the same set action occurs with a different value in a subsequent route map entry, the last set of actions overrides the previous set of actions with the same set command.
- If you configure the set community additive and set as-path prepend options, the communities and AS numbers are prepended.

Related Commands		
set metric	Specifies a COMMUNITY attribute
set automatic-tag	Configures a filter to modify the AS path

description

Add a description to this route map.

Syntax description { *description*}

Parameters

description	Enter a description to identify the route map (80 characters maximum).

Defaults none

Command Modes ROUTE-MAP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

route-map	Enables a route map.

match interface

Configure a filter to match routes whose next hop is on the interface specified.

Syntax   match interface *interface*

To remove a match, use the no match interface *interface* command.

Parameters

interface	Enter the following keywords and slot/port or number information:

- For the loopback interface, enter the keyword loopback followed by a number from zero (0) to 16383.
- For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128
- For a Ten Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
- For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   Not configured

Command Modes   ROUTE-MAP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

match ip address	Redistributes routes that match an IP address.
match ip next-hop	Redistributes routes that match the next-hop IP address.
match ip route-source	Redistributes routes that match routes advertised by other routers.
match metric	Redistributes routes that match a specific metric.
match route-type	Redistributes routes that match a route type.
match tag	Redistributes routes that match a specific tag.

match ip address

Configure a filter to match routes based on IP addresses specified in an access list.

Syntax   match ip address *prefix-list-name*

Parameters

prefix-list-name	Enter the name of configured prefix list, up to 140 characters.

Defaults   Not configured.

Command Modes   ROUTE-MAP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

match interface	Redistributes routes that match the next-hop interface.
match ip next-hop	Redistributes routes that match the next-hop IP address.
match ip route-source	Redistributes routes that match routes advertised by other routers.

match metric	Redistributes routes that match a specific metric.
match route-type	Redistributes routes that match a route type.
match tag	Redistributes routes that match a specific tag.

match ip next-hop

Configure a filter to match routes based on the next-hop IP addresses specified in an IP access list or IP prefix list.

Syntax	match ip next-hop {*access-list*	prefix-list *prefix-list-name*}

Parameters		
	access-list-name	Enter the name of a configured IP access list, up to 140 characters.
	prefix-list *prefix-list-name*	Enter the keywords prefix-list followed by the name of configured prefix list.

Defaults	Not configured.

Command Modes	ROUTE-MAP

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands		
	match interface	Redistributes routes that match the next-hop interface.
	match ip address	Redistributes routes that match an IP address.
	match ip route-source	Redistributes routes that match routes advertised by other routers.
	match metric	Redistributes routes that match a specific metric.
	match route-type	Redistributes routes that match a route type.
	match tag	Redistributes routes that match a specific tag.

match ip route-source

Configure a filter to match routes based on the routes advertised by routers specified in IP access lists or IP prefix lists.

Syntax	match ip route-source {*access-list*	prefix-list *prefix-list-name*}

Parameters		
	access-list-name	Enter the name of a configured IP access list, up to 140 characters.
	prefix-list *prefix-list-name*	Enter the keywords prefix-list followed by the name of configured prefix list, up 10 140 characters.

Defaults	Not configured.

Command Modes	ROUTE-MAP

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	match interface	Redistributes routes that match the next-hop interface.
	match ip address	Redistributes routes that match an IP address.
	match ip next-hop	Redistributes routes that match the next-hop IP address.
	match metric	Redistributes routes that match a specific metric.
	match route-type	Redistributes routes that match a route type.
	match tag	Redistributes routes that match a specific tag.

match metric

Configure a filter to match on a specified value.

Syntax match metric *metric-value*

Parameters

metric-value	Enter a value to match.
	Range: zero (0) to 4294967295.

Defaults Not configured.

Command Modes ROUTE-MAP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

match interface	Redistributes routes that match the next-hop interface.
match ip address	Redistributes routes that match an IP address.
match ip next-hop	Redistributes routes that match the next-hop IP address.
match ip route-source	Redistributes routes that match routes advertised by other routers.
match route-type	Redistributes routes that match a route type.
match tag	Redistributes routes that match a specific tag.

match route-type

Configure a filter to match routes based on the how the route is defined.

Syntax match route-type {external [type-1 | type-2] | internal | local}

Parameters

external [type-1| type-2]	Enter the keyword external followed by either type-1 or type-2 to match only on OSPF Type 1 routes or OSPF Type 2 routes.
internal	Enter the keyword internal to match only on routes generated within OSPF areas.
local	Enter the keyword local to match only on routes generated within the switch.

Defaults Not configured.

Command Modes ROUTE-MAP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands		
match interface	Redistributes routes that match the next-hop interface.
match ip address	Redistributes routes that match an IP address.
match ip next-hop	Redistributes routes that match the next-hop IP address.
match ip route-source	Redistributes routes that match routes advertised by other routers.
match metric	Redistributes routes that match a specific metric.
match tag	Redistributes routes that match a tag.

match tag

Configure a filter to redistribute only routes that match a specified tag value.

Syntax   match tag *tag-value*

Parameters

tag-value	Enter a value as the tag on which to match.
	Range: zero (0) to 4294967295.

Defaults   Not configured

Command Modes   ROUTE-MAP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands		
match interface	Redistributes routes that match the next-hop interface.
match ip address	Redistributes routes that match an IP address.
match ip next-hop	Redistributes routes that match the next-hop IP address.
match ip route-source	Redistributes routes that match routes advertised by other routers.
match metric	Redistributes routes that match a specific metric.
match route-type	Redistributes routes that match a route type.

route-map

Enable a route map statement and configure its action and sequence number. This command also places you in ROUTE-MAP mode.

Syntax   route-map *map-name* [permit | deny] [*sequence-number*]

Parameters

map-name	Enter a text string of up to 140 characters to name the route map for easy identification.
permit	(OPTIONAL) Enter the keyword permit to set the route map default as permit.
	If no keyword is specified, the default is permit.

deny	(OPTIONAL) Enter the keyword deny to set the route map default as deny.
sequence-number	(OPTIONAL) Enter a number to identify the route map for editing and sequencing with other route maps. You are prompted for a sequence number if there are multiple instances of the route map.
	Range: 1 to 65535.

Defaults   Not configured

If no keyword (permit or deny) is defined for the route map, the permit action is the default.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 6-12.   route-map Command Example**

```
FTOS(conf)#route-map dempsey
FTOS(conf-route-map)#
```

Usage Information   Use caution when you delete route maps because if you do not specify a sequence number, all route maps with the same *map-name* are deleted when you use no route-map *map-name* command.

Related Commands

show config	Displays the current configuration.

set automatic-tag

Configure a filter to automatically compute the tag value of the route.

Syntax   set automatic-tag

To return to the default, enter no set automatic-tag.

Defaults   Not configured.

Command Modes   ROUTE-MAP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

set metric	Specifies the metric value assigned to redistributed routes.
set metric-type	Specifies the metric type assigned to redistributed routes.
set tag	Specifies the tag assigned to redistributed routes.

set metric

Configure a filter to assign a new metric to redistributed routes.

Syntax

set metric [**+** | **-**] *metric-value*

To delete a setting, use the no set metric command.

Parameters

+	(OPTIONAL) Enter + to add a metric-value to the redistributed routes.
-	(OPTIONAL) Enter - to subtract a metric-value from the redistributed routes.
metric-value	Enter a number as the new metric value. Range: zero (0) to 4294967295

Defaults

Not configured

Command Modes

ROUTE-MAP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

set automatic-tag	Computes the tag value of the route.
set metric-type	Specifies the route type assigned to redistributed routes.
set tag	Specifies the tag assigned to redistributed routes.

set metric-type

Configure a filter to assign a new route type for routes redistributed to OSPF.

Syntax

set metric-type {internal | external | type-1 | type-2}

Parameters

internal	Enter the keyword internal to assign the Interior Gateway Protocol metric of the next hop as the route's BGP MULTI_EXIT_DES (MED) value.
external	Enter the keyword external to assign the IS-IS external metric.
type-1	Enter the keyword type-1 to assign the OSPF Type 1 metric.
type-2	Enter the keyword type-2 to assign the OSPF Type 2 metric.

Defaults

Not configured.

Command Modes

ROUTE-MAP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

set automatic-tag	Computes the tag value of the route.
set metric	Specifies the metric value assigned to redistributed routes.
set tag	Specifies the tag assigned to redistributed routes.

set tag

Configure a filter to specify a tag for redistributed routes.

| **Syntax** | set tag *tag-value* |

Parameters		
tag-value	Enter a number as the tag.
	Range: zero (0) to 4294967295.

| **Defaults** | Not configured |

| **Command Modes** | ROUTE-MAP |

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands		
set automatic-tag	Computes the tag value of the route.
set metric	Specifies the metric value assigned to redistributed routes.
set metric-type	Specifies the route type assigned to redistributed routes.

show config

Display the current route map configuration.

| **Syntax** | show config |

| **Command Modes** | ROUTE-MAP |

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 6-13.   show config Command Example**

```
FTOS(conf-route-map)#show config
!
route-map hopper permit 10
FTOS(conf-route-map)#
```

show route-map

Display the current route map configurations.

| **Syntax** | show route-map [*map-name*] |

Parameters		
map-name	(OPTIONAL) Enter the name of a configured route map, up to 140 characters.

Command Modes	EXEC
	EXEC Privilege

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example	**Figure 6-14. show route-map Command Example**

```
FTOS#show route-map
route-map firpo, permit, sequence 10
 Match clauses:
 Set clauses:
  tag  34
FTOS#
```

Related
Commands

route-map   Configures a route map.

7

Bare Metal Provisioning

Overview

Bare metal provisioning (BMP) or jumpstarting improves accessibility to the MXL 10/40GbE Switch IO Module. Bare metal provisioning performs auto configuration using a configuration file and an approved version of the Dell Force10 operating system (FTOS) from a network source. Bare metal provisioning not only allows you to configure a stack with a minimum of effort, but it is also useful for quick configuration of a stand alone system.

Bare metal provisioning eases configuration in the following key areas:

- Obtaining an IP address, running the configuration, and boot image information from a dynamic host configuration protocol (DHCP) server.
- Allowing access to the system through an Ethernet management port and data ports with or without DHCP-based dynamic IP address configuration of the user device. This does not stop BMP.
- Booting up in Layer 3 mode with interfaces already in No Shutdown mode. Only the management mode will be in No Shutdown mode and have ip address dhcp enabled, Front end ports are in the Shut mode. You can configure the username root password if the configuration file is not received.

> **Note:** The MXL 10/40GbE Switch IO Module supports BMP on the management ports and front end ports. BMP is supported on the 10GbE, 40GbE, and management interfaces.

Commands

- reload-type
- show reload-type
- show boot jumpstart

reload-type

Reload the system using the specified start-up mode.

Syntax
reload-type [normal | jump-start auto-save [enable | disable] dhcp-timeout {minutes} config-download [enable | disable]]

Parameters

normal	Enable the normal reload type. The system retrieves the FTOS image and start-up configuration files from the flash.
jump-start	Enable the BMP reload type. The system acts as a DHCP client and downloads the FTOS image and configuration and boot files from a specified DHCP server.
dhcp-timeout	Set the amount of time the system waits for a DHCP server response before reverting to normal reload type. **Range**: 1-50 minutes **Default**: infinity The default time is infinity; if no time is set, the system continues to wait unless the stop jump-start command is given. **Note:** Dell Force10 recommends setting the value to 2 or higher.
config-download	Specify if the system should download a configuration file from the DHCP server or use the start-up configuration files from the flash. **Enable**: Download the configuration files from the server. **Disable**: Use the local start-up configuration files.
auto-save	Configure the auto save option for the downloaded configuration file.

Defaults
jump-start

Command Modes
EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show reload-type

Display the reload type currently configured on the system.

Syntax
show reload-type

Command Modes
EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show boot jumpstart

Display the jumpstart status at any instant.

Syntax
show boot jumpstart

Command Modes
EXEC Privilege

stop jump-start

Cancel the jump-start reload process.

Syntax	stop jump-start

Command Modes	EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   This command stops the jump-start process while the reload is in progress. However, if the system is downloading an FTOS image or configuration file, the process is stopped AFTER the DHCP release is sent.

Content Addressable Memory (CAM)

Overview

> ⚠ **Warning:** If you are using these features for the first time, contact Dell Force10 Technical Assistance Center (TAC) for guidance. For information on contacting Dell Force10 TAC, visit the Dell Force10 website at www.force10networks.com/support

CAM Profile Commands

The content addressable memory (CAM) profiling feature allows you to partition the CAM to best suit your application. For example:

- Configure more Layer 2 forwarding information base (FIB) entries when the system is deployed as a switch.
- Configure more Layer 3 FIB entries when the system is deployed as a router.
- Configure more access control list (ACLs).
- Optimize the virtual local area network (VLAN) ACL group feature, which permits group VLANs for IP egress ACLs.

Important Points to Remember

- The Dell Force10 operating software (FTOS) versions 7.8.1.0 and later support CAM allocations on the MXL 10/40GbE Switch IO Module.
- The CAM configuration is applied to entire system when you use CONFIGURATION mode commands. You must save the running-configuration to affect the change.
- When budgeting your CAM allocations for ACLs and quality of service (QoS) configurations, remember that ACL and QoS rules might consume more than one CAM entry depending on complexity. For example, transmission control protocol (TCP) and user datagram protocol (UDP) rules with port range options might require more than one CAM entry.
- You MUST save your changes and reboot the system for CAM profiling or allocations to take effect.

The CAM Profiling commands are:

- cam-acl (Configuration)
- cam-optimization
- show cam-acl
- show cam-acl-egress

cam-acl (Configuration)

Select the default CAM allocation settings or reconfigure new CAM allocation for Layer 2, IPv4 and IPv6 ACLs, Layer 2 and Layer 3 (IPv4) QoS, Layer 2 Protocol Tunneling (L2PT), IP and MAC source address validation for DHCP, Ethernet Connectivity Fault Management (CFM) ACLs, and Policy-based Routing (PBR).

Syntax cam-acl {default | l2acl *number* ipv4acl *number* ipv6acl *number* ipv4qos *number* l2qos *number* l2pt *number* ipmacacl *number* [vman-qos | vman-qos-dual- *number* | vman-qos-dual-fp *number*] ipv4pbr *number*} ecfmacl *number* fcoeacl *number* iscsioptacl *number*

Parameters

default	Use the default CAM profile settings, and set the CAM as follows. • L3 ACL (ipv4acl): 2 • L2 ACL(l2acl): 2 • IPv6 L3 ACL(ipv6Acl):0 • L3 QoS (ipv4qos): 2 • L2 QOS(L2Qos): 1 • L2PT (L2PT): 0 • MAC ACL (IpMacAcl): 0 • VmanDualQos: 0 • EcfmAcl: 0 • FcoeAcl: 4 • iscsiOptAcl: 2
l2acl *number* ipv4acl *number* ipv6acl *number*, ipv4qos *number* l2qos *number*, l2pt *number* ipmacacl *number* ecfmacl *number* [vman-qos | vman--qos-dual *number* | vman-qos-dual-fp *number*] ipv4pbr *number*	Allocate space to each CAM region. Enter the CAM profile name followed by the amount of CAM space to be allotted. The total space allocated must equal 13. The range for ipv4acl is 1 to 4. The ipv6acl range must be a factor of 2. The vman-qos-dual-fp *number* must be entered as a multiple of 4.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information You must save the new CAM settings to the startup-config (write-mem or copy run start) then reload the system for the new settings to take effect.

The total amount of space allowed is 16 FP Blocks. System flow requires three blocks and these cannot be reallocated. The ipv4acl profile range is 1-4.

When configuring space for IPv6 ACLs, the total number of Blocks must equal 13.

On the MXL 10/40GbE Switch IO Module, there can be *only one* odd number of Blocks in the CLI configuration; the other Blocks must be in factors of two. For example, a CLI configuration of 5+4+2+1+1 Blocks is not supported; a configuration of 6+4+2+1 Blocks is supported.

Ranges for the CAM profiles are 1-10, except for the ipv6acl profile which is 0-10. The ipv6acl allocation must be a factor of two (2, 4, 6, 8, 10).

cam-optimization

Optimize CAM utilization for QoS Entries by minimizing require policy-map CAM space.

Syntax	**cam-optimization [qos]**

Parameters		
qos	Optimize CAM usage for Quality of Service (QoS)

Command Modes   CONFIGURATION

Defaults   Disabled

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   When this command is enabled, if a Policy Map containing classification rules (ACL and/or dscp/ip-precedence rules) is applied to more than one physical interface on the same port pipe, only a single copy of the policy will be written (only one FP entry is used).

> **Note:** An ACL may still require more that a single FP entry, regardless of the number of interfaces. Refer to the *IP Access Control Lists, Prefix Lists, and Route-map in the FTOS Configuration Guide* for complete description.

show cam-acl

Display the details of the CAM profiles on the chassis and all stack units.

Syntax   show cam-acl

Defaults   none

Command Modes   EXEC Privilege

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The display reflects the settings implemented with the cam-acl command.

Example   **Figure 8-1.   show cam-acl (default) Command Example**

```
FTOS#show cam-acl

-- Chassis Cam ACL --
            Current Settings(in block sizes)
L2Acl        :        6
Ipv4Acl      :        2
Ipv6Acl      :        0
Ipv4Qos      :        2
L2Qos        :        1
L2PT         :        0
IpMacAcl     :        0
VmanQos      :        0
VmanDualQos  :        0
EcfmAcl      :        0
FcoeAcl      :        0
iscsiOptAcl  :        2

-- Stack unit 5 --
            Current Settings(in block sizes)
L2Acl        :        6
Ipv4Acl      :        2
Ipv6Acl      :        0
Ipv4Qos      :        2
L2Qos        :        1
L2PT         :        0
IpMacAcl     :        0
VmanQos      :        0
VmanDualQos  :        0
EcfmAcl      :        0
FcoeAcl      :        0
iscsiOptAcl  :        2

FTOS#
```

Figure 8-2.   show cam-acl (non-default) Command Example

```
FTOS#show cam-acl

-- Chassis Cam ACL --

            Current Settings(in block sizes)
L2Acl        :        2
Ipv4Acl      :        2
Ipv6Acl      :        2
Ipv4Qos      :        2
L2Qos        :        2
L2PT         :        1
IpMacAcl     :        2
VmanQos      :        0
VmanDualQos:        0
Ipv4pbr      :        0

-- Line card 4 --
            Current Settings(in block sizes)
L2Acl        :        5
Ipv4Acl      :        5
Ipv6Acl      :        1
Ipv4Qos      :        1
L2Qos        :        1
L2PT         :        0
IpMacAcl     :        0
VmanQos      :        0
VmanDualQos:        0
Ipv4pbr      :        0

FTOS#
```

show cam-acl-egress

Display the details of the FP groups allocated for the egress ACL.

Syntax show cam-acl-egress

Defaults none

Command Modes EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The display reflects the settings implemented with the cam-acl-egress command.

Example **Figure 8-3.   show cam-acl-egress (default) Command Example**

```
FTOS#show cam-acl-egress

-- Chassis Egress Cam ACL --
          Current Settings(in block sizes)
L2Acl          :          1
Ipv4Acl        :          1
Ipv6Acl        :          2

-- Stack unit 5 --
          Current Settings(in block sizes)
L2Acl          :          1
Ipv4Acl        :          1
Ipv6Acl        :          2

FTOS#
```

9

Data Center Bridging

Overview

Data center bridging (DCB) refers to a set of IEEE Ethernet enhancements that provide data centers with a single, robust, converged network to support multiple traffic types, including LAN, server, and storage traffic.

The Dell Force10 operating software (FTOS) commands for data center bridging features include 802.1Qbb priority-based flow control (PFC), 802.1Qaz enhanced transmission selection (ETS), and the Data Center Bridging Exchange (DCBX) protocol. CLI commands for individual DCB features are as follows:

DCB Command

- dcb-enable

PFC Commands

- dcb-input
- dcb-policy input
- dcb-policy input stack-unit stack-ports all
- dcb stack-unit all pfc-buffering pfc-port-count pfc-queues
- dcb stack-unit pfc-buffering pfc-port pfc-queues
- description
- pfc link-delay
- pfc mode on
- pfc priority
- pfc no-drop queues
- show dcb
- show interface pfc
- show interface pfc statistics
- show qos priority-groups
- show stack-unit stack-ports pfc detail

ETS Commands

DCBX Commands

advertise dcbx-appln-tlv

On a DCBX port with a manual role, configure the application priority TLVs advertised on the interface to DCBX peers.

Syntax   advertise dcbx-appln-tlv {fcoe | iscsi}

To remove the application priority TLVs, use the no advertise dcbx-appln-tlv {fcoe | iscsi} command.

Parameters

{fcoe | iscsi}	Enter the application priority TLVs, where:
	• fcoe: enables the advertisement of FCoE in application priority TLVs.
	• iscsi: enables the advertisement of iSCSI in application priority TLVs.

Defaults   Application priority TLVS are enabled to advertise FCoE and iSCSI.

Command Modes   PROTOCOL LLDP

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

To disable TLV transmission, use the no form of the command; for example, no advertise dcbx-appln-tlv iscsi.

advertise dcbx-tlv

On a DCBX port with a manual role, configure the PFC and ETS TLVs advertised to DCBX peers.

Syntax   advertise dcbx-tlv {ets-conf | ets-reco | pfc} [ets-conf | ets-reco | pfc] [ets-conf | ets-reco | pfc]

To remove the advertised ETS TLVs, use the no advertise dcbx-tlv command.

Parameters

{ets-conf	ets-reco	pfc}	Enter the PFC and ETS TLVs to be advertised, where: • ets-conf: enables the advertisement of ETS configuration TLVs. • ets-reco: enables the advertisement of ETS recommend TLVs. • pfc: enables the advertisement of PFC TLVs.

Defaults   All PFC and ETS TLVs are advertised.

Command Modes   PROTOCOL LLDP

Command
History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage
Information
You can configure the transmission of more than one TLV type at a time; for example: advertise dcbx-tlv ets-conf ets-reco.

You can enable ETS recommend TLVs (ets-reco) only if ETS configuration TLVs (ets-conf) are enabled. To disable TLV transmission, use the no form of the command; for example, no advertise dcbx-tlv pfc ets-reco.

DCBX requires that you enable LLDP to advertise DCBX TLVs to peers.

Configure DCBX operation at the INTERFACE level on a switch or globally on the switch. To verify the DCBX configuration on a port, use the show interface dcbx detail command.

bandwidth-percentage

Configure the bandwidth percentage allocated to priority traffic in port queues.

Syntax   bandwidth-percentage *percentage*

To remove the configured bandwidth percentage, use the no bandwidth-percentage command.

Parameters

percentage	(Optional) Enter the bandwidth percentage. The percentage range is 1 to 100% in units of 1%.

Defaults	none

Command Modes	POLICY-MAP-OUT-ETS

**Command
History**

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

**Usage
Information**

By default, equal bandwidth is assigned to each port queue and each dot1p priority in a priority group. Use the **bandwidth-percentage** command to configure bandwidth amounts in associated dot1p queues. When specified bandwidth is assigned to some port queues and not to others, the remaining bandwidth (100% minus assigned bandwidth amount) is equally distributed to unassigned non-strict priority queues in the priority group. The sum of the allocated bandwidth to all queues in a priority group should be 100% of the bandwidth on the link.

ETS-assigned bandwidth allocation applies only to data queues, not to control queues.

The configuration of bandwidth allocation and strict-queue scheduling is not supported at the same time for a priority group. If both are configured, the configured bandwidth allocation will be ignored for priority-group traffic when you apply the output policy on an interface.

By default, equal bandwidth is assigned to each priority group in the ETS output policy applied to an egress port if no bandwidth allocation is configured. The sum of configured bandwidth allocation to dot1p priority traffic in all ETS priority groups must be 100%. You must allocate at least 1% of the total bandwidth to each priority group and queue. If bandwidth is assigned to some priority groups but not to others, the remaining bandwidth (100% minus assigned bandwidth amount) is equally distributed to non-strict-priority groups which have no configured scheduler.

**Related
Commands**

qos-policy-output ets	Create a QoS output policy.
scheduler	Schedule priority traffic in port queues.

dcb-enable

Enable DCB.

Syntax	dcb enable

To disable DCB, use the no dcb enable command.

Defaults	none

Command Modes	CONFIGURATION

**Command
History**

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

**Usage
Information**

DCB is not supported if link-level flow control is enabled on one or more interfaces.

dcb-input

Create a DCB input policy to apply pause or flow control for specified priorities using a configure delay time.

Syntax   dcb-input *policy-name*

To delete the DCB input policy, use the no dcb-input command.

Parameters

policy-name	Maximum: 32 alphanumeric characters.

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

As soon as you apply a DCB policy with PFC enabled on an interface, DCBX starts exchanging information with PFC-enabled peers. The IEEE802.1Qbb, CEE, and CIN versions of PFC TLV are supported. DCBX also validates PFC configurations received in TLVs from peer devices.

By applying a DCB input policy with PFC enabled, you enable PFC operation on ingress port traffic. To achieve complete lossless handling of traffic, you must also enable PFC on all DCB egress ports or configure the dot1p priority-queue assignment of PFC priorities to lossless queues (see pfc no-drop queues).

To remove a DCB input policy, including the PFC configuration it contains, enter the **no dcb-input** ***policy-name*** command in interface configuration mode.

Related Commands

dcb-policy input	Apply the input policy with the PFC configuration.

dcb-output

Create a DCB output policy to associate an ETS configuration with priority traffic.

Syntax   dcb-output *policy-name*

To remove the ETS output policy from an interface, use the no dcb-policy output command.

Parameters

policy-name	Enter the DCB output policy name.
	Maximum: 32 alphanumeric characters.

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	Create a DCB output policy to associate a priority group with an ETS output policy with scheduling and bandwidth configuration. You can apply a DCB output policy on multiple egress ports. When you apply an ETS output policy on an interface, ETS-configured scheduling and bandwidth allocation take precedence over any configured settings in QoS output policies.

The ETS configuration associated with 802.1 priority traffic in a DCB output policy is used in DCBX negotiation with ETS peers.

Related Commands	dcb-policy output	Apply the output policy.

dcb-policy input

Apply the input policy with the PFC configuration to an ingress interface.

Syntax	dcb-policy input *policy-name*

To delete the input policy, use the no dcb-policy input command.

Parameters	*policy name*	Enter the input policy name with the PFC configuration to an ingress interface.

Defaults	none

Command Modes	INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

If you apply an input policy with PFC disabled (no pfc mode on):

- Link-level flow control can be enabled on the interface. To delete the input policy, you must first disable link-level flow control. PFC is then automatically enabled on the interface because an interface is by default PFC-enabled.
- PFC still allows you to configure lossless queues on a port to ensure no-drop handling of lossless traffic.

When you apply an input policy to an interface, an error message is displayed if:

- The PFC dot1p priorities result in more than two lossless port queues globally on the switch.
- Link-level flow control is already enabled. PFC and link-level flow control cannot be enabled at the same time on an interface.

In a switch stack, you must configure all stacked ports with the same PFC configuration.

A DCB input policy for PFC applied to an interface may become invalid if the dot1p-queue mapping is reconfigured. This situation occurs when the new dot1p-queue assignment exceeds the maximum number (2) of lossless queues supported globally on the switch. In this case, all PFC configurations received from PFC-enabled peers are removed and re-synchronized with the peer devices.

Traffic may be interrupted when you reconfigure PFC no-drop priorities in an input policy or re-apply the policy to an interface.

Related Commands	dcb-input	Create a DCB input policy.

dcb-policy input stack-unit stack-ports all

Apply the specified DCB input policy on all ports of the switch stack or a single stacked switch.

Syntax   dcb-policy input stack-unit {all | *stack-unit-id*} stack-ports all *dcb-input-policy-name*

To remove all DCB input policies applied to the stacked ports and rest the PFC to its default settings, use the no dcb-policy input stack-unit all command.

To remove only the DCB input policies applied to the specified switch, use the no dcb-policy input stack-unit command.

Parameters

stack-unit-id	Enter the stack unit identification.
dcb-input-policy-name	Enter the policy name for the DCB input policy.

Defaults   None

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The dcb-policy input stack-unit all command overwrites any previous dcb-policy input stack-unit *stack-unit-id* configurations. Similarly, a dcb-policy input stack-unit *stack-unit-id* command overwrites any previous dcb-policy input stack-unit all configuration.

Related Commands

dcb-policy output stack-unit stack-ports all	Apply the specified DCB output policy.

dcb-policy output

Apply the output policy with the ETS configuration to an egress interface.

Syntax   dcb-policy output *policy-name*

To delete the output policy, use the no dcb-policy output command.

Parameters

policy name	Enter the output policy name.

Defaults   none

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   When you apply an ETS output policy to on interface, ETS-configured scheduling and bandwidth allocation take precedence over any configured settings in QoS output policies.

To remove an ETS output policy from an interface, enter the **no dcb-policy output** *policy-name* command. ETS is enabled by default with the default ETS configuration applied (all dot1p priorities in the same group with equal bandwidth allocation).

Related Commands		
	dcb-output	Create a DCB output policy.

dcb-policy output stack-unit stack-ports all

Apply the specified DCB output policy on all ports of the switch stack or a single stacked switch.

Syntax   dcb-policy output stack-unit {all | *stack-unit-id*} stack-ports all *dcb-output-policy-name*

To remove all DCB input policies applied to the stacked ports, use the no dcb-policy output stack-unit all command.

To remove only the DCB input policies applied to the specified switch, use the no dcb-policy output stack-unit command.

Parameters		
	stack-unit-id	Enter the stack unit identification.
	dcb-output-policy-name	Enter the policy name for the DCB output policy.

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The dcb-policy output stack-unit all command overwrites any previous dcb-policy output stack-unit *stack-unit-id* configurations. Similarly, a dcb-policy output stack-unit *stack-unit-id* command overwrites any previous dcb-policy output stack-unit all configuration.

You can apply a DCB output policy with ETS configuration to all stacked ports in a switch stack or an individual stacked switch. You can apply different DCB output policies to different stack units.

Related Commands		
	dcb-policy input stack-unit stack-ports all	Apply the specified DCB input policy.

dcb stack-unit all pfc-buffering pfc-port-count pfc-queues

Configure the PFC buffer for all switches in the stack.

Syntax   dcb stack-unit all pfc-buffering pfc-port-count {*1-56*} pfc-queues {*1-2*}

To remove the configuration for the PFC buffer on all switches in the stack, use the no dcb stack-unit all pfc-buffering pfc-port-count pfc-queues command.

Parameters	pfc-port-count {*1-56*}	Enter the pfc-port count.
		The valid range is 1 to 56.
	pfc-queues {*1-2*}	Enter the pfc-queue number.
		The valid range is 1 to 2.

Defaults   The PFC buffer is enabled on all ports on the stack unit.

Command Modes   CONFIGURATION

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information   If you configure PFC on a 40GbE port, count the 40GbE port as four PFC-enabled ports in the pfc-port number you enter in the command syntax.

To achieve lossless PFC operation, the PFC port count and queue number used for the reserved buffer size that is created must be greater than or equal to the buffer size required for PFC-enabled ports and lossless queues on the switch.

You must reload the stack or a specified stack unit (use the reload command in EXEC Privilege mode) for the PFC buffer configuration to take effect.

Related Commands

| dcb stack-unit pfc-buffering pfc-port pfc-queues | Configure the PFC buffer for all port pipes in a specified stack unit. |

dcb stack-unit pfc-buffering pfc-port pfc-queues

Configure the PFC buffer for all port pipes in a specified stack unit by specifying the port-pipe number, number of PFC-enabled ports, and number of configured lossless queues.

Syntax   dcb stack-unit *stack-unit-id* [port-set *port-set-id*] pfc-buffering pfc-ports {*1-56*} pfc-queues {*1-2*}

To remove the configuration for the PFC buffer on all port pipes in a specified stack unit, use the no dcb stack-unit *stack-unit-id* [port-set *port-set-id*] pfc-buffering pfc-ports pfc-queues command.

Parameters

stack-unit-id	Enter the stack-unit identification.
	The valid stack-unit IDs are 0 to 5.
port-set	Enter the port-set identification.
	The only valid port-set ID (port-pipe number) on an MXL Switch is 0.
pfc-ports {*1-56*}	Enter the pfc-ports.
	The valid range is 1 to 56.
pfc-queues {*1-2*}	Enter the pfc-queue number.
	The valid range is 1 to 2.

Command Modes   CONFIGURATION

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information	If you configure PFC on a 40GbE port, count the 40GbE port as four PFC-enabled ports in the pfc-port number you enter in the command syntax.

To achieve lossless PFC operation, the PFC port count and queue number used for the reserved buffer size that is created must be greater than or equal to the buffer size required for PFC-enabled ports and lossless queues on the switch.

You must reload the stack or a specified stack unit (use the reload command in EXEC Privilege mode) for the PFC buffer configuration to take effect.

Related Commands		
	dcb stack-unit all pfc-buffering pfc-port-count pfc-queues	Configure the PFC buffer for all switches in the stack.

dcbx port-role

Configure the DCBX port role used by the interface to exchange DCB information.

Syntax   dcbx port-role {config-source | auto-downstream | auto-upstream | manual}

To remove DCBX port role, use the no dcbx port-role {config-source | auto-downstream | auto-upstream | manual} command.

Parameters		
	config-source | auto-downstream | auto-upstream | manual	Enter the DCBX port role, where: • **config-source**: configures the port to serve as the configuration source on the switch. • **auto-upstream**: configures the port to receive a peer configuration. The configuration source is elected from auto-upstream ports. • **auto-downstream**: configures the port to accept the internally propagated DCB configuration from a configuration source. • **manual**: configures the port to operate only on administer-configured DCB parameters. The port does not accept a DCB configuration received form a peer or a local configuration source.

Defaults   Manual.

Command Modes   PROTOCOL LLDP

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	DCBX requires that you enable LLDP to advertise DCBX TLVs to peers.

Configure DCBX operation at the INTERFACE level on a switch. To verify the DCBX configuration on a port, use the show interface dcbx detail command.

dcbx version

Configure the DCBX version used on the interface.

Syntax
dcbx version {auto | cee | cin | ieee-v2.5}

To remove the DCBX version, use the no dcbx version {auto | cee | cin | ieee-v2.5} command.

Parameters

auto | cee | cin | ieee-v2.5	Enter the DCBX version type used on the interface, where: • auto: configures the port to operate using the DCBX version received from a peer. • cee: configures the port to use CDD (Intel 1.01). • cin: configures the port to use Cisco-Intel-Nuova (DCBX 1.0). • ieee-v2: configures the port to use IEEE 802.1az (Draft 2.5).

Defaults
Auto

Command Modes
PROTOCOL LLDP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information
DCBX requires that you enable LLDP to advertise DCBX TLVs to peers.

Configure DCBX operation at the INTERFACE level on a switch or globally on the switch.To verify the DCBX configuration on a port, use the show interface dcbx detail command.

debug dcbx

Enable DCBX debugging.

Syntax
debug dcbx {all | auto-detect-timer | config-exchng | fail | mgmt | resource | sem | tlv}

To disable DXBX debugging, use the no debug dcbx command.

Parameters

{all | auto-detect-timer | config-exchng | fail | mgmt | resource | sem | tlv}	Enter the type of debugging, where: • all: enables all DCBX debugging operations. • auto-detect-timer: enables traces for DCBX auto-detect timers. • config-exchng: enables traces for DCBX configuration exchanges. • fail: enables traces for DCBX failures. • mgmt: enables traces for DCBX management frames. • resource: enables traces for DCBX system resource frames. • sem: enables traces for the DCBX state machine. • tlv: enables traces for DCBX TLVs.

Defaults
none

Command Modes
EXEC PRIVILEGE

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

description

Enter a text description of the DCB policy (PFC input or ETS output).

Syntax description *text*

To remove the text description, use the no description command.

Parameters

text	Enter the description of the output policy.
	Maximum: 32 characters.

Defaults none

Command Modes DCB INPUT POLICY

DCB OUTPUT POLICY

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

dcb-input	Create a DCB PFC input policy.
dcb-policy input	Apply the output policy.
dcb-output	Create a DCBETS output policy.
dcb-policy output	Apply the output policy.

ets mode on

Enable the ETS configuration so that scheduling and bandwidth allocation configured in an ETS output policy or received in a DCBX TLV from a peer can take effect on an interface.

Syntax ets mode on

To remove the ETS configuration, use the ets mode on command.

Defaults ETS mode is on.

Command Modes DCB OUTPUT POLICY

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information If you disable ETS in an output policy applied to an interface using the no ets mode on command, any previously configured QoS settings at the interface or global level take effect. If QoS settings are configured at the interface or global level and in an output policy map (service-policy output command), the QoS configuration in the output policy takes precedence.

Related Commands	dcb-output	Create a DCB output policy.
	dcb-policy output	Apply the output policy.

fcoe priority-bits

Configure the FCoE priority advertised for the FCoE protocol in application priority TLVs.

Syntax

fcoe priority-bits *priority-bitmap*

To remove the configured FCoE priority, use the no fcoe priority-bits command.

Parameters

priority-bitmap	Enter the priority-bitmap range.
	The valid range is 1 to FF.

Defaults

0x8

Usage Information

This command is available at the global level only.

Command Modes

PROTOCOL LLDP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

iscsi priority-bits

Configure the iSCSI priority advertised for the iSCSI protocol in application priority TLVs.

Syntax

iscsi priority-bits *priority-bitmap*

To remove the configured iSCSI priority, use the no iscsi priority-bits command.

Parameters

priority-bitmap	Enter the priority bitmap.
	The valid range is 1 to FF.

Defaults

0x10

Usage Information

This command is available at the global level only.

Command Modes

PROTOCOL LLDP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

pfc link-delay

Configure the link delay used to pause specified priority traffic.

Syntax	pfc link-delay *value*

To remove the link delay, use the no pfc link-delay command.

Parameters		
	value	Valid values (in quanta) are 712-65535. One quantum is equal to a 512-bit transmission.

Defaults 45556 quantum

Command Modes DCB INPUT POLICY

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The minimum link delay should be greater than the round-trip transmission time required by a peer to honor a PFC pause frame multiplied by the number of PFC-enabled ingress ports.

Related Commands		
	dcb-input	Create a DCB input policy.

pfc mode on

Enable the PFC configuration on the port so that the priorities are included in DCBX negotiation with peer PFC devices.

Syntax	pfc mode on

To disable the PFC configuration, use the no pfc mode on command.

Defaults PFC mode is on.

Command Modes DCB INPUT POLICY

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information By applying a DCB input policy with PFC enabled, you enable PFC operation on ingress port traffic. To achieve complete lossless handling of traffic, you must also enable PFC on all DCB egress ports or configure the dot1p priority-queue assignment of PFC priorities to lossless queues (see pfc no-drop queues).

To disable PFC operation on an interface, enter the **no pfc mode on** command in DCB input policy configuration mode. PFC is enabled and disabled as global DCB operation is enabled (dcb-enable) or disabled (no dcb-enable).

PFC and link-level flow control cannot be enabled at the same time on an interface.

Related Commands		
	dcb-input	Create a DCB input policy.

pfc no-drop queues

Configure the port queues that will still function as no-drop queues for lossless traffic.

Syntax pfc no-drop queues *queue-range*

To remove the no-drop port queues, use the no pfc no-drop queues command.

Parameters

queue-range	Enter the queue range. Separate the queue values with a comma; specify a priority range with a dash; for example, pfc no-drop queues 1,3 or pfc no-drop queues 2-3.
	Valid values: 0 to 3.

Defaults No lossless queues are configured.

Command Modes INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The maximum number of lossless queues globally supported on the switch is two.

Table 9-1 lists the dot1p priority-queue assignments.

Table 9-1. dot1p Priority-Queue Assignments

dot1p Value in the Incoming Frame	Egress Queue Assignment
0	0
1	0
2	0
3	1
4	2
5	3
6	3
7	3

pfc priority

Configure the CoS traffic to be stopped for the specified delay.

Syntax pfc priority *priority-range*

To delete the pfc priority configuration, use the no pfc priority command.

Parameters

priority-range	Enter the 802.1p values of the frames to be paused. Separate the priority values with a comma; specify a priority range with a dash; for example, pfc priority 1,3,5-7.
	Valued values: 0 to 7.

| **Defaults** | none |

| **Command Modes** | DCB INPUT POLICY |

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

you can enable any number of 802.1p priorities for PFC. Queues to which PFC priority traffic is mapped are lossless by default. Traffic may be interrupted due to an interface flap (going down and coming up) when you reconfigure the lossless queues for no-drop priorities in a PFC input policy and re-apply the policy to an interface.

The maximum number of lossless queues supported on the switch is two.

The configured priority traffic must be supported by a PFC peer (as detected by DCBX) for PFC to be applied.

Related Commands		
	dcb-input	Create a DCB input policy.

priority-group

Create an ETS priority group to use with an ETS output policy.

Syntax

priority-group *group-name*

To remove the priority group, use the no priority-group command.

Parameters		
	group-name	Enter the name of the ETS priority group. Maximum: 32 characters.

| **Defaults** | none |

| **Command Modes** | CONFIGURATION |

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

A priority group consists of 802.1p priority values that are grouped together for similar bandwidth allocation and scheduling, and that share the same latency and loss requirements. All 802.1p priorities mapped to the same queue should be in the same priority group.

All 802.1p priorities should be configured in priority groups associated with an ETS output policy. You can assign each dot1p priority to only one priority group.

The maximum number of priority groups supported in ETS output policies on an interface is equal to the number of data queues (4) on the port. The 802.1p priorities in a priority group can map to multiple queues.

If you configure more than one priority queue as strict priority or more than one priority group as strict priority, the higher numbered priority queue is given preference when scheduling data traffic

Related Commands	priority-list	Configure the 802.1p priorities for an ETS output policy.
	set-pgid	Configure the priority-group.

priority-group qos-policy

Associate the 802.1p priority traffic in a priority group with the ETS configuration in a QoS output policy.

Syntax priority-group *group-name* qos-policy *ets-policy-name*

To remove the 802.1p priority group, use the no priority-group qos-policy command.

Parameters

group-name	Enter the group name of the 802.1p priority group.
	Maximum: 32 characters.
ets-policy-name	Enter the ETS policy name.

Defaults none

Command Modes DCB OUTPUT POLICY

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The ETS configuration associated with 802.1p priority traffic in a DCB output policy is used in DCBX negotiation with ETS peers.

If you disable ETS in an output policy applied to an interface using the no ets mode on command, any previously configured QoS settings at the interface or global level take effect. If QoS settings are configured at the interface or global level and in an output policy map (service-policy output command), the QoS configuration in the output policy takes precedence.

Related Commands

dcb-output	Create a DCB output policy.
dcb-policy output	Apply the output policy.

priority-list

Configure the 802.1p priorities for the traffic on which you want to apply an ETS output policy.

Syntax priority-list *value*

To remove the priority list, use the no priority-list command.

Parameters

value	Enter the priority list value. Separate priority values with a comma; specify a priority range with a dash; for example, priority-list 3,5-7.
	The value range is 0 to 7.

Defaults none

| **Command Modes** | PRIORITY-GROUP |

| **Command History** | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information

By default:

- All 802.1p priorities are grouped in priority group 0.
- 100% of the port bandwidth is assigned to priority group 0. The complete bandwidth is equally assigned to each priority class so that each class has 12-13%.

Related Commands

| priority-group qos-policy | Create an ETS priority group. |
| set-pgid | Configure the priority-group. |

qos-policy-output ets

Create a QoS output policy to configure the ETS bandwidth allocation and scheduling for priority traffic.

Syntax   qos-policy-output *policy-name* ets

To remove the QoS output policy, use the no qos-policy-output ets command.

Parameters

| *policy-name* | Enter the policy name. Maximum: 32 characters. |

| **Command Modes** | CONFIGURATION |

| **Command History** | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information

If an error occurs in an ETS output-policy configuration, the configuration is ignored and the scheduler and bandwidth allocation settings are reset to the ETS default values (all priorities are in the same ETS priority group and bandwidth is allocated equally to each priority).

If an error occurs when a port receives a peer's ETS configuration, the port's configuration is reset to the previously configured ETS output policy. If no ETS output policy was previously applied, the port is reset to the default ETS parameters.

Related Commands

| scheduler | Schedule priority traffic in port queues. |
| bandwidth-percentage | Bandwidth percentage allocated to priority traffic in port queues. |

scheduler

Configure the method used to schedule priority traffic in port queues.

Syntax   scheduler *value*

To remove the configured priority schedule, use the no scheduler command.

Parameters	value	Enter schedule priority value.
		The valid values are:
		• strict: strict priority traffic is serviced before any other queued traffic.
		• werr: weighted elastic round robin (werr) provides low-latency scheduling for priority traffic on port queues.

Defaults WERR scheduling is used to queue priority traffic.

Command Modes POLICY-MAP-OUT-ETS

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information dot1p priority traffic on the switch is scheduled to the current queue mapping. dot1p priorities within the same queue should have the same traffic properties and scheduling method.

ETS-assigned scheduling applies only to data queues, not to control queues.

The configuration of bandwidth allocation and strict-queue scheduling is not supported at the same time for a priority group. If both are configured, the configured bandwidth allocation will be ignored for priority-group traffic when you apply the output policy on an interface.

Related Commands

qos-policy-output ets	Configure the ETS bandwidth allocation.
bandwidth-percentage	Bandwidth percentage allocated to priority traffic in port queues.

set-pgid

Configure the priority-group identifier.

Syntax set-pgid value

To remove the priority group, use the no set-pgid command.

Parameters

value	Enter the priority group identification.
	The valid values are 0 to 7.

Defaults none

Command Modes PRIORITY-GROUP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

priority-group qos-policy	Create an ETS priority group.
priority-list	Configure the 802.1p priorities.

show dcb

Displays the data center bridging status, the number of PFC-enabled ports, and the number of PFC-enabled queues.

| Syntax | show dcb [stack-unit *unit-number*] |

Parameters

| *unit number* | Enter the DCB unit number. |
| | The valid values are 0 to 5. |

Command Mode   EXEC PRIVILEGE

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Example   **Figure 9-1.   show dcb Command Example**

```
FTOS# show dcb
stack-unit 0 port-set 0
      DCB Status : Enabled
   PFC Port Count : 56 (current), 56 (configured)
 PFC Queue Count : 2 (current), 2 (configured)
```

Usage Information   Specify a stack-unit number on the Master switch in a stack.

show interface dcbx detail

Displays the DCBX configuration on an interface.

| Syntax | show interface *port-type slot/port* dcbx detail |

Parameters

| *port-type* | Enter the port type. |
| *slot/port* | Enter the slot/port number. |

Command Mode   CONFIGURATION

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Figure 9-2.   show interface dcbx detail Command Example

```
FTOS(conf)# show interface tengigabitethernet 0/49 dcbx detail
FTOS#show interface te 0/49 dcbx detail

E-ETS Configuration TLV enabled              e-ETS Configuration TLV disabled
R-ETS Recommendation TLV enabled             r-ETS Recommendation TLV disabled
P-PFC Configuration TLV enabled              p-PFC Configuration TLV disabled
F-Application priority for FCOE enabled      f-Application Priority for FCOE
disabled
I-Application priority for iSCSI enabled     i-Application Priority for iSCSI
disabled
--------------------------------------------------------------------------------
-----------

Interface TenGigabitEthernet 0/49
   Remote Mac Address 00:00:00:00:00:11
    Port Role is Auto-Upstream
   DCBX Operational Status is Enabled
   Is Configuration Source? TRUE

Local DCBX Compatibility mode is CEE
   Local DCBX Configured mode is CEE
   Peer Operating version is CEE
   Local DCBX TLVs Transmitted: ErPfi

Local DCBX Status
-----------------
     DCBX Operational Version is 0
     DCBX Max Version Supported is 0
     Sequence Number: 2
     Acknowledgment Number: 2
     Protocol State: In-Sync

Peer DCBX Status:
----------------
     DCBX Operational Version is 0
     DCBX Max Version Supported is 255
     Sequence Number: 2
     Acknowledgment Number: 2
     Total DCBX Frames transmitted 27
     Total DCBX Frames received 6
     Total DCBX Frame errors 0
     Total DCBX Frames unrecognized 0
```

Table 9-2 lists the show interface dcbx detail field descriptions.

Table 9-2.   show interface dcbx detail Command Example Fields

Field	Description
Interface	Interface type with chassis slot and port number.
Port-Role	Configured the DCBX port role: auto-upstream, auto-downstream, config-source, or manual.
DCBX Operational Status	Operational status (enabled or disabled) used to elect a configuration source and internally propagate a DCB configuration. The DCBX operational status is the combination of PFC and ETS operational status.
Configuration Source	Specifies whether the port serves as the DCBX configuration source on the switch: true (yes) or false (no).
Local DCBX Compatibility mode	DCBX version accepted in a DCB configuration as compatible. In auto-upstream mode, a port can only received a DCBX version supported on the remote peer.

Table 9-2.   show interface dcbx detail Command Example Fields (continued)

Field	Description
Local DCBX Configured mode	DCBX version configured on the port: CEE, CIN, IEEE v2.5, or Auto (port auto-configures to use the DCBX version received from a peer).
Peer Operating version	DCBX version that the peer uses to exchange DCB parameters.
Local DCBX TLVs Transmitted	Transmission status (enabled or disabled) of advertised DCB TLVs (see TLV code at the top of the show command output).
Local DCBX Status: DCBX Operational Version	DCBX version advertised in Control TLVs.
Local DCBX Status: DCBX Max Version Supported	Highest DCBX version supported in Control TLVs.
Local DCBX Status: Sequence Number	Sequence number transmitted in Control TLVs.
Local DCBX Status: Acknowledgment Number	Acknowledgement number transmitted in Control TLVs.
Local DCBX Status: Protocol State	Current operational state of the DCBX protocol: ACK or IN-SYNC.
Peer DCBX Status: DCBX Operational Version	DCBX version advertised in Control TLVs received from the peer device.
Peer DCBX Status: DCBX Max Version Supported	Highest DCBX version supported in Control TLVs received from the peer device.
Peer DCBX Status: Sequence Number	Sequence number transmitted in Control TLVs received from the peer device.
Peer DCBX Status: Acknowledgment Number	Acknowledgement number transmitted in Control TLVs received from the peer device.
Total DCBX Frames transmitted	Number of DCBX frames sent from the local port.
Total DCBX Frames received	Number of DCBX frames received from the remote peer port.
Total DCBX Frame errors	Number of DCBX frames with errors received.
Total DCBX Frames unrecognized	Number of unrecognizable DCBX frames received.

Usage Information   To clear DCBX frame counters, use the clear dcbx counters interface *stack-unit/port* command.

show interface ets

Displays the ETS configuration applied to egress traffic on an interface, including priority groups with priorities and bandwidth allocation.

Syntax   show interface *port-type slot/port* ets {summary | detail}

Parameters

port-type slot/port ets	Enter the port-type slot and port ETS information.
{summary | detail}	Enter the keyword summary for a summary list of results or enter the keyword detail for a full list of results.

Command Mode   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 9-3.   show interfaces ets summary Command Example**

```
FTOS(conf)# show interfaces  te 0/0 ets  summary
Interface TenGigabitEthernet 0/0
Max Supported TC Groups is 4
Number of Traffic Classes is 8
Admin mode is on
Admin Parameters:
------------------
Admin is enabled
TC-grp   Priority#        Bandwidth        TSA
0        0,1,2,3,4,5,6,7  100%             ETS
1                         0%               ETS
2                         0%               ETS
3                         0%               ETS
4                         0%               ETS
5                         0%               ETS
6                         0%               ETS
7                         0%               ETS
Priority#                Bandwidth        TSA
0                        13%              ETS
1                        13%              ETS
2                        13%              ETS
3                        13%              ETS
4                        12%              ETS
5                        12%              ETS
6                        12%              ETS
7                        12%              ETS
Remote Parameters:
------------------
Remote is disabled
Local Parameters:
------------------
Local is enabled
TC-grp   Priority#        Bandwidth        TSA
0        0,1,2,3,4,5,6,7  100%             ETS
1                         0%               ETS
2                         0%               ETS
3                         0%               ETS
4                         0%               ETS
5                         0%               ETS
6                         0%               ETS
7                         0%               ETS

Priority#                Bandwidth        TSA
0                        13%              ETS
1                        13%              ETS
2                        13%              ETS
3                        13%              ETS
4                        12%              ETS
5                        12%              ETS
6                        12%              ETS
7                        12%              ETS
Oper status is init
Conf TLV Tx Status is disabled
Traffic Class TLV Tx Status is disabled
```

Example   **show interfaces ets detail Command Example**

```
FTOS(conf)# show  interfaces  tengigabitethernet 0/0 ets  detail
Interface TenGigabitEthernet 0/0
Max Supported TC Groups is 4
Number of Traffic Classes is 8
Admin mode is on
Admin Parameters :
------------------
Admin is enabled
TC-grp   Priority#         Bandwidth     TSA
0        0,1,2,3,4,5,6,7   100%          ETS
1                          0%            ETS
2                          0%            ETS
3                          0%            ETS
4                          0%            ETS
5                          0%            ETS
6                          0%            ETS
7                          0%            ETS


Priority#                  Bandwidth     TSA
0                          13%           ETS
1                          13%           ETS
2                          13%           ETS
3                          13%           ETS
4                          12%           ETS
5                          12%           ETS
6                          12%           ETS
7                          12%           ETS
Remote Parameters:
------------------
Remote is disabled

Local Parameters :
------------------
Local is enabled
TC-grp   Priority#         Bandwidth     TSA
0        0,1,2,3,4,5,6,7   100%          ETS
1                          0%            ETS
2                          0%            ETS
3                          0%            ETS
4                          0%            ETS
5                          0%            ETS
6                          0%            ETS
7                          0%            ETS


Priority#                  Bandwidth     TSA
0                          13%           ETS
1                          13%           ETS
2                          13%           ETS
3                          13%           ETS
4                          12%           ETS
5                          12%           ETS
6                          12%           ETS
7                          12%           ETS
Oper status is init
Conf TLV Tx Status is disabled
Traffic Class TLV Tx Status is disabled
0 Input Conf TLV Pkts, 0 Output Conf TLV Pkts, 0 Error Conf TLV Pkts
0 Input Traffic Class TLV Pkts, 0 Output Traffic Class TLV Pkts, 0 Error Traffic
Class TLV
Pkts
```

Table 9-3 lists the show interface ets detail field descriptions.

Table 9-3.   show interfaces ets detail Command Example Fields

Field	Description
Interface	Interface type with stack-unit and port number.
Max Supported TC Group	Maximum number of priority groups supported.
Number of Traffic Classes	Number of 802.1p priorities currently configured.
Admin mode	ETS mode: on or off. When on, the scheduling and bandwidth allocation configured in an ETS output policy or received in a DCBX TLV from a peer can take effect on an interface.
Admin Parameters	ETS configuration on local port, including priority groups, assigned dot1p priorities, and bandwidth allocation.
Remote Parameters	ETS configuration on remote peer port, including admin mode (enabled if a valid TLV was received or disabled), priority groups, assigned dot1p priorities, and bandwidth allocation. If ETS admin mode is enabled on the remote port for DCBX exchange, the Willing bit received in ETS TLVs from the remote peer is included.
Local Parameters	ETS configuration on local port, including admin mode (enabled when a valid TLV is received from a peer), priority groups, assigned dot1p priorities, and bandwidth allocation.
Operational status (local port)	Port state for current operational ETS configuration: • Init: Local ETS configuration parameters were exchanged with the peer. • Recommend: Remote ETS configuration parameters were received from the peer. • Internally propagated: ETS configuration parameters were received from the configuration source.
ETS DCBX Oper status	Operational status of the ETS configuration on the local port: match or mismatch.
State Machine Type	Type of state machine used for DCBX exchanges of ETS parameters: Feature - for legacy DCBX versions; Asymmetric - for an IEEE version.
Conf TLV Tx Status	Status of ETS Configuration TLV advertisements: enabled or disabled.
ETS TLV Statistic: Input Conf TLV pkts	Number of ETS Configuration TLVs received.
ETS TLV Statistic: Output Conf TLV pkts	Number of ETS Configuration TLVs transmitted.
ETS TLV Statistic: Error Conf TLV pkts	Number of ETS Error Configuration TLVs received.

Usage Information   To clear ETS TLV counters, use the clear ets counters interface *port-type slot/port* command.

show interface pfc

Displays the PFC configuration applied to ingress traffic on an interface, including priorities and link delay.

Syntax   show interface *port-type slot/port pfc* {summary | detail}

Parameters

port-type slot/port pfc	Enter the port-type slot and port PFC information.
{summary | detail}	Enter the keyword summary for a summary list of results or enter the keyword detail for a full list of results.

Command Mode   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 9-4.   show interface pfc Command Example**

```
FTOS# show interfaces tengigabitethernet 0/49 pfc summary
Interface TenGigabitEthernet 0/49
  Admin mode is on
  Admin is enabled
  Remote is enabled, Priority list is 4
  Remote Willing Status is enabled
  Local is enabled
  Oper status is Recommended
  PFC DCBX Oper status is Up
  State Machine Type is Feature
  TLV Tx Status is enabled
  PFC Link Delay 45556 pause quantams
  Application Priority TLV Parameters :
  ------------------------------------
  FCOE TLV Tx Status is disabled
  ISCSI TLV Tx Status is disabled
  Local FCOE PriorityMap is 0x8
  Local ISCSI PriorityMap is 0x10
  Remote FCOE PriorityMap is 0x8
  Remote ISCSI PriorityMap is 0x8

FTOS# show interfaces tengigabitethernet 0/49 pfc detail
  Interface TenGigabitEthernet 0/49
  Admin mode is on
  Admin is enabled
  Remote is enabled
  Remote Willing Status is enabled
  Local is enabled
  Oper status is recommended
  PFC DCBX Oper status is Up
  State Machine Type is Feature
  TLV Tx Status is enabled
  PFC Link Delay 45556 pause quanta
  Application Priority TLV Parameters :
  ------------------------------------
  FCOE TLV Tx Status is disabled
  ISCSI TLV Tx Status is disabled
  Local FCOE PriorityMap is 0x8
  Local ISCSI PriorityMap is 0x10
  Remote FCOE PriorityMap is 0x8
  Remote ISCSI PriorityMap is 0x8
  0 Input TLV pkts, 1 Output TLV pkts, 0 Error pkts, 0 Pause Tx pkts, 0 Pause Rx
pkts
```

Usage Information   To clear the PFC TLV counters, use the clear pfc counters interface *port-type slot/port* command.

Table 9-4 lists the show interface pfc summary field descriptions.

Table 9-4.   show interfaces pfc summary Command Example Fields

Field	Description
Interface	Interface type with stack-unit and port number.
Admin mode is on Admin is enabled	PFC admin mode is on or off with a list of the configured PFC priorities. When the PFC admin mode is on, PFC advertisements are enabled to be sent and received from peers; received PFC configuration will take effect. The admin operational status for a DCBX exchange of PFC configuration is enabled or disabled.

Table 9-4. show interfaces pfc summary Command Example Fields (continued)

Field	Description
Remote is enabled, Priority list Remote Willing Status is enabled	Operational status (enabled or disabled) of peer device for DCBX exchange of PFC configuration with a list of the configured PFC priorities. Willing status of peer device for DCBX exchange (Willing bit received in PFC TLV): enabled or disabled.
Local is enabled	DCBX operational status (enabled or disabled) with a list of the configured PFC priorities.
Operational status (local port)	Port state for current operational PFC configuration: • Init: Local PFC configuration parameters were exchanged with the peer. • Recommend: Remote PFC configuration parameters were received from the peer. • Internally propagated: PFC configuration parameters were received from the configuration source.
PFC DCBX Oper status	Operational status for the exchange of the PFC configuration on the local port: match (up) or mismatch (down).
State Machine Type	Type of state machine used for DCBX exchanges of the PFC parameters: Feature - for legacy DCBX versions; Symmetric - for an IEEE version.
TLV Tx Status	Status of the PFC TLV advertisements: enabled or disabled.
PFC Link Delay	Link delay (in quanta) used to pause specified priority traffic.
Application Priority TLV: FCOE TLV Tx Status	Status of FCoE advertisements in application priority TLVs from the local DCBX port: enabled or disabled.
Application Priority TLV: SCSI TLV Tx Status	Status of ISCSI advertisements in application priority TLVs from the local DCBX port: enabled or disabled.
Application Priority TLV: Local FCOE Priority Map	Priority bitmap used by the local DCBX port in FCoE advertisements in application priority TLVs.
Application Priority TLV: Local ISCSI Priority Map	Priority bitmap used by the local DCBX port in ISCSI advertisements in application priority TLVs.
Application Priority TLV: Remote FCOE Priority Map	Status of FCoE advertisements in application priority TLVs from the remote peer port: enabled or disabled.
Application Priority TLV: Remote ISCSI Priority Map	Status of iSCSI advertisements in application priority TLVs from the remote peer port: enabled or disabled.
PFC TLV Statistics: Input TLV pkts	Number of PFC TLVs received.
PFC TLV Statistics: Output TLV pkts	Number of PFC TLVs transmitted.
PFC TLV Statistics: Error pkts	Number of PFC error packets received.
PFC TLV Statistics: Pause Tx pkts	Number of PFC pause frames transmitted.
PFC TLV Statistics: Pause Rx pkts	Number of PFC pause frames received.

show interface pfc statistics

Displays counters for the PFC frames received and transmitted (by dot1p priority class) on an interface.

Syntax   show interface *port-type slot/port* pfc statistics

Parameters

port-type	Enter the port type.
slot/port	Enter the slot/port number.

Command Mode   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 9-5.   show interfaces pfc statistics Command Example**

```
FTOS#show interface tengigabitethernet 0/3 pfc statistics
Interface TenGigabitEthernet 0/3

Priority        Rx XOFF Frames        Rx Total Frames        Tx Total Frames
-------------------------------------------------------------------------------
0               0                     0                      0
1               0                     0                      0
2               0                     0                      0
3               0                     0                      0
4               0                     0                      0
5               0                     0                      0
6               0                     0                      0
7               0                     0                      0
```

show qos dcb-input

Displays the PFC configuration in a DCB input policy.

Syntax   show qos dcb-input [pfc-profile]

Parameters

[pfc-profile]	Enter the PFC profile.

Command Mode   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 9-6.   show qos dcb-input Command Example**

```
FTOS(conf)# show qos dcb-input
dcb-input pfc-profile
  pfc link-delay 32
  pfc priority 0-1
dcb-input pfc-profile1
  no pfc mode on
  pfc priority 6-7
```

show qos dcb-output

Displays the ETS configuration in a DCB output policy.

Syntax show qos dcb-output [ets-profile]

Parameters

[ets-profile]	Enter the ETS profile.

Command Mode EXEC PRIVILEGE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 9-7.   show qos dcb-output Command Example**

```
FTOS# show qos dcb-output
dcb-output ets
  priority-group san qos-policy san
  priority-group ipc qos-policy ipc
  priority-group lan qos-policy lan
```

show qos priority-groups

Displays the ETS priority groups configured on the switch, including the 802.1p priority classes and ID of each group.

Syntax show qos priority-groups

Command Mode EXEC PRIVILEGE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 9-8.   show qos priority-groups Command Example**

```
Force10#Force10#show qos priority-groups
priority-group ipc
  priority-list 4
  set-pgid 2
```

show stack-unit stack-ports ets detail

Displays the ETS configuration applied to egress traffic on stacked ports, including ETS operational mode on each unit and the configured priority groups with dot1p priorities, bandwidth allocation, and scheduler type.

Syntax show stack-unit {all | *stack-unit*} stack-ports {all | *port-number*} ets detail

Parameters

stack-unit	Enter the stack unit identification.
port-number	Enter the port number.

Command Mode　CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example　**Figure 9-9.　show stack-unit stack-ports ets detail Command Example**

```
FTOS(conf)# show stack-unit all  stack-ports all ets details

Stack unit 0 stack port all
Max Supported TC Groups is 4
Number of Traffic Classes is 1
Admin mode is on

Admin Parameters:
--------------------
Admin is enabled
TC-grp     Priority#          Bandwidth       TSA
-----------------------------------------------
0          0,1,2,3,4,5,6,7    100%            ETS
1                             -               -
2                             -               -
3                             -               -
4                             -               -
5                             -               -
6                             -               -
7                             -               -
8                             -               -


Stack unit 1 stack port all
Max Supported TC Groups is 4
Number of Traffic Classes is 1
Admin mode is on
Admin Parameters:
--------------------
Admin is enabled
TC-grp     Priority#          Bandwidth       TSA
-----------------------------------------------
0          0,1,2,3,4,5,6,7    100%            ETS
1                             -               -
2                             -               -
3                             -               -
4                             -               -
5                             -               -
6                             -               -
7                             -               -
8                             -               -
```

show stack-unit stack-ports pfc detail

Displays the PFC configuration applied to ingress traffic on stacked ports, including PFC operational mode on each unit with the configured priorities, link delay, and number of pause packets sent and received.

Syntax show stack-unit {all | *stack-unit*} stack-ports {all | *port-number*} pfc detail

Parameters

stack-unit	Enter the stack unit.
port-number	Enter the port number.

Command Mode CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 9-10.   show stack-unit all stack-ports all pfc details Command Example**

```
FTOS(conf)# show stack-unit all  stack-ports all pfc details

 stack unit 0 stack-port all
     Admin mode is On
     Admin is enabled, Priority list is 4-5
     Local is enabled, Priority list is 4-5
     Link Delay 45556 pause quantum
     0 Pause Tx pkts, 0 Pause Rx pkts

 stack unit 1 stack-port all
     Admin mode is On
     Admin is enabled, Priority list is 4-5
     Local is enabled, Priority list is 4-5
     Link Delay 45556 pause quantum
     0 Pause Tx pkts, 0 Pause Rx pkts
```

Dynamic Host Configuration Protocol (DHCP)

Overview

Dynamic host configuration protocol (DHCP) is an application layer protocol that dynamically assigns IP addresses and other configuration parameters to network end-stations (hosts) based on configuration policies determined by network administrators.

An MXL Switch can operate as a DHCP server or DHCP client. As a DHCP client, the switch requests an IP address from a DHCP server.

The following types of DHCP commands are described in this chapter:

- Commands to Configure the System to be a DHCP Server
- Commands to Configure the System to be a DHCP Client
- Other Commands supported by DHCP Client
- Commands to Configure Secure DHCP

Commands to Configure the System to be a DHCP Server

- clear ip dhcp
- debug ip dhcp server
- default-router
- disable
- dns-server
- domain-name
- excluded-address
- hardware-address
- host
- disable
- lease
- netbios-name-server
- netbios-node-type
- network
- show ip dhcp binding
- show ip dhcp configuration
- show ip dhcp conflict
- show ip dhcp server

clear ip dhcp

Reset DHCP counters.

Syntax	clear ip dhcp [binding {*address*}	conflict	server statistics]

Parameters

binding	Enter this keyword to delete all entries in the binding table.
address	Enter the IP address to clear the binding entry for a single IP address.
conflict	Enter this keyword to delete all of the log entries created for IP address conflicts.
server statistics	Enter this keyword to clear all the server counter information.

Command Mode EXEC Privilege

Default none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Entering <CR> after clear ip dhcp binding, clears all the IPs from the binding table.

debug ip dhcp server

Display FTOS debugging messages for DHCP.

Syntax	debug ip dhcp server [events	packets]

Parameters

events	Enter this keyword to display DHCP state changes.
packet	Enter this keyword to display packet transmission/reception.

Command Mode EXEC Privilege

Default none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

default-router

Assign a default gateway to clients based on address pool.

Syntax	default-router *address* [*address2...address8*]

Parameters

address	Enter the a list of routers that may be the default gateway for clients on the subnet. You may specify up to 8. List them in order of preference.

Command Mode DHCP <POOL>

Default	none

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

disable

Disable the DHCP server.

DHCP Server is disabled by default. Enable the system to be a DHCP server using the **no** form of the **disable** command.

Syntax	disable

Command Mode	DHCP

Default	Disabled

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

dns-server

Assign a DNS server to clients based on address pool.

Syntax	dns-server *address* [*address2...address8*]

Parameters	*address*	Enter the a list of DNS servers that may service clients on the subnet. You may list up to 8 servers, in order of preference.

Command Mode	DHCP <POOL>

Default	none

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

domain-name

Assign a domain to clients based on address pool.

Syntax	domain-name *name*

Parameters	*name*	Give a name to the group of addresses in a pool.

Command Mode	DHCP <POOL>

Default	none

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

excluded-address

Prevent the server from leasing an address or range of addresses in the pool.

Syntax   excluded-address [*address* | *low-address high-address*]

Parameters

address	Enter a single address to be excluded from the pool.
low-address	Enter the lowest address in a range of addresses to be excluded from the pool.
high-address	Enter the highest address in a range of addresses to be excluded from the pool.

Command Mode   DHCP

Default   none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

hardware-address

For manual configurations, specify the client hardware address.

Syntax   hardware-address *address*

Parameters

address	Enter the hardware address of the client.

Command Mode   DHCP <POOL>

Default   none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

host

For manual (rather than automatic) configurations, assign a host to a single-address pool.

Syntax   host *address*

Parameters

address/mask	Enter the host IP address and subnet mask.

Command Mode   DHCP <POOL>

Default   none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

lease

Specify a lease time for the addresses in a pool.

Syntax   lease { *days* [*hours*] [*minutes*] | infinite }

Parameters

days	Enter the number of days of the lease. Range: 0-31
hours	Enter the number of hours of the lease. Range: 0-23
minutes	Enter the number of minutes of the lease. Range: 0-59
infinite	Specify that the lease never expires.

Command Mode   DHCP <POOL>

Default   24 hours

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

netbios-name-server

Specify the NetBIOS windows internet naming service (WINS) name servers, in order of preference, that are available to Microsoft dynamic host configuration protocol (DHCP) clients.

Syntax   netbios-name-server *address* [*address2...address8*]

Parameters

address	Enter the address of the NETBIOS name server. You may enter up to 8, in order of preference.

Command Mode   DHCP <POOL>

Default   none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

netbios-node-type

Specify the NetBIOS node type for a Microsoft DHCP client. Dell Force10 recommends specifying clients as hybrid.

Syntax   netbios-node-type *type*

Parameters	*type*	Enter the NETBIOS node type.
		Broadcast: Enter the keyword b-node.
		Hybrid: Enter the keyword h-node.
		Mixed: Enter the keyword m-node.
		Peer-to-peer: Enter the keyword p-node.

Command Mode   DHCP <POOL>

Default   Hybrid

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

network

Specify the range of addresses in an address pool.

Syntax   network *network* / *prefix-length*

Parameters	*network/* *prefix-length*	Specify a range of addresses. Prefix-length Range: 17-31

Command Mode   DHCP <POOL>

Default   none

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show ip dhcp binding

Display the DHCP binding table.

Syntax   show ip dhcp binding

Command Mode   EXEC Privilege

Default   none

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show ip dhcp configuration

Display the DHCP configuration.

Syntax   show ip dhcp configuration [global | pool *name*]

pool *name*	Display the configuration for a DHCP pool.
global	Display the DHCP configuration for the entire system.

Command Mode   EXEC Privilege

Default   none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show ip dhcp conflict

Display the address conflict log.

Syntax   show ip dhcp conflict *address*

Parameters

address	Display a particular conflict log entry.

Command Mode   EXEC Privilege

Default   none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show ip dhcp server

Display the DHCP server statistics.

Syntax   show ip dhcp server statistics

Command Mode   EXEC Privilege

Default   none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Commands to Configure the System to be a DHCP Client

-

ip address dhcp

Configure an Ethernet interface to acquire its IP address from a DHCP network server.

Syntax ip address dhcp

Command Mode INTERFACE

Default The Ethernet is not configured to operate as a DHCP client and receive a dynamic IP address.

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The **ip address dhcp** command enables an Ethernet interface to acquire a DHCP server-assigned dynamic IP address. This setting persists after a switch reboot. If you enter the **shutdown** command on the interface, DHCP transactions are stopped and the dynamically-acquired IP address is saved. Use the **show interface** *type slot/port* command to display the dynamic IP address and DHCP as the mode of IP address assignment. If you later enter the **no shutdown** command and the lease timer for the dynamic IP address has expired, the IP address is unconfigured and the interface tries to acquire a new dynamic address from DHCP server.

You cannot configure a secondary (backup) IP address on an interface using the **ip address dhcp** command; you must use the **ip address** command at the interface configuration level.

To release a DHCP-assigned IP address and remove the interface from being a DHCP client, enter the **no ip address dhcp** command. When you enter the no ip address dhcp command:
- The IP address dynamically acquired from a DHCP server is released from the interface.
- The DHCP client is disabled on the interface; it can no longer acquire a dynamic IP address from a DHCP server.
- DHCP packet transactions on the interface are stopped.

To display the currently configure dynamic IP address and lease time, enter the **show ip dhcp lease** command.

Other Commands supported by DHCP Client

- clear ip dhcp client statistics
- debug ip dhcp clients events
- debug ip dhcp clients packets
- release dhcp interface
- renew dhcp interface
- show ip dhcp client statistics
- show ip dhcp lease

clear ip dhcp client statistics

Display DHCP client statistics, including the number of DHCP messages sent and received on an interface.

Syntax	clear ip dhcp client statistics {all	interface *type slot*/*port*}

Parameters

all	Clear DHCP client statistics on all DHCP client-enabled interfaces on the switch.
interface *type slot/ port*	Clear DHCP client statistics on the specified interface. For a 10-GigabitEthernet Ethernet interface, enter **TenGigabitEthernet** followed by the *slot*/*port* numbers; for example, **tengigabitethernet 1/3**. For a 40-GigabitEthernet Ethernet interface, enter **FortyGigabitEthernet** followed by the *slot*/*port* numbers; for example, **fortygigabitethernet 0/2**.

Command Mode   EXEC Privilege

Default   None.

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

debug ip dhcp clients events

Enable the display of log messages for the following events on DHCP client interfaces:

- IP address acquisition
- IP address release
- Renewal of IP address and lease time
- Release of an IP address

Syntax	debug ip dhcp client events [interface *type slot*/*port*]

Parameters

interface *type slot/ port*	Display log messages for DHCP events on the specified interface. For a 10-GigabitEthernet Ethernet interface, enter **TenGigabitEthernet** followed by the *slot*/*port* numbers; for example, **tengigabitethernet 1/3**. For a 40-GigabitEthernet Ethernet interface, enter **FortyGigabitEthernet** followed by the *slot*/*port* numbers; for example, **fortygigabitethernet 0/2**.

Command Mode	EXEC Privilege

Default	None

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

debug ip dhcp clients packets

Enable the display of log messages for all DHCP packets sent and received on DHCP client interfaces.

Syntax	debug ip dhcp client packets [interface *type slot*/*port*]

Parameters	interface *type slot/ port*	Display log messages for DHCP packets sent and received on the specified interface.
		For a 10-GigabitEthernet Ethernet interface, enter **TenGigabitEthernet** followed by the *slot*/*port* numbers; for example, **tengigabitethernet 1/3**.
		For a 40-GigabitEthernet Ethernet interface, enter **FortyGigabitEthernet** followed by the *slot*/*port* numbers; for example, **fortygigabitethernet 0/2**.

Command Mode	EXEC Privilege

Default	None

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

release dhcp interface

Release the dynamically-acquired IP address on an Ethernet interface while retaining the DHCP client configuration on the interface.

Syntax	release dhcp interface *type slot*/*port*

Parameters	interface *type slot/ port*	For a 10-GigabitEthernet Ethernet interface, enter **TenGigabitEthernet** followed by the *slot*/*port* numbers; for example, **tengigabitethernet 1/3**.
		For a 40-GigabitEthernet Ethernet interface, enter **FortyGigabitEthernet** followed by the *slot*/*port* numbers; for example, **fortygigabitethernet 0/2**.

Command Mode	EXEC Privilege

Default	None.

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	When you enter the **release dhcp** command, although the IP address that was dynamically-acquired from a DHCP server is released from an interface, the ability to acquire a new DHCP server-assigned address remains in the running configuration for the interface. To acquire a new IP address, enter either the **renew dhcp** command at the EXEC privilege level or the **ip address dhcp** command at the interface configuration level.

renew dhcp interface

Re-acquire a dynamic IP address on an Ethernet interface enabled as a DHCP client.

Syntax	renew dhcp interface *type slot*/*port*

Parameters		
	interface *type slot/ port*	For a 10-GigabitEthernet Ethernet interface, enter **TenGigabitEthernet** followed by the *slot*/*port* numbers; for example, **tengigabitethernet 1/3**.
		For a 40-GigabitEthernet Ethernet interface, enter **FortyGigabitEthernet** followed by the *slot*/*port* numbers; for example, **fortygigabitethernet 0/2**.

Command Mode	EXEC Privilege

Default	None.

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

When you enter the **renew dhcp** command, a new dynamic IP address is acquired on the specified Ethernet interface for the renewed lease time.

To display the currently configure dynamic IP address and lease time, enter the **show ip dhcp lease** command.

show ip dhcp client statistics

Display DHCP client statistics, including the number of DHCP messages sent and received on an interface.

Syntax	show ip dhcp client statistics {all	interface *type slot*/*port*}

Parameters		
	all	Display DHCP client statistics on all DHCP client-enabled interfaces on the switch.
	interface *type slot/ port*	Display DHCP client statistics on the specified interface.
		For a 10-GigabitEthernet Ethernet interface, enter **TenGigabitEthernet** followed by the *slot*/*port* numbers; for example, **tengigabitethernet 1/3**.
		For a 40-GigabitEthernet Ethernet interface, enter **FortyGigabitEthernet** followed by the *slot*/*port* numbers; for example, **fortygigabitethernet 0/2**.

Command Mode	EXEC Privilege

Default	None.

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show ip dhcp lease

Display lease information about the dynamic IP address currently assigned to a DHCP client-enabled interface.

Syntax	show ip dhcp lease [interface *type slot*/*port*]

Parameters	interface *type slot/ port*	Display DHCP lease information on the specified interface.
		For a 10-GigabitEthernet Ethernet interface, enter **TenGigabitEthernet** followed by the *slot/port* numbers; for example, **tengigabitethernet 1/3**.
		For a 40-GigabitEthernet Ethernet interface, enter **FortyGigabitEthernet** followed by the *slot/port* numbers; for example, **fortygigabitethernet 0/2**.

Command Mode EXEC Privilege

Default Display DHCP lease information on all DHCP client-enabled interfaces on the switch.

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Commands to Configure Secure DHCP

DHCP as defined by RFC 2131 provides no authentication or security mechanisms. Secure DHCP is a suite of features that protects networks that use dynamic address allocation from spoofing and attacks.

- arp inspection
- arp inspection-trust
- clear ip dhcp snooping
- ip dhcp snooping
- ip dhcp snooping database
- ip dhcp snooping binding
- ip dhcp snooping database renew
- ip dhcp snooping trust
- ip dhcp source-address-validation
- ip dhcp snooping vlan
- ip dhcp relay
- ip dhcp snooping verify mac-address
- show ip dhcp snooping

arp inspection

Enable dynamic ARP inspection (DAI) on a VLAN.

Syntax arp inspection

Command Modes INTERFACE VLAN

Default Disabled

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

arp inspection-trust	Specifies a port as trusted so that ARP frames are not validated against the binding table.

arp inspection-trust

Specify a port as trusted so that ARP frames are not validated against the binding table.

Syntax   arp inspection-trust

Command Modes   INTERFACE

INTERFACE PORT-CHANNEL

Default   Disabled

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

arp inspection	Enables Dynamic ARP Inspection on a VLAN.

clear ip dhcp snooping

Clear the DHCP binding table.

Syntax   clear ip dhcp snooping binding

Command Modes   EXEC Privilege

Default   none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show ip dhcp snooping	Displays the contents of the DHCP binding table.

ip dhcp snooping

Enable DHCP snooping globally.

Syntax   [no] ip dhcp snooping

Command Modes   CONFIGURATION

Default   Disabled

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   When enabled, no learning takes place until you enable snooping on a VLAN. AFter disabling DHCP snooping, the binding table is deleted, and Option 82, IP Source Guard, and Dynamic ARP Inspection are disabled.

Introduced in FTOS version 7.8.1.0, DHCP snooping was available for Layer 3 only and dependent on DHCP Relay Agent (**ip helper-address**). FTOS version 8.2.1.0 extends DHCP Snooping to Layer 2, and you do not have to enable relay agent to snoop on Layer 2 interfaces.

Related Commands	ip dhcp snooping vlan	Enables DHCP snooping on one or more VLANs.

ip dhcp snooping database

Delay writing the binding table for a specified time.

Syntax ip dhcp snooping database write-delay *minutes*

Parameters

minutes	Range: 5-21600

Command Modes CONFIGURATION

Default none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip dhcp snooping binding

Create a static entry in the DHCP binding table.

Syntax [no] ip dhcp snooping binding mac *address* vlan-id *vlan-id* ip *ip-address* interface *type slot/port* lease *number*

Parameters

mac *address*	Enter the keyword mac followed by the MAC address of the host to which the server is leasing the IP address.
vlan-id *vlan-id*	Enter the keyword vlan-id followed by the VLAN to which the host belongs. Range: 2-4094
ip *ip-address*	Enter the keyword ip followed by the IP address that the server is leasing.
interface *type*	Enter the keyword interface followed by the type of interface to which the host is connected. • For a Ten Gigabit Ethernet interface, enter the keyword tengigabitethernet. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE.
slot/port	Enter the slot and port number of the interface.
lease *time*	Enter the keyword **lease** followed by the amount of time the IP address will be leased. Range: 1-4294967295

Command Modes EXEC

EXEC Privilege

Default none

Related Commands	show ip dhcp snooping	Displays the contents of the DHCP binding table.

ip dhcp snooping database renew

Renew the binding table.

Syntax ip dhcp snooping database renew

Command Modes EXEC

EXEC Privilege

Default none

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip dhcp snooping trust

Configure an interface as trusted.

Syntax [no] ip dhcp snooping trust

Command Modes INTERFACE

Default Untrusted

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip dhcp source-address-validation

Enable IP source guard.

Syntax [no] ip dhcp source-address-validation [ipmac]

Parameters

ipmac	Enable IP+MAC Source Address Validation (Not available on E-Series).

Command Modes INTERFACE

Default Disabled

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information You must allocate at least one FP block to ipmacacl before you can enable IP+MAC Source Address Validation.

1. Use the command cam-acl l2acl from CONFIGURATION mode
2. Save the running-config to the startup-config
3. Reload the system.

ip dhcp snooping vlan

Enable DHCP snooping on one or more VLANs.

Syntax	[no] ip dhcp snooping vlan *name*

Parameters	
name	Enter the name of a VLAN on which to enable DHCP Snooping.

Command Modes CONFIGURATION

Default Disabled

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information When enabled the system begins creating entries in the binding table for the specified VLAN(s). Note that learning only happens if there is a trusted port in the VLAN.

Related Commands		
	ip dhcp snooping trust	Configures an interface as trusted.

ip dhcp relay

Enable Option 82.

Syntax	ip dhcp relay information-option [remote-id	trust-downstream]

Parameters		
	remote-id	Configure the system to enable remote-id string in Option 82.
	trust-downstream	Configure the system to trust Option 82 when it is received from the previous-hop router.

Command Modes CONFIGURATION

Default Disabled

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show ip dhcp snooping

Display the contents of the DHCP binding table or display the interfaces configured with IP source guard.

Syntax	show ip dhcp snooping [binding	source-address-validation]

Parameters	binding	Display the binding table.
	source-address-validation	Display the interfaces configured with IP Source Guard.

Command Modes	EXEC
	EXEC Privilege

Default	none

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	clear ip dhcp snooping	Clears the contents of the DHCP binding table.

ip dhcp snooping verify mac-address

Validate a DHCP packet's source hardware address against the client hardware address field (CHADDR) in the payload.

Syntax	[no] ip dhcp snooping verify mac-address

Command Modes	CONFIGURATION

Default	Disabled

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

FIP Snooping

Overview

In a converged Ethernet network, an MXL Switch can operate as an intermediate Ethernet bridge to snoop on Fibre Channel over Ethernet Initialization Protocol (FIP) packets during the login process on Fibre Channel over Ethernet (FCoE) forwarders (FCFs). Acting as a transit FIP snooping bridge, the switch uses dynamically-created ACLs to permit only authorized FCoE traffic to be transmitted between an FCoE end-device and an FCF.

The following FTOS commands are used to configure and verify the FIP snooping feature:

- clear fip-snooping database interface vlan
- clear fip-snooping statistics
- feature fip-snooping
- fip-snooping enable
- fip-snooping fc-map
- fip-snooping port-mode fcf
- show fip-snooping config
- show fip-snooping enode
- show fip-snooping fcf
- show fip-snooping sessions
- show fip-snooping statistics
- show fip-snooping system
- show fip-snooping vlan

clear fip-snooping database interface vlan

Clear FIP snooping information on a VLAN for a specified FCoE MAC address, ENode MAC address, or FCF MAC address, and remove the corresponding ACLs generated by FIP snooping.

Syntax
clear fip-snooping database interface vlan *vlan-id* {*fcoe-mac-address* | *enode-mac-address* | *fcf-mac-address*}

Parameters

fcoe-mac-address	Enter the FCoE MAC address to be cleared of FIP snooping information.
enode-mac-address	Enter the ENode MAC address to be cleared of FIP snooping information.
fcf-mac-address	Enter the FCF MAC address to be cleared of FIP snooping information.

Command Modes   EXEC Privilege

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

clear fip-snooping statistics

Clears the statistics on the FIP packets snooped on all VLANs, a specified VLAN, or a specified port interface.

Syntax	clear fip-snooping statistics [interface vlan *vlan-id*	interface *port-type port/slot*	interface port-channel *port-channel-number*]

Parameters		
	vlan-id	Enter the VLAN ID of the FIP packet statistics to be cleared.
	port-type port/slot	Enter the port-type and slot number of the FIP packet statistics to be cleared.
	port-channel-number]	Enter the port channel number of the FIP packet statistics to be cleared.

Command Modes	EXEC Privilege

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

feature fip-snooping

Enable the FIP snooping feature on a switch.

Syntax	feature fip-snooping

To disable the FIP snooping feature, use the no feature fip-snooping command.

Defaults	Disabled.

Command Modes	CONFIGURATION

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

fip-snooping enable

Enable FIP snooping on all VLANs or on a specified VLAN.

Syntax	fip-snooping enable
	To disable the FIP snooping feature on all or a specified VLAN, use the no fip-snooping enable command.
Defaults	FIP snooping is disabled on all VLANs.
Command Modes	• CONFIGURATION
	• VLAN INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	The maximum number of FCFs supported per FIP snooping-enabled VLAN is four. The maximum number of FIP snooping sessions supported per ENode server is 16.

fip-snooping fc-map

Configure the FC-MAP value used by FIP snooping on all VLANs.

Syntax	fip-snooping fc-map *fc-map-value*
	To remove the configured FM-MAP value, use the no fip-snooping fc-map command.

Parameters	*fc-map-value*	Enter the FC-MAP value used by FIP snooping.
		The valid values are from 0EFC00 to 0EFCFF.

Defaults	0x0EFC00
Command Mode	• CONFIGURATION
	• VLAN INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

fip-snooping port-mode fcf

Configure the port for bridge-to-FCF links.

Syntax	fip-snooping port-mode fcf
	To disable the bridge-to-FCF link on a port, use the no fip-snooping port-mode fcf command.
Command Modes	INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	The maximum number of FCFs supported per FIP snooping-enabled VLAN is four.

show fip-snooping config

Display the FIP snooping status and configured FC-MAP values.

Syntax   show fip-snooping config

Command Mode
- EXEC
- EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 11-1.   show fip-snooping config Command Example**

```
FTOS# show fip-snooping config
FIP Snooping Feature enabled Status: Enabled
FIP Snooping Global enabled Status: Enabled
Global FC-MAP Value: 0X0EFC00

FIP Snooping enabled VLANs
VLAN    Enabled         FC-MAP
----    -------         --------
100     TRUE            0X0EFC00
```

show fip-snooping enode

Display information on the ENodes in FIP-snooped sessions, including the ENode interface and MAC address, FCF MAC address, VLAN ID and FC-ID.

Syntax   show fip-snooping enode [*enode-mac-address*]

Parameters

enode-mac-address	Enter the MAC address of the ENodes to be displayed.

Command Mode
- EXEC
- EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 11-2.   show fip-snooping enode Command Example**

```
FTOS# show fip-snooping enode
Enode MAC           Enode Interface     FCF MAC           VLAN      FC-ID
---------           --------------      -------           ----      -----
d4:ae:52:1b:e3:cd   Te 0/11             54:7f:ee:37:34:40 100       62:00:11
```

Table 11-1.   show fip-snooping enode Command Field Description

Field	Description
ENode MAC	MAC address of the ENode
ENode Interface	Slot/ port number of the interface connected to the ENode.
FCF MAC	MAC address of the FCF
VLAN	VLAN ID number used by the session
FC-ID	Fibre Channel session ID assigned by the FCF.

show fip-snooping fcf

Display information on the FCFs in FIP-snooped sessions, including the FCF interface and MAC address, FCF interface, VLAN ID, FC-MAP value, FKA advertisement period, and number of ENodes connected.

Syntax   show fip-snooping fcf [*fcf-mac-address*]

Parameters

fcf-mac-address	Enter the MAC address of the FCF to be displayed.

Command Mode
- EXEC
- EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 11-3.   show fip-snooping fcf Command Example**

```
FTOS# show fip-snooping fcf
FCF MAC              FCF Interface      VLAN      FC-MAP    FKA_ADV_PERIOD   No. of Enodes
-------              -------------      ----      ------    -------------    -------------
54:7f:ee:37:34:40    Po 22              100       0e:fc:00  4000             2
```

Table 11-2 lists the show fip-snooping fcf command field descriptions.

Table 11-2.   show fip-snooping fcf Command Field Descriptions

Field	Description
FCF MAC	MAC address of the FCF
FCF Interface	Slot/port number of the interface to which the FCF is connected.
VLAN	VLAN ID number used by the session
FC-MAP	FC-Map value advertised by the FCF.
ENode Interface	Slot/ number of the interface connected to the ENode.
FKA_ADV_PERIOD	Period of time (in milliseconds) during which FIP keep-alive advertisements are transmitted.

Table 11-2.   show fip-snooping fcf Command Field Descriptions (continued)

Field	Description
No of ENodes	Number of ENodes connected to the FCF
FC-ID	Fibre Channel session ID assigned by the FCF.

show fip-snooping sessions

Display information on FIP-snooped sessions on all VLANs or a specified VLAN, including the ENode interface and MAC address, the FCF interface and MAC address, VLAN ID, FCoE MAC address and FCoE session ID number (FC-ID), worldwide node name (WWNN) and the worldwide port name (WWPN).

Syntax   show fip-snooping sessions [interface vlan *vlan-id*]

Parameters

vlan-id	Enter the vlan-id of the specified VLAN to be displayed.

Command Mode
- EXEC
- EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 11-4.   show fip-snooping sessions Command Example**

```
FTOS#show fip-snooping sessions
Enode MAC          Enode Intf     FCF MAC          FCF Intf       VLAN
aa:bb:cc:00:00:00  Te 0/42        aa:bb:cd:00:00:00  Te 0/43        100
aa:bb:cc:00:00:00  Te 0/42        aa:bb:cd:00:00:00  Te 0/43        100
aa:bb:cc:00:00:00  Te 0/42        aa:bb:cd:00:00:00  Te 0/43        100
aa:bb:cc:00:00:00  Te 0/42        aa:bb:cd:00:00:00  Te 0/43        100
aa:bb:cc:00:00:00  Te 0/42        aa:bb:cd:00:00:00  Te 0/43        100

FCoE MAC           FC-ID          Port WWPN                Port WWNN
0e:fc:00:01:00:01  01:00:01  31:00:0e:fc:00:00:00:00  21:00:0e:fc:00:00:00:00
0e:fc:00:01:00:02  01:00:02  41:00:0e:fc:00:00:00:00  21:00:0e:fc:00:00:00:00
0e:fc:00:01:00:03  01:00:03  41:00:0e:fc:00:00:00:01  21:00:0e:fc:00:00:00:00
0e:fc:00:01:00:04  01:00:04  41:00:0e:fc:00:00:00:02  21:00:0e:fc:00:00:00:00
0e:fc:00:01:00:05  01:00:05  41:00:0e:fc:00:00:00:03  21:00:0e:fc:00:00:00:00
```

Table 11-3 lists the show fip-snooping sessions command field descriptions.

Table 11-3.   show fip-snooping sessions Command Field Description

Field	Description
ENode MAC	MAC address of the ENode.
ENode Interface	Slot/ port number of the interface connected to the ENode.

Table 11-3. show fip-snooping sessions Command Field Description (continued)

Field	Description
FCF MAC	MAC address of the FCF.
FCF Interface	Slot/ port number of the interface to which the FCF is connected.
VLAN	VLAN ID number used by the session.
FCoE MAC	MAC address of the FCoE session assigned by the FCF.
FC-ID	Fibre Channel ID assigned by the FCF.
Port WWPN	Worldwide port name of the CNA port.
Port WWNN	Worldwide node name of the CNA port.

show fip-snooping statistics

Display statistics on the FIP packets snooped on all interfaces, including VLANs, physical ports, and port channels.

Syntax   show fip-snooping statistics [interface vlan *vlan-id* | interface *port-type port/slot* | interface port-channel *port-channel-number*]

Parameters

vlan-id	Enter the VLAN ID of the FIP packet statistics to be displayed.
port-type port/slot	Enter the port-type and slot number of the FIP packet statistics to be displayed.
port-channel-number]	Enter the port channel number of the FIP packet statistics to be displayed.

Command Mode   • EXEC
• EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 11-5. show fip-snooping statistics Command Example**

```
FTOS# show fip-snooping statistics interface vlan 100
Number of Vlan Requests                              :0
Number of Vlan Notifications                         :0
Number of Multicast Discovery Solicits               :2
Number of Unicast Discovery Solicits                 :0
Number of FLOGI                                      :2
Number of FDISC                                      :16
Number of FLOGO                                      :0
Number of Enode Keep Alive                           :9021
Number of VN Port Keep Alive                         :3349
Number of Multicast Discovery Advertisement          :4437
Number of Unicast Discovery Advertisement            :2
Number of FLOGI Accepts                              :2
Number of FLOGI Rejects                              :0
Number of FDISC Accepts                              :16
Number of FDISC Rejects                              :0
Number of FLOGO Accepts                              :0
Number of FLOGO Rejects                              :0
Number of CVL                                        :0
Number of FCF Discovery Timeouts                     :0
Number of VN Port Session Timeouts                   :0
Number of Session failures due to Hardware Config    :0
FTOS(conf)#

FTOS# show fip-snooping statistics int tengigabitethernet 0/11
Number of Vlan Requests                              :1
Number of Vlan Notifications                         :0
Number of Multicast Discovery Solicits               :1
Number of Unicast Discovery Solicits                 :0
Number of FLOGI                                      :1
Number of FDISC                                      :16
Number of FLOGO                                      :0
Number of Enode Keep Alive                           :4416
Number of VN Port Keep Alive                         :3136
Number of Multicast Discovery Advertisement          :0
Number of Unicast Discovery Advertisement            :0
Number of FLOGI Accepts                              :0
Number of FLOGI Rejects                              :0
Number of FDISC Accepts                              :0
Number of FDISC Rejects                              :0
Number of FLOGO Accepts                              :0
Number of FLOGO Rejects                              :0
Number of CVL                                        :0
Number of FCF Discovery Timeouts                     :0
Number of VN Port Session Timeouts                   :0
Number of Session failures due to Hardware Config    :0
```

Figure 11-6.   show fip-snooping statistics (port channel) Command Example

```
FTOS# show fip-snooping statistics interface port-channel 22
Number of Vlan Requests                                :0
Number of Vlan Notifications                           :2
Number of Multicast Discovery Solicits                 :0
Number of Unicast Discovery Solicits                   :0
Number of FLOGI                                        :0
Number of FDISC                                        :0
Number of FLOGO                                        :0
Number of Enode Keep Alive                             :0
Number of VN Port Keep Alive                           :0
Number of Multicast Discovery Advertisement            :4451
Number of Unicast Discovery Advertisement              :2
Number of FLOGI Accepts                                :2
Number of FLOGI Rejects                                :0
Number of FDISC Accepts                                :16
Number of FDISC Rejects                                :0
Number of FLOGO Accepts                                :0
Number of FLOGO Rejects                                :0
Number of CVL                                          :0
Number of FCF Discovery Timeouts                       :0
Number of VN Port Session Timeouts                     :0
Number of Session failures due to Hardware Config      :0
```

Table 11-4 lists the show fip-snooping statistics command field descriptions.

Table 11-4.   show fip-snooping statistics Command Fields Description

Field	Description
Number of Vlan Requests	Number of FIP-snooped VLAN request frames received on the interface
Number of VLAN Notifications	Number of FIP-snooped VLAN notification frames received on the interface.
Number of Multicast Discovery Solicits	Number of FIP-snooped multicast discovery solicit frames received on the interface
Number of Unicast Discovery Solicits	Number of FIP-snooped unicast discovery solicit frames received on the interface
Number of FLOGI	Number of FIP-snooped FLOGI request frames received on the interface
Number of FDISC	Number of FIP-snooped FDISC request frames received on the interface
Number of FLOGO	Number of FIP-snooped FLOGO frames received on the interface
Number of ENode Keep Alives	Number of FIP-snooped ENode keep-alive frames received on the interface
Number of VN Port Keep Alives	Number of FIP-snooped VN port keep-alive frames received on the interface
Number of Multicast Discovery Advertisements	Number of FIP-snooped multicast discovery advertisements received on the interface
Number of Unicast Discovery Advertisements	Number of FIP-snooped unicast discovery advertisements received on the interface

Table 11-4.   show fip-snooping statistics Command Fields Description (continued)

Field	Description
Number of FLOGI Accepts	Number of FIP FLOGI accept frames received on the interface
Number of FLOGI Rejects	Number of FIP FLOGI reject frames received on the interface
Number of FDISC Accepts	Number of FIP FDISC accept frames received on the interface
Number of FDISC Rejects	Number of FIP FDISC reject frames received on the interface
Number of FLOGO Accepts	Number of FIP FLOGO accept frames received on the interface
Number of FLOGO Rejects	Number of FIP FLOGO reject frames received on the interface
Number of CVLs	Number of FIP clear virtual link frames received on the interface
Number of FCF Discovery Timeouts	Number of FCF discovery timeouts that occurred on the interface
Number of VN Port Session Timeouts	Number of VN port session timeouts that occurred on the interface
Number of Session failures due to Hardware Config	Number of session failures due to hardware configuration that occurred on the interface

show fip-snooping system

Display information on the status of FIP snooping on the switch (enabled or disabled), including the number of FCoE VLANs, FCFs, ENodes, and currently active sessions.

Syntax   show fip-snooping system

Command Mode
- EXEC
- EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 11-7.   show fip-snooping system Command Example**

```
FTOS# show fip-snooping system
Global Mode                    : Enabled
FCOE VLAN List (Operational)   : 1, 100
FCFs                           : 1
Enodes                         : 2
Sessions                       : 17
```

show fip-snooping vlan

Display information on the FCoE VLANs on which FIP snooping is enabled.

Syntax   show fip-snooping vlan

Command Mode   • EXEC
              • EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 11-8.   show fip-snooping vlan Command Example**

```
 FTOS# show fip-snooping vlan
* = Default VLAN

VLAN    FC-MAP       FCFs    Enodes  Sessions
----    ------       ----    ------  --------
*1      -            -       -       -
100     0X0EFC00     1       2       17
```

GARP VLAN Registration (GVRP)

Commands

The generic attribute registration protocol (GVRP) commands are:

- clear gvrp statistics
- debug gvrp
- disable
- garp timers
- gvrp enable
- gvrp registration
- protocol gvrp
- show config
- show garp timers
- show gvrp
- show gvrp statistics
- show vlan

The GARP mechanism allows the configuration of a GARP participant to propagate through a network quickly. A GARP participant registers or de-registers its attributes with other participants by making or withdrawing declarations of attributes. At the same time, based on received declarations or withdrawals, GARP handles attributes of other participants.

GVRP enables a device to propagate virtual local area network (VLAN) registration information to other participant devices and dynamically update the VLAN registration information from other devices. The registration information updates local databases regarding active VLAN members and through which port the VLANs can be reached.

GVRP ensures that all participants on a bridged LAN maintain the same VLAN registration information. The VLAN registration information propagated by GVRP include both manually configured local static entries and dynamic entries from other devices.

GVRP participants have the following components:

- The GVRP application
- GARP information propagation (GIP)
- GARP information declaration (GID)

Important Points to Remember

- GVRP is supported on Layer 2 ports only.
- All VLAN ports added by GVRP are tagged.
- GVRP is supported on untagged ports belonging to a default VLAN, and tagged ports.
- GVRP cannot be enabled on untagged ports belonging to a non-default VLAN *unless* native VLAN is turned on.
- GVRP requires end stations with dynamic access network interface controller (NICs).
- Based on updates from GVRP-enabled devices, GVRP allows the system to dynamically create a port-based VLAN (unspecified) with a specific VLAN ID and a specific port.
- On a port-by-port basis, GVRP allows the system to learn about GVRP updates to an existing port-based VLAN with that VLAN ID and IEEE 802.1Q tagging.
- GVRP allows the system to send dynamic GVRP updates about your existing port-based VLAN.
- GVRP updates are not sent to any blocked spanning tree protocol (STP) ports. GVRP operates only on ports that are in the forwarding state.
- GVRP operates only on ports that are in the STP forwarding state. If GVRP is enabled, a port that changes to the STP forwarding state automatically begins to participate in GVRP. A port that changes to an STP state other than forwarding no longer participates in GVRP.
- VLANs created dynamically with GVRP exist only as long as a GVRP-enabled device is sending updates. If the devices no longer send updates, or GVRP is disabled, or the system is rebooted, all dynamic VLANs are removed.
- GVRP manages the active topology, not non-topological data such as VLAN protocols. If a local bridge needs to classify and analyze packets by VLAN protocols, you must manually configure protocol-based VLANs, and simply rely on GVRP for VLAN updates. But if the local bridge needs to know only how to reach a given VLAN, then GVRP provides all necessary information.
- The VLAN topologies that GVRP learns are treated differently from VLANs that are statically configured. The GVRP dynamic updates are not saved in NVRAM, while static updates are saved in NVRAM. When GVRP is disabled, the system deletes all VLAN interfaces that were learned through GVRP and leaves unchanged all VLANs that were manually configured.

clear gvrp statistics

Clear GVRP statistics on an interface.

Syntax	clear gvrp statistics interface *interface*

Parameters	interface *interface*	Enter the following keywords and slot/port or number information:
		• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128
		• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
		• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults	none

Command Modes	EXEC

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

debug gvrp

Enable debugging on GVRP.

Syntax debug gvrp {config | events | pdu}

To disable debugging, use the no debug gvrp {config | events | pdu} command.

Parameters

config	Enter the keyword config to enable debugging on the GVRP configuration.
event	Enter the keyword event to enable debugging on the JOIN/LEAVE events.
pdu	Enter the keyword pdu followed one of the following Interface keywords and slot/port or number information: • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults Disabled

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

disable

Globally disable GVRP.

Syntax disable

To re-enable GVRP, use the no disable command.

Defaults Enabled

Command Modes CONFIGURATION-GVRP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

gvrp enable	Enables GVRP on physical interfaces and LAGs.
protocol gvrp	Accesses the GVRP protocol.

garp timers

Set the intervals (in milliseconds) for sending GARP messages.

Syntax

garp timers {join | leave | leave-all}

To return to the previous setting, use the no garp timers {join | leave | leave-all} command.

Parameters

join	Enter the keyword join followed by the number of milliseconds to configure the join time. Range: 100 to 147483647 milliseconds Default: 200 milliseconds **Note:** Designate the milliseconds in multiples of 100
leave	Enter the keyword leave followed by the number of milliseconds to configure the leave time. Range: 100 to 2147483647 milliseconds Default: 600 milliseconds **Note:** Designate the milliseconds in multiples of 100
leave-all	Enter the keyword leave-all followed by the number of milliseconds to configure the leave-all time. Range: 100 to 2147483647 milliseconds Default: 1000 milliseconds **Note:** Designate the milliseconds in multiples of 100

Defaults

Default as above

Command Modes

CONFIGURATION-GVRP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

Join Timer—Join messages announce the willingness to register some attributes with other participants. Each GARP application entity sends a Join message twice, for reliability, and uses a join timer to set the sending interval.

Leave Timer—Leave announces the willingness to de-register with other participants. Together with the Join, Leave messages help GARP participants complete attribute reregistration and de-registration. Leave Timer starts upon receipt of a leave message sent for de-registering some attribute information. If a join message is *not* received before the leave time expires, the GARP application entity removes the attribute information as requested.

Leave All Timer—The Leave All Timer starts when a GARP application entity starts. When this timer expires, the entity sends a leave-all message so that other entities can re-register their attribute information. Then, the leave-all time begins again.

Related Commands

show garp timers	Displays the current GARP times.

gvrp enable

Enable GVRP on physical interfaces and LAGs.

Syntax   gvrp enable

To disable GVRP on the interface, use the no gvrp enable command.

Defaults   Disabled

Command Modes   CONFIGURATION-INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

disable	Globally disables the GVRP.

gvrp registration

Configure the GVRP register type.

Syntax   gvrp registration {fixed | normal | forbidden}

To return to the default, use the gvrp register normal command.

Parameters

fixed	Enter the keyword fixed followed by the VLAN range in a comma separated VLAN ID set.
normal	Enter the keyword normal followed by the VLAN range in a comma separated VLAN ID set. This is the default
forbidden	Enter the keyword forbidden followed by the VLAN range in a comma separated VLAN ID set.

Defaults   Default registration is normal

Command Modes   CONFIGURATION-INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The fixed registration prevents an interface, configured via the command line to belong to a VLAN (static configuration), from being un-configured when it receives a Leave message. Therefore, the registration mode on that interface is fixed.

The normal registration is the default registration. The port's membership in the VLANs depends on GVRP. The interface becomes a member of VLANs after learning about the VLAN through GVRP. If the VLAN is removed from the port that sends GVRP advertisements to this device, then the port will stop being a member of the VLAN.

Use forbidden when you do not want the interface to advertise or learn about VLANs through GVRP.

Related Commands	show gvrp	Displays the GVRP configuration including the registration

protocol gvrp

Access GVRP protocol — (config-gvrp)#.

Syntax	protocol gvrp

Defaults	Disabled

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	disable	Globally disables the GVRP.

show config

Display the global GVRP configuration.

Syntax	show config

Command Modes	CONFIGURATION-GVRP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	gvrp enable	Enables GVRP on physical interfaces and LAGs.
	protocol gvrp	Accesses the GVRP protocol.

show garp timers

Display the GARP timer settings for sending GARP messages.

Syntax	show garp timers

Defaults	none

Command Modes	EXEC
	EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 12-1.   show garp timers Command Example**

```
FTOS#show garp timers
GARP Timers     Value (milliseconds)
----------------------------------------
Join Timer         200
Leave Timer        600
LeaveAll Timer     10000
FTOS#
```

Related
Commands   garp timers   Sets the intervals (in milliseconds) for sending GARP messages.

show gvrp

Display the GVRP configuration.

Syntax   show gvrp [brief | *interface*]

Parameters

brief	(OPTIONAL) Enter the keyword brief to display a brief summary of the GVRP configuration.
interface	(OPTIONAL) Enter the following keywords and slot/port or number information: • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command
History   Version 8.3.16.1   Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 12-2.   show gvrp brief Command Example**

```
R3#show gvrp brief
GVRP Feature is currently enabled.

Port                 GVRP Status         Edge-Port
----------------------------------------------------
Te 3/0               Disabled                  No
Te 3/1               Disabled                  No
Te 3/2               Enabled                   No
Te 3/3               Disabled                  No
Te 3/4               Disabled                  No
Te 3/5               Disabled                  No
Te 3/6               Disabled                  No
Te 3/7               Disabled                  No
Te 3/8               Disabled                  No
R3#show gvrp brief
```

Usage
Information   If no ports are GVRP participants, the message output changes from:

GVRP Participants running on <port_list>

to

GVRP Participants running on no ports

Related Commands	show gvrp statistics	Displays the GVRP statistics.

show gvrp statistics

Display the GVRP configuration statistics.

Syntax   show gvrp statistics {interface *interface* | summary}

Parameters

interface *interface*	Enter the keyword interface followed by one of the interface keywords and slot/port or number information:
	• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
summary	Enter the keyword summary to display just a summary of the GVRP statistics.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 12-3.   show gvrp statistics Command Example**

```
FTOS#show gvrp statistics int tengig 1/0

Join Empty Received: 0
Join In Received: 0
Empty Received: 0
LeaveIn Received: 0
Leave Empty Received: 0
Leave All Received: 40
Join Empty Transmitted: 156
Join In Transmitted: 0
Empty Transmitted: 0
Leave In Transmitted: 0
Leave Empty Transmitted: 0
Leave All Transmitted: 41
Invalid Messages/Attributes skipped: 0
Failed Registrations: 0
FTOS#
```

Usage Information   Invalid messages/attributes skipped can occur in the following cases:

• The incoming GVRP PDU has an incorrect length.

• "End of PDU" was reached before the complete attribute could be parsed.

• The Attribute Type of the attribute that was being parsed was not the GVRP VID Attribute Type (0x01).

- The attribute that was being parsed had an invalid attribute length.
- The attribute that was being parsed had an invalid GARP event.
- The attribute that was being parsed had an invalid VLAN ID. The valid range is 1 - 4095.

A failed registration can occur for the following reasons:

- Join requests were received on a port that was blocked from learning dynamic VLANs (GVRP Blocking state).
- An entry for a new GVRP VLAN could not be created in the GVRP database.

Related Commands	show gvrp	Displays the GVRP configuration.

show vlan

Display the global VLAN configuration.

Syntax	show vlan

Command Modes	EXEC
	EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 12-4.   show vlan Command Example**

```
FTOS# show vlan
 Codes: * - Default VLAN, G - GVRP VLANs, R - Remote Port Mirroring VLANs, P -
Primary, C - Community, I - Isolated
Q: U - Untagged, T - Tagged
   x - Dot1x untagged, X - Dot1x tagged
   G - GVRP tagged, M - Vlan-stack, H - VSN tagged
   i - Internal untagged, I - Internal tagged, v - VLT untagged, V - VLT tagged
    NUM    Status    Description                      Q Ports
*   1      Active                                     U Te 3/20
                                                      U Te 5/20-21
G   10     Active                                     G Po128(Te 5/49) (dynamically
leanred vlan)
FTOS#
```

Internet Group Management Protocol (IGMP)

IGMP Snooping Commands

The Dell Force10 operating software (FTOS) supports internet group management protocol (IGMP) snooping version 2 and 3 on all Dell Force10 systems:

- ip igmp access-group
- ip igmp group-join-limit
- ip igmp querier-timeout
- ip igmp query-interval
- ip igmp query-max-resp-time
- ip igmp version
- ip igmp snooping enable
- ip igmp snooping fast-leave
- ip igmp snooping flood
- ip igmp snooping last-member-query-interval
- ip igmp snooping mrouter
- ip igmp snooping querier
- show ip igmp snooping mrouter

Important Points to Remember for IGMP Snooping

- FTOS supports version 1, version 2, and version 3 hosts.
- FTOS IGMP snooping implementation is based on IP multicast address (not based on Layer 2 multicast mac-address) and the IGMP snooping entries are in Layer 3 flow table not in Layer 2 forwarding information base (FIB).
- FTOS IGMP snooping implementation is based on draft-ietf-magma-snoop-10.
- IGMP snooping is supported on all MXL 10/40GbE stack members.
- IGMP snooping is not enabled by default on the switch.
- A maximum of 1800 groups and 600 virtual local area network (VLAN) are supported.
- IGMP snooping is not supported on default VLAN interface.
- IGMP snooping is not supported over VLAN-Stack-enabled VLAN interfaces (you must disable IGMP snooping on a VLAN interface before configuring VLAN-Stack-related commands).
- IGMP snooping does not react to Layer 2 topology changes triggered by spanning tree protocol (STP).
- IGMP snooping reacts to Layer 2 topology changes triggered by multiple spanning tree protocol (MSTP) by sending a general query on the interface that comes in FWD state.

Important Points to Remember for IGMP Querier

- The IGMP snooping Querier supports version 2.
- You must configure an IP address to the VLAN interface for IGMP snooping Querier to begin. The IGMP snooping Querier disables itself when a VLAN IP address is cleared, and then it restarts itself when an IP address is re-assigned to the VLAN interface.
- When enabled, IGMP snooping Querier will not start if there is a statically configured multicast router interface in the VLAN.
- When enabled, IGMP snooping Querier starts after one query interval in case no IGMP general query (with IP SA lower than its VLAN IP address) is received on any of its VLAN members.
- When enabled, IGMP snooping Querier periodically sends general queries with an IP source address of the VLAN interface. If it receives a general query on any of its VLAN member, it will check the IP source address of the incoming frame.
- If the IP SA in the incoming IGMP general query frame is lower than the IP address of the VLAN interface, then the switch disables its IGMP snooping Querier functionality.
- If the IP SA of the incoming IGMP general query is higher than the VLAN IP address, the switch will continue to work as an IGMP snooping Querier.

ip igmp access-group

Use this feature to specify access control for packets.

Syntax	ip igmp access-group *access-list*
	To remove the feature, use the no ip igmp access-group *access-list* command.

Parameters	
access-list	Enter the name of the extended ACL (16 characters maximum).

Defaults	Not configured
Command Modes	INTERFACE (conf-if-*interface-slot/port*)

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The access list accepted is an extended ACL. This feature is used to block IGMP reports from hosts, on a per-interface basis; based on the group address and source address specified in the access list.

ip igmp group-join-limit

Use this feature to limit the number of IGMP groups that can be joined in a second.

Syntax	ip igmp group-join-limit *number*

Parameters	
number	Enter the number of IGMP groups permitted to join in a second. Range: 1 to 10000

Defaults	none
Command Modes	CONFIGURATION (conf-if-*interface-slot/port*)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip igmp querier-timeout

Change the interval that must pass before a multicast router decides that there is no longer another multicast router that should be the querier.

Syntax   ip igmp querier-timeout *seconds*

To return to the default value, enter no ip igmp querier-timeout.

Parameters

seconds	Enter the number of seconds the router must wait to become the new querier.
	Default: 125 seconds
	Range: 60 to 300

Defaults   125 seconds

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip igmp query-interval

Change the transmission frequency of IGMP general queries sent by the Querier.

Syntax   ip igmp query-interval *seconds*

To return to the default values, enter no ip igmp query-interval.

Parameters

seconds	Enter the number of seconds between queries sent out.
	Default: 60 seconds
	Range: 1 to 18000

Defaults   60 seconds

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip igmp query-max-resp-time

Set the maximum query response time advertised in general queries.

Syntax   ip igmp query-max-resp-time *seconds*

To return to the default values, enter no ip igmp query-max-resp-time.

Parameters		
seconds	Enter the number of seconds for the maximum response time.	
	Default: 10 seconds	
	Range: 1 to 25	

Defaults   10 seconds

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip igmp version

Manually set the version of the router to IGMPv2 or IGMPv3.

Syntax   ip igmp version {2 | 3}

Parameters

2	Enter the number 2 to set the IGMP version number to IGMPv2.
3	Enter the number 3 to set the IGMP version number to IGMPv3.

Defaults   2 (that is IGMPv2)

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip igmp snooping enable

Enable IGMP snooping on all or a single VLAN. This is the master on/off switch to enable IGMP snooping.

Syntax   ip igmp snooping enable

To disable IGMP snooping, enter no ip igmp snooping enable command.

Defaults   Disabled

Command Modes   CONFIGURATION

INTERFACE VLAN

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You must enter this command to enable IGMP snooping. When enabled from CONFIGURATION mode, IGMP snooping is enabled on all VLAN interfaces (except default VLAN).

> **Note:** You must execute the no shutdown command on the VLAN interface for IGMP Snooping to function.

Related Commands	no shutdown	Activates an interface.

ip igmp snooping fast-leave

Enable IGMP snooping fast leave for this VLAN.

Syntax   ip igmp snooping fast-leave

To disable IGMP snooping fast leave, use the no igmp snooping fast-leave command.

Defaults   Not configured

Command Modes   INTERFACE VLAN — (conf-if-vl-*n*)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Queriers normally send a certain number of queries when a leave message is received prior to deleting a group from the membership database. There may be situations in which *fast* deletion of a group is required. When you enable IGMP fast leave processing, the switch removes an interface from the multicast group as soon as it detects an IGMP version 2 leave message on the interface.

ip igmp snooping flood

This command controls the flooding behavior of unregistered multicast data packets. When flooding is disabled, unregistered multicast data traffic is forwarded to *only* multicast router ports, both static and dynamic, in a VLAN. If there is no multicast router port in a VLAN, unregistered multicast data traffic is dropped.

On the MXL Switch, when you configure no ip igmp snooping flood, the system forwards the frames on mrouter ports for first 96 IGMP snooping enabled VLANs. For all other VLANs, unregistered multicast packets are dropped.

Syntax   ip igmp snooping flood

Defaults   Enabled

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip igmp snooping last-member-query-interval

The last member query interval is the *maximum response time* inserted into Group-Specific queries sent in response to Group-Leave messages. This interval is also the interval between successive Group-Specific Query messages. Use this command to change the last member query interval.

Syntax   ip igmp snooping last-member-query-interval *milliseconds*

To return to the default value, enter no ip igmp snooping last-member-query-interval.

Parameters

milliseconds	Enter the interval in milliseconds.
	Default: 1000 milliseconds
	Range: 100 to 65535

Defaults   1000 milliseconds

Command Modes   INTERFACE VLAN

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip igmp snooping mrouter

Statically configure a VLAN member port as a multicast router interface.

Syntax   ip igmp snooping mrouter interface *interface*

To delete a specific multicast router interface, use the no igmp snooping mrouter interface *interface* command.

Parameters

interface *interface*	Enter the following keywords and slot/port or number information:
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a Port Channel interface, enter the keyword port-channel followed by a number:
	Range: 1 to 128

Defaults   Not configured

Command Modes   INTERFACE VLAN — (conf-if-vl-*n*)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   FTOS provides the capability of statically configuring interface to which a multicast router is attached. To configure a static connection to the multicast router, enter the ip igmp snooping mrouter interface command in the VLAN context. The interface to the router must be a part of the VLAN where you are entering the command.

ip igmp snooping querier

Enable IGMP querier processing for the VLAN interface.

Syntax ip igmp snooping querier

To disable IGMP querier processing for the VLAN interface, enter no ip igmp snooping querier command.

Defaults Not configured

Command Modes INTERFACE VLAN — (conf-if-vl-*n*)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information This command enables the IGMP switch to send General Queries periodically. This is useful when there is no multicast router present in the VLAN because the multicast traffic does not need to be routed. An IP address must be assigned to the VLAN interface for the switch to act as a querier for this VLAN.

show ip igmp snooping mrouter

Display multicast router interfaces.

Syntax show ip igmp snooping mrouter [vlan *number*]

Parameters

vlan *number*	Enter the keyword vlan followed by the vlan number.
	Range: 1 to 4094

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 13-1.   show ip igmp snooping mrouter Command Example**

```
FTOS#show ip igmp snooping mrouter
Interface Router Ports
Vlan 2    Te 13/3, Po 1
FTOS#
```

Related Commands

show ip igmp groups	Use this IGMP command to view groups.

14

Interfaces

Overview

This chapter defines interface commands and is divided into the following sections:

- Basic Interface Commands
- Port Channel Commands
- Time Domain Reflectometer (TDR)
- UDP Broadcast

Basic Interface Commands

The following commands are for physical, loopback, and null interfaces:

- clear counters
- clear dampening
- cx4-cable-length
- dampening
- description
- duplex (1000/10000 Interfaces)
- flowcontrol
- interface
- interface loopback
- interface ManagementEthernet
- interface null
- interface range
- interface range macro (define)
- interface range macro name
- interface vlan
- intf-type cr4 autoneg
- keepalive
- monitor interface
- mtu
- negotiation auto
- portmode hybrid
- rate-interval
- show config

- show config (from INTERFACE RANGE mode)
- show interfaces
- show interfaces configured
- show interfaces dampening
- show interfaces description
- show interfaces stack-unit
- show interfaces status
- show interfaces switchport
- show interfaces transceiver
- show range
- shutdown
- speed (for 1000/10000/auto interfaces)
- stack-unit portmode

clear counters

Clear the counters used in the show interfaces commands for all VRRP groups, VLANs, and physical interfaces, or selected ones.

Syntax

clear counters [*interface*] [vrrp [{ *vrid* | vrf *instance*}]] | learning-limit]

Parameters

interface	(OPTIONAL) Enter any of the following keywords and slot/port or number to clear counters from a specified interface:
	• For a Loopback interface, enter the keyword loopback followed by a number from 0 to 16383.
	• For a Port Channel interface, enter the keyword port-channel followed by a number. Range: 1-128
	• For the management interface on the stack-unit, enter the keyword managementethernet followed by slot/port information. The slot range is 0-1, and the port range is 0.
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.
vrrp [*vrid*]	(OPTIONAL) Enter the keyword vrrp to clear the counters of all VRRP groups. To clear the counters of a specified group, enter a *vrid* number from 1 to 255.
vrrp [vrf *instance*]	(OPTIONAL): Enter the keyword vrrp to clear counters for all VRRP groups. To clear the counters of VRRP groups in a specified VRF instance, enter the name of the instance (32 characters maximum).
learning-limit	(OPTIONAL) Enter the keyword learning-limit to clear unknown source address (SA) drop counters when MAC learning limit is configured on the interface.

Defaults

Without a specific interface specified, the command clears all interface counters.

Command Modes

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 14-1.   clear counters Command Example**

```
FTOS#clear counters
Clear counters on all interfaces [confirm]
```

Related Commands

mac learning-limit	Limit the maximum number of MAC addresses (static + dynamic) learned on a selected interface.
show interfaces	Display information on a specific physical interface or virtual interface.

clear dampening

Clear the dampening counters on all the interfaces or just the specified interface.

Syntax   clear dampening [*interface*]

Parameters

interface	(OPTIONAL) Enter one of the following keywords and slot/port or number information:
	• For a Port Channel interface, enter the keyword port-channel followed by a number. Range: 1 to 128.
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   Without a specific interface specified, the command clears all interface dampening counters

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   On the MXL Switch, after you enter the clear counters command and verify the results with the show interfaces command, the line rate is not reset to 0.00%.

Example   **Figure 14-2.   clear dampening Command Example**

```
FTOS#clear dampening tengigabitethernet 1/2
Clear dampening counters on tengig 1/2 [confirm] y
FTOS#
```

Related Commands

show interfaces dampening	Displays interface dampening information.
dampening	Configures dampening on an interface.

cx4-cable-length

Configure the length of the cable to be connected to the selected CX4 port.

Syntax   [no] cx4-cable-length {long | medium | short}

Parameters	long	medium	short	Enter the keyword that matches the cable length to be used at the selected port:
		short = For 1-meter and 3-meter cable lengths
		medium = For 5-meter cable length
		long = For 10-meter and 15-meter cable lengths

Defaults medium

Command Mode INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

This command only works on ports that the system recognizes as CX4 ports. The figure below shows an attempt to configure an XFP port with the command after inserting a CX4 converter into the port:

Example **Figure 14-3.   Example of Unsuccessful CX4 Cable Length Configuration**

```
FTOS#show interfaces tengigabitethernet 0/26 | grep "XFP type"

Pluggable media present, XFP type is 10GBASE-CX4

FTOS(conf-if-te-0/26)#cx4-cable-length short
% Error: Unsupported command.
FTOS(conf-if-te-0/26)#cx4-cable-length medium
% Error: Unsupported command.
FTOS(conf-if-te-0/26)#cx4-cable-length long
% Error: Unsupported command.
FTOS(conf-if-te-0/26)#
```

Figure 14-4 shows a successful CX4 cable length configuration.

Example **Figure 14-4.   Example of CX4 Cable Length Configuration**

```
FTOS#config
FTOS(conf)#interface tengigabitethernet 0/52
FTOS(conf-if-0/52)#cx4-cable-length long
FTOS(conf-if-0/52)#show config
!
interface TenGigabitEthernet 0/51
 no ip address
 cx4-cable-length long
 shutdown
FTOS(conf-if-0/52)#exit
FTOS(conf)#
```

For details on using XFP ports with CX4 cables, refer to your MXL Switch hardware guide.

Related Commands

show config	Displays the configuration of the selected interface.

dampening

Configures dampening on an interface.

Syntax dampening [[[[h*alf-life*] [*reuse-threshold*]] [*suppress-threshold*]] [*max-suppress-time*]]

To disable dampening, use the no dampening [[[[*half-life*] [*reuse-threshold*]] [*suppress-threshold*]] [*max-suppress-time*]] command syntax.

half-life	Enter the number of seconds after which the penalty is decreased. The penalty is decreased by half after the half-life period expires. Range: 1 to 30 seconds Default: 5 seconds
reuse-threshold	Enter a number as the reuse threshold, the penalty value below which the interface state is changed to "up". Range: 1 to 20000 Default: 750
suppress-threshold	Enter a number as the suppress threshold, the penalty value above which the interface state is changed to "error disabled". Range: 1 to 20000 Default: 2500
max-suppress-time	Enter the maximum number for which a route can be suppressed. The default is four times the half-life value. Range: 1 to 86400 Default: 20 seconds

Defaults   Disabled

Command Modes   INTERFACE (conf-if-)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 14-5.   dampening Command Example**

```
FTOS(conf-if-tengig-3/2)#dampening 20 800 4500 120
FTOS(conf-if-tengig-3/2)#
```

Usage Information   With each flap, FTOS penalizes the interface by assigning a penalty (1024) that decays exponentially depending on the configured half-life. After the accumulated penalty exceeds the suppress threshold value, the interface is moved to the Error-Disabled state. This interface state is deemed as "down" by all static/dynamic Layer 2 and Layer 3 protocols. The penalty is exponentially decayed based on the half-life timer. Once the penalty decays below the reuse threshold, the interface is enabled. The configured parameters should follow:

* *suppress-threshold* should be greater than *reuse-threshold*
* *max-suppress-time* should be at least four times *half-life*

> **Note:** Dampening cannot be applied on an interface that is monitoring traffic for other interfaces.

Related Commands

clear dampening	Clears the dampening counters on all the interfaces or just the specified interface.
show interfaces dampening	Displays interface dampening information.

description

Assign a descriptive text string to the interface.

Syntax	description *desc_text*

To delete a description, enter no description.

Parameters

desc_text	Enter a text string up to 240 characters long.

Defaults No description is defined.

Command Modes INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

- Spaces between characters are not preserved after entering this command unless you enclose the entire description in quotation marks ("*desc_text*").
- Entering a text string after the description command overwrites any previous text string configured as the description.
- The shutdown and description commands are the only commands that you can configure on an interface that is a member of a port-channel.
- Use the show interfaces description command to display descriptions configured for each interface.

Related Commands

show interfaces description	Displays the description field of interfaces.

duplex (1000/10000 Interfaces)

Configure duplex mode on any physical interfaces where the speed is set to 1000/10000.

Syntax	duplex {half	full}

To return to the default setting, use the no duplex command.

Parameters

half	Enter the keyword half to set the physical interface to transmit only in one direction.
full	Enter the keyword full to set the physical interface to transmit in both directions.

Defaults Not configured

Command Modes INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information This command applies to any physical interface with speed set to 1000/10000.

> **Note:** Starting with FTOS 7.8.1.0, when a copper SFP2 module with catalog number GP-SFP2-1T is used, its speed can be manually set with the speed command. When the speed is set to 10 or 100 Mbps, the duplex command can also be executed.

flowcontrol

Control how the system responds to and generates 802.3x pause frames on 10G and 40G stack units.

Syntax   flowcontrol rx {off | on} tx {off | on} threshold

Parameters

rx on	Enter the keywords rx on to process the received flow control frames on this port. This is the default value for the receive side.
rx off	Enter the keywords rx off to ignore the received flow control frames on this port.
tx on	Enter the keywords tx on to send control frames from this port to the connected device when a higher rate of traffic is received. This is the default value on the send side.
tx off	Enter the keywords tx off so that flow control frames are not sent from this port to the connected device when a higher rate of traffic is received.

Defaults   rx off tx off

Command Modes   INTERFACE

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information   The globally assigned 48-bit Multicast address 01-80-C2-00-00-01 is used to send and receive pause frames. To allow full duplex flow control, stations implementing the pause operation instruct the MAC to enable reception of frames with a destination address equal to this multicast address.

The pause:

- Starts when *either* the packet pointer or the buffer threshold is met (whichever is met first). When the discard threshold is met, packets are dropped.
- Ends when *both* the packet pointer and the buffer threshold fall below 50% of the threshold settings.

The *discard threshold* defines when the interface starts dropping the packet on the interface. This may be necessary when a connected device does not honor the flow control frame sent by the MXL Switch. The discard threshold should be larger than the *buffer threshold* so that the buffer holds at least hold at least 3 packets.

On 4-port 10G stack units: Changes in the flow-control values are not reflected automatically in the show interface output for 10G interfaces. This issue results from the fact that 10G interfaces do not support auto-negotiation per-se.

Important Points to Remember

- Do not enable tx pause when buffer carving is enabled. Consult Dell Force10 TAC for information and assistance.
- Asymmetric flow control (rx on tx off or rx off tx on) setting for the interface port less than 100 Mb/s speed is not permitted. The following error is returned:

```
Cannot configure Asymmetric flowcontrol when speed <1G, config ignored
```

- The only configuration applicable to half duplex ports is rx off tx off. The following error is returned:

Cannot configure flowcontrol when half duplex is configure, config ignored

- Half duplex cannot be configured when the flow control configuration is on (default is rx on tx on). The following error is returned:

Cannot configure half duplex when flowcontrol is on, config ignored

📝 **Note:** The flow control must be off (rx off tx off) before configuring the half duplex.

Example   **Figure 14-6.   show running config (partial) Command Example**

```
FTOS(conf-if-tengig-0/1)#show config
!
interface TenGigabitEthernet 0/1
no ip address
switchport
no negotiation auto
flowcontrol rx off tx on
no shutdown
...
```

Table 14-1 lists how FTOS negotiates the flow control values between two Dell Force10 chassis connected back-to-back using 10G copper ports.

Table 14-1.   Negotiated Flow Control Values

Configured				Negotiated			
LocRxConf	LocTxConf	RemoteRxConf	RemoteTxConf	LocNegRx	LocNegTx	RemNegRx	RemNegTx
off	off	off	off	**off**	**off**	**off**	**off**
		off	on	**off**	**off**	**off**	**off**
		on	off	**off**	**off**	**off**	**off**
		on	on	**off**	**off**	**off**	**off**
off	on	off	off	**off**	**off**	**off**	**off**
		off	on	**off**	**off**	**off**	**off**
		on	off	**off**	**on**	**on**	**off**
		on	on	**off**	**off**	**off**	**off**
on	off	off	off	**off**	**off**	**off**	**off**
		off	on	**on**	**off**	**off**	**on**
		on	off	**on**	**on**	**on**	**on**
		on	on	**on**	**on**	**on**	**on**
on	on	off	off	**off**	**off**	**off**	**off**
		off	on	**off**	**off**	**off**	**off**
		on	off	**on**	**on**	**on**	**on**
		on	on	**on**	**on**	**on**	**on**

interface

Configure a physical interface on the switch.

Syntax interface *interface*

Parameters

interface	Enter one of the following keywords and slot/port or number information:
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults Not configured.

Command Modes CONFIGURATION

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Example **Figure 14-7. interface Command Example**

```
FTOS(conf)#interface tengig 0/0
FTOS(conf-if-tengig-0/0)#exit#
```

Usage Information You cannot delete a physical interface.

By default, physical interfaces are disabled (shutdown) and are in Layer 3 mode. To place an interface in mode, ensure that the interface's configuration does not contain an IP address and enter the Port Channel Commands command.

Related Commands

interface loopback	Configures a Loopback interface.
interface null	Configures a Null interface.
interface port-channel	Configures a port channel.
interface vlan	Configures a VLAN.
show interfaces	Displays interface configuration.

interface loopback

Configure a Loopback interface.

Syntax	interface loopback *number*

To remove a loopback interface, use the no interface loopback *number* command.

Parameters

number	Enter a number as the interface number.
	Range: 0 to 16383.

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 14-8. interface loopback Command Example**

```
FTOS(conf)#interface loopback 1655
FTOS(conf-if-lo-1655)#
```

Related Commands

interface	Configures a physical interface.
interface null	Configures a Null interface.
interface port-channel	Configures a port channel.
interface vlan	Configures a VLAN.

interface ManagementEthernet

Configure the Management port on the system.

Syntax	interface ManagementEthernet *slot/port*

Parameters

slot/port	Enter the keyword ManagementEthernet followed by slot number (0-1) and port number zero (0).

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 14-9. interface ManagementEthernet Command Example**

```
FTOS(conf)#interface managementethernet 0/0
FTOS(conf-if-ma-0/0)#
```

Usage Information You cannot delete a Management port.

The Management port is enabled by default (no shutdown). Use the ip address command to assign an IP address to the Management port.

| **Related Commands** | management route | Configure a static route that points to the Management interface or a forwarding router. |
| | duplex (1000/10000 Interfaces) | Configure duplex mode on any physical interfaces where the speed is set to 1000/10000 |

interface null

Configure a Null interface on the switch.

Syntax interface null *number*

Parameters

| *number* | Enter zero (0) as the Null interface number. |

Defaults Not configured; *number* = 0

Command Modes CONFIGURATION

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Example **Figure 14-10.   interface null Command Example**

```
FTOS(conf)#interface null 0
FTOS(conf-if-nu-0)#
```

Usage Information You cannot delete the Null interface. The only configuration command possible in a Null interface is ip unreachables.

Related Commands

interface	Configures a physical interface.
interface loopback	Configures a Loopback interface.
interface port-channel	Configures a port channel.
interface vlan	Configures a VLAN.
ip unreachables	Enables generation of ICMP unreachable messages.

interface range

This command permits configuration of a range of interfaces to which subsequent commands are applied (bulk configuration). Using the interface range command, you can enter identical commands for a range of interface.

Syntax interface range *interface*, *interface*,...

Parameters	*interface,* *interface,...*	Enter the keyword **interface range** and one of the interfaces — slot/port, port-channel or VLAN number. Select the range of interfaces for bulk configuration. You can enter up to six comma separated ranges—spaces are **not** required between the commas. Comma-separated ranges can include VLANs, port-channels and physical interfaces.
		Slot/Port information must contain a space before and after the dash. For example, **interface range tengigabitethernet 0/1 - 5** is valid; **interface range tengigabitethernet 0/1-5** is not valid.
		• For a Port Channel interface, enter the keyword **port-channel** followed by a number:
		Range: 1 to 128
		• For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information.
		• For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.
		• For a VLAN, enter the keyword **vlan** followed by a number from 1 to 4094.

Defaults none

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

When creating an interface range, interfaces appear in the order they are entered; they are not sorted. The command verifies that interfaces are present (physical) or configured (logical). Important things to remember:

• Bulk configuration is created if at least one interface is valid.
• Non-existing interfaces are excluded from the bulk configuration with a warning message.
• The interface range prompt includes interface types with slot/port information for valid interfaces. The prompt allows for a maximum of 32 characters. If the bulk configuration exceeds 32 characters, it is represented by an ellipsis (...).
• When the interface range prompt has multiple port ranges, the smaller port range is excluded from the prompt.
• If overlapping port ranges are specified, the port range is extended to the smallest start port and the biggest end port.

Example **Figure 14-11. Bulk Configuration Warning Message**

```
FTOS(conf)#interface range so 2/0 - 1 , te 10/0 , tengig 3/0  , fa 0/
0
% Warning: Non-existing ports (not configured) are ignored by
```

Example **Figure 14-12. Interface Range prompt with Multiple Ports**

```
FTOS(conf)#interface range tengig 2/0 - 23 , tengig 2/1 - 10
FTOS(conf-if-range-tengig-2/0-23#
```

Example **Figure 14-13.   Interface Range prompt Overlapping Port Ranges**

```
FTOS(conf)#interface range tengig 2/1 - 11 , tengig 2/1 - 23
FTOS(conf-if-range-tengig-2/1-23#
```

Only VLAN and port-channel interfaces created using the interface vlan and interface port-channel commands can be used in the interface range command.

Use the show running-config command to display the VLAN and port-channel interfaces. VLAN or port-channel interfaces that are not displayed in the show running-config command cannot be used with the bulk configuration feature of the interface range command. You cannot create virtual interfaces (VLAN, Port-channel) using the interface range command.

> ✎ **Note:** If a range has VLAN, physical, and port-channel interfaces, only commands related to physical interfaces can be bulk configured. To configure commands specific to VLAN or port-channel, only those respective interfaces should be configured in a particular range.

Figure 14-14 is an example of a single range bulk configuration.

Example **Figure 14-14.   Single Range Bulk Configuration**

```
FTOS(conf)# interface range tengigabitethernet 5/1 - 23
FTOS(conf-if-range)# no shutdown
FTOS(conf-if-range)#
```

Figure 14-15 shows how to use commas to add different interface types to the range enabling all Ten Gigabit Ethernet interfaces in the range 5/1 to 5/23 and both Ten Gigabit Ethernet interfaces 1/1 and 1/2.

Example **Figure 14-15.   Multiple Range Bulk Configuration Gigabit Ethernet and Ten Gigabit Ethernet**

```
FTOS(conf-if)# interface range tengigabitethernet 5/1 - 23, tengigabitethernet 1/1 - 2
FTOS(conf-if-range)# no shutdown
FTOS(conf-if-range)#
```

Figure 14-16 shows how to use commas to add VLAN and port-channel interfaces to the range.

Example **Figure 14-16.   Multiple Range Bulk Configuration with VLAN and port channel**

```
FTOS(conf-if)# interface range tengigabitethernet 5/1 - 23, tengigabitethernet 1/1 - 2,
Vlan 2 - 100 , Port 1 - 25
FTOS(conf-if-range)# no shutdown
FTOS(conf-if-range)#
```

Related Commands

interface port-channel	Configures a port channel group.
interface vlan	Configures a VLAN interface.
show config (from INTERFACE RANGE mode)	Shows the bulk configuration interfaces.
show range	Shows the bulk configuration ranges.
interface range macro (define)	Defines a macro for an interface-range.

interface range macro (define)

Defines a macro for an interface range and then saves the macro in the running configuration.

Syntax   define interface range macro *name interface* , *interface* , ...

Parameters

name	Enter up to 16 characters for the macro name.
interface , *interface* ,...	Enter the interface keyword (see below) and one of the interfaces slot/port, port-channel or VLAN numbers. Select the range of interfaces for bulk configuration. You can enter up to six comma separated ranges—spaces are **not** required between the commas. Comma-separated ranges can include VLANs, port-channels and physical interfaces. Slot/Port information must contain a space before and after the dash. For example, interface range tengigabitethernet 0/1 - 5 is valid; interface range tengigabitethernet 0/1-5 is not valid. • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information. • For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 14-17.   define interface-range macro *C*ommand Example**

```
FTOS(conf)# define interface-range test tengigabitethernet 0/0 - 3 ,
tengigabitethernet 5/0 - 47 , tengigabitethernet 13/0 - 89

FTOS# show running-config | grep define
define interface-range test tengigabitethernet 0/0 - 3 , tengigabitethernet 5/0 -
47 , tengigabitethernet 13/0 - 89
FTOS(conf)#interface range macro test
FTOS(conf-if-range-te-0/0-3,tengig-5/0-47,tengig-13/0-89)#
```

Usage Information   Figure 14-17 is an example of how to define an interface range macro named *test*. To display the macro definition, execute the show running-config command.

Related Commands

interface range	Configures a range of command (bulk configuration)
interface range macro name	Runs an interface range macro.

interface range macro *name*

Run the interface-range macro to automatically configure the pre-defined range of interfaces.

Syntax	interface range macro *name*

Parameters		
	name	Enter the name of an existing macro.

Defaults	none

Command Modes	CONFIGURATION

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Figure 14-18 runs the macro named *test* that was defined earlier.

Example   **Figure 14-18.   interface-range macro Command Example**

```
FTOS(conf)#interface range macro test
FTOS(conf-if-range-te-0/0-3,tengig-5/0-47,tengig-13/0-89)#
```

Related Commands		
	interface range	Configures a range of command (bulk configuration)
	interface range macro (define)	Defines a macro for an interface range (bulk configuration)

interface vlan

Configure a VLAN. You can configure up to 4094 VLANs.

Syntax	interface vlan *vlan-id*

To delete a VLAN, use the no interface vlan *vlan-id* command.

Parameters		
	vlan-id	Enter a number as the VLAN Identifier. Range: 1 to 4094.

Defaults	Not configured, except for the Default VLAN, which is configured as VLAN 1.

Command Modes	CONFIGURATION

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 14-19.   interface vlan Command Example**

```
FTOS(conf)#int vlan 3
FTOS(conf-if-vl-3)#
```

Usage Information   For more information about VLANs and the commands to configure them, refer to Virtual LAN (VLAN) Commands.

FTP, TFTP, and SNMP operations are not supported on a VLAN. MAC ACLs are not supported in VLANs. IP ACLs are supported. Refer to Chapter 6, Access Control Lists (ACL).

Related Commands		
	interface	Configures a physical interface.
	interface loopback	Configures a loopback interface.
	interface null	Configures a null interface.
	interface port-channel	Configures a port channel group.
	show vlan	Displays the current VLAN configuration on the switch.
	shutdown	Disables/Enables the VLAN.
	tagged	Adds a Layer 2 interface to a VLAN as a tagged interface.
	untagged	Adds a Layer 2 interface to a VLAN as an untagged interface.

intf-type cr4 autoneg

Set the interface type as CR4 with auto-negotiation enabled.

Syntax   intf-type cr4 autoneg

If intf-type cr4 autoneg is configured, use the no intf-type cr4 autoneg command to set the interface type as cr4 with autonegotiation disabled.

Defaults   Not configured

Command Modes   CONFIGURATION

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   If interface type is configured as CR4 with auto-negotiation enabled, then the peer should also be configured as CR4 with auto-negotiation. Many DAC cable link issues can be resolved by setting the interface type as CR4.

Related Commands		
	interface	Configures a physical interface.
	interface loopback	Configures a loopback interface.
	interface null	Configures a null interface.
	interface port-channel	Configures a port channel group.

keepalive

Send keepalive packets periodically to keep an interface alive when it is not transmitting data.

Syntax   keepalive [*seconds*]

To stop sending keepalive packets, use the no keepalive command.

Parameters		
seconds	(OPTIONAL) For interfaces with PPP encapsulation enabled, enter the number of seconds between keepalive packets.	
	Range: 0 to 23767	
	Default: 10 seconds	

Defaults   Enabled

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   When you configure keepalive, the system sends a self-addressed packet out of the configured interface to verify that the far end of a WAN link is up. When you configure no keepalive, the system does not send keepalive packets and so the local end of a WAN link remains up even if the remote end is down.

monitor interface

Monitor counters on a single interface or all interfaces on a stack unit. The screen is refreshed every 5 seconds and the CLI prompt disappears.

Syntax   monitor interface [*interface*]

To disable monitoring and return to the CLI prompt, press the q key.

Parameters	
interface	(OPTIONAL) Enter the following keywords and slot/port or number information:
	• For the management port, enter the keyword managementethernet followed by the slot (0-1) and the port (0).
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The delta column displays changes since the last screen refresh.

Example   **Figure 14-20.   monitor Command Example of a Single Interface**

```
systest-3   Monitor time: 00:00:06   Refresh Intvl.: 2s   Time: 03:26:26

Interface: tengig 0/3, Enabled, Link is Up, Linespeed is 1000 Mbit

 Traffic statistics:              Current           Rate                Delta
       Input bytes:              9069828          43 Bps                  86
      Output bytes:            606915800          43 Bps                  86
     Input packets:                54001           0 pps                   1
    Output packets:              9401589           0 pps                   1
       64B packets:                   67           0 pps                   0
  Over 64B packets:                49166           0 pps                   1
 Over 127B packets:                  350           0 pps                   0
 Over 255B packets:                 1351           0 pps                   0
 Over 511B packets:                  286           0 pps                   0
Over 1023B packets:                 2781           0 pps                   0
Error statistics:
   Input underruns:                    0           0 pps                   0
     Input giants:                     0           0 pps                   0
   Input throttles:                    0           0 pps                   0
         Input CRC:                    0           0 pps                   0
 Input IP checksum:                    0           0 pps                   0
     Input overrun:                    0           0 pps                   0
  Output underruns:                    0           0 pps                   0
  Output throttles:                    0           0 pps                   0

     m - Change mode                      c - Clear screen
     l - Page up                          a - Page down
     T - Increase refresh interval        t - Decrease refresh interval
     q - Quit
```

Table 14-2.   monitor Command Menu Options

Key	Description
systest-3	Displays the host name assigned to the system.
monitor time	Displays the amount of time since the monitor interface command was entered.
time	Displays the amount of time the chassis is up (since last reboot).
m	Change the view from a single interface to all interfaces on the stack unit or visa-versa.
c	Refresh the view.
b	Change the counters displayed from Packets on the interface to Bytes.
r	Change the [delta] column from change in the number of packets/bytes in the last interval to rate per second.
l	Change the view to next interface on the stack unit, or if in the stack unit mode, the next stack unit in the chassis.
a	Change the view to the previous interface on the stack unit, or if the stack unit mode, the previous stack unit in the chassis.
T	Increase the screen refresh rate.
t	Decrease the screen refresh rate.
q	Return to the CLI prompt.

mtu

Set the Maximum Link MTU (frame size) for an Ethernet interface.

Syntax   mtu *value*

To return to the default MTU value, use the no mtu command.

Parameters

value	Enter a maximum frame size in bytes.
	Range: 594 to 9252
	MXL Switch Range: 594 to 12000
	Default: 1554

Defaults   1554

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

If the packet includes a Layer 2 header, the difference between the link MTU and IP MTU (ip mtu command) must be enough bytes to include the Layer 2 header:

- The IP MTU will get adjusted automatically when the Layer 2 MTU is configured with the mtu command.

When you enter the no mtu command, FTOS reduces the IP MTU value to 1536 bytes.

Link MTU and IP MTU considerations for port channels and VLANs are as follows.

port channels:

- All members must have the same link MTU value and the same IP MTU value.
- The port channel link MTU and IP MTU must be less than or equal to the link MTU and IP MTU values configured on the channel members.

Example: if the members have a link MTU of 2100 and an IP MTU 2000, the port channel's MTU values cannot be higher than 2100 for link MTU or 2000 bytes for IP MTU.

VLANs:

- All members of a VLAN must have same IP MTU value.
- Members can have different Link MTU values. Tagged members must have a link MTU 4 bytes higher than untagged members to account for the packet tag.
- The VLAN link MTU and IP MTU must be less than or equal to the link MTU and IP MTU values configured on the VLAN members.

Example

The VLAN contains tagged members with Link MTU of 1522 and IP MTU of 1500 and untagged members with Link MTU of 1518 and IP MTU of 1500. The VLAN's Link MTU cannot be higher than 1518 bytes and its IP MTU cannot be higher than 1500 bytes.

Table 14-3.   Difference between Link MTU and IP MTU

Layer 2 Overhead	Link MTU and IP MTU Delta
Ethernet (untagged)	18 bytes
VLAN Tag	22 bytes
Untagged Packet with VLAN-Stack Header	22 bytes
Tagged Packet with VLAN-Stack Header	26 bytes

negotiation auto

Enable auto-negotiation on an interface.

Syntax negotiation auto

To disable auto-negotiation, enter no negotiation auto.

Defaults Enabled

Command Modes INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The no negotiation auto command is only available if you first manually set the speed of a port to 10Mbits or 100Mbits.

The negotiation auto command provides a mode option for configuring an individual port to forced-master/forced slave once auto-negotiation is enabled

Figure 14-21.   negotiation auto Master/Slave Example

```
FTOS(conf)# int tengig 0/0
FTOS(conf-if)#neg auto
FTOS(conf-if-autoneg)# ?

end                    Exit from configuration mode
exit                   Exit from autoneg configuration mode
mode                   Specify autoneg mode
no                     Negate a command or set its defaults
show                   Show autoneg configuration information
FTOS(conf-if-autoneg)#mode ?
forced-master          Force port to master mode
forced-slave           Force port to slave mode
FTOS(conf-if-autoneg)#
```

If the mode option is not used, the default setting is slave. If you do not configure forced-master or forced slave on a port, the port negotiates to either a master or a slave state. Port status is one of the following:

- Forced-master
- Force-slave
- Master
- Slave
- Auto-neg Error—typically indicates that both ends of the node are configured with forced-master or forced-slave.

△ **Caution:** Ensure that one end of your node is configured as forced-master and one is configured as forced-slave. If both are configured the same (that is forced-master or forced-slave), the show interfaces command will flap between an auto-neg-error and forced-master/slave states.

You can display master/slave settings with the show interfaces command.

Figure 14-22.   Display Auto-negotiation Master/Slave Setting (partial)

```
FTOS#show interfaces configured
TenGigabitEthernet 13/18 is up, line protocol is up
Hardware is Dell Force10Eth, address is 00:01:e8:05:f7:fc
    Current address is 00:01:e8:05:f7:fc
Interface index is 474791997
Internet address is 1.1.1.1/24
MTU 1554 bytes, IP MTU 1500 bytes
LineSpeed 1000 Mbit, Mode full duplex, Master
ARP type: ARPA, ARP Timeout 04:00:00
Last clearing of "show interfaces" counters 00:12:42
Queueing strategy: fifo
Input Statistics:
...
```

Both sides of the link must have auto-negotiation enabled or disabled for the link to come up.

The following table details the possible speed and auto-negotiation combinations for a line between two 100/1000 Base-T Ethernet interfaces.

Table 14-4.   Auto-negotiation and Link Speed Combinations

Port 0	Port 1	Link Status between Port 1 and Port 2
auto-negotiation enabled* speed 1000 or auto	auto-negotiation enabled* speed 1000 or auto	Up at 1000 Mb/s
auto-negotiation enabled speed 100	auto-negotiation enabled speed 100	Up at 100 Mb/s
auto-negotiation disabled speed 100	auto-negotiation disabled speed 100	Up at 100 Mb/s
auto-negotiation disabled speed 100	auto-negotiation enabled speed 100	Down
auto-negotiation enabled* speed 1000 or auto	auto-negotiation disabled speed 100	Down

* You cannot disable auto-negotiation when the speed is set to 1000 or auto.

Related Commands	speed (for 1000/10000/auto interfaces)	Set the link speed to 1000, 10000, or auto-negotiate the speed.

portmode hybrid

Set a physical port or port-channel to accept *both* tagged and untagged frames. A port configured this way is identified as a hybrid port in report displays.

Syntax   portmode hybrid

To return a port to accept *either* tagged or untagged frames (non-hybrid), use the no portmode hybrid command.

Defaults   non-hybrid

Command Modes   INTERFACE (conf-if-*interface-slot/port*)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 14-23.   portmode hybrid Configuration Example**

```
FTOS(conf)#interface tengig 0/20
FTOS(conf-if-te-0/20)#no shut
FTOS(conf-if-te-0/20)#portmode hybrid
FTOS(conf-if-te-0/20)#sw
FTOS(conf-if-te-0/20)#int vlan 10
FTOS(conf-if-vl-10)#tag tengig 0/20
FTOS(conf-if-vl-10)#int vlan 20
FTOS(conf-if-vl-20)#untag tengig 0/20
FTOS(conf-if-vl-20)#
```

Usage Information   Figure 14-23 sets a port as hybrid, makes the port a tagged member of VLAN 20, and an untagged member of VLAN 10, which becomes the native VLAN of the port. The port will now accept:

- untagged frames and classify them as VLAN 10 frames
- VLAN 20 tagged frames

The next figure is an example show output with "Hybrid" as the newly added value for 802.1QTagged. The options for this field are:

- True—port is tagged
- False—port is untagged
- Hybrid—port accepts both tagged and untagged frames

Figure 14-24.   Display the Tagged Hybrid Interface

```
FTOS(conf)#interface tengig 0/20
FTOS(conf-if-te-0/20)#no shut
FTOS(conf-if-te-0/20)#portmode hybrid
FTOS(conf-if-te-0/20)#sw
FTOS(conf-if-te-0/20)#int vlan 10
FTOS(conf-if-vl-10)#int tengig 0/20
FTOS(conf-if-vl-20)# untag tengig 0/20

FTOS (conf-if-vl-20)#

FTOS(conf)#do show interfaces switchport tengigabitethernet 3/20

 Codes:  U – Untagged, T – Tagged

        x – Dot1x untagged, X – Dot1x tagged

        G – GVRP tagged, M – Trunk, H – VSN tagged

       i – Internal untagged, I – Internal tagged, v – VLT untagged,
V – VLT tagged

 Name: TenGigabitEthernet 3/20

802.1QTagged: Hybrid

Vlan membership:

Q       Vlans

U       20

T       10

Native VlanId:    20.

FTOS(conf)#
```

Figure 14-25 is an example of unconfiguration of the hybrid port using the no portmode hybrid command.

> **Note:** You must remove all other configurations on the port before you can remove the hybrid configuration from the port.

Example   **Figure 14-25.   Unconfigure the hybrid port**

```
FTOS(conf-if-vl-20)#interface vlan 10
FTOS(conf-if-vl-10)#no untagged tengig 0/20
FTOS(conf-if-vl-10)#interface vlan 20
FTOS(conf-if-vl-20)#no tagged tengig 0/20
FTOS(conf-if-vl-20)#interface tengig 0/20
FTOS(conf-if-te-0/20)#no portmode hybrid
FTOS(conf-if-vl-20)#
```

Related Commands

show interfaces switchport	Displays the configuration of switchport (Layer 2) interfaces on the switch.
vlan-stack trunk	Specifies an interface as a trunk port to the Stackable VLAN network.

rate-interval

Configure the traffic sampling interval on the selected interface.

Syntax	rate-interval *seconds*

Parameters		
seconds	Enter the number of seconds for which to collect traffic data.
	Range: 5 to 299 seconds
	Note: For 0-5 seconds, polling occurs every 5 seconds. For 6-10 seconds, polling occurs every 10 seconds. For any other value, polling occurs every 15 seconds.

Defaults 299 seconds

Command Modes INTERFACE

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The configured rate interval is displayed, along with the collected traffic data, in the output of show interfaces commands.

Related Commands		
show interfaces	Displays information on physical and virtual interfaces.

show config

Display the interface configuration.

Syntax show config

Command Modes INTERFACE

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 14-26.   show config Command Example for the INTERFACE Mode**

```
FTOS(conf-if)#show conf
!
interface TenGigabitEthernet 1/7
 no ip address
 switchport
 no shutdown
FTOS(conf-if)#
```

show config (from INTERFACE RANGE mode)

Display the bulk configured interfaces (interface range).

Syntax show config

Command Modes CONFIGURATION INTERFACE (conf-if-range)

Example

Figure 14-27.   show config (Bulk Configuration) Command Example

```
FTOS(conf)#interface range tengigabitethernet 1/1 - 2
FTOS(conf-if-range-tengig-1/1-2)#show config
 !
interface TenGigabitEthernet 1/1
 no ip address
 switchport
 no shutdown
 !
interface TenGigabitEthernet 1/2
 no ip address
 switchport
 no shutdown
FTOS(conf-if-range-tengig-1/1-2)#
```

show interfaces

Display information on a specific physical interface or virtual interface.

Syntax   show interfaces *interface*

Parameters

interface	Enter one of the following keywords and slot/port or number information:
	• For a Loopback interface, enter the keyword loopback followed by a number from 0 to 16383.
	• For the management interface, enter the keyword ManagementEthernet followed by the slot/port information. The slot range is 0 to 1 and the port range is 0.
	• For a Null interface, enter the keywords null 0.
	• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage   Use this show interfaces command for details on a specific interface. Use the show interfaces stack-unit command for details on all interfaces on the designated stack unit.

On the MXL Switch, the show interface output displays incorrect rate information details over time for link monitoring when the rate-interval is configured for 5 seconds. Dell Force10 recommends using higher rate-intervals such as 15 to 299 seconds to minimize the errors seen.

> **Note:** In the CLI output, the power value will be rounded to a 3-digit value. For receive/transmit power that is less than 0.000, an snmp query will return the corresponding dbm value even though the CLI displays as 0.000.

☑ **Note:** After the counters are cleared, the line-rate continues to increase until it reaches the maximum line rate. When the maximum line rate is reached, there will be no change in the line-rate.

Example **Figure 14-28.   show interfaces Command Example for 10G Port**

```
FTOS#show interfaces tengigabitethernet 2/0
TenGigabitEthernet 2/0 is up, line protocol is up
Hardware is Dell Force10Eth, address is 00:01:e8:05:f7:3a
Interface index is 100990998
Internet address is 213.121.22.45/28
MTU 1554 bytes, IP MTU 1500 bytes
LineSpeed 10000 Mbit
ARP type: ARPA, ARP Timeout 04:00:00
Last clearing of "show interfaces" counters 02:31:45
Queueing strategy: fifo
Input Statistics:
     0 packets, 0 bytes
     Input 0 IP Packets, 0 Vlans 0 MPLS
     0 64-byte pkts, 0 over 64-byte pkts, 0 over 127-byte pkts
     0 over 255-byte pkts, 0 over 511-byte pkts, 0 over 1023-byte pkts
     0 symbol errors, 0 runts, 0 giants, 0 throttles
     0 CRC, 0 IP Checksum, 0 overrun, 0 discarded
Output Statistics:
     1 packets, 64 bytes, 0 underruns
     0 Multicasts, 2 Broadcasts, 0 Unicasts
     0 IP Packets, 0 Vlans, 0 MPLS
     0 throttles, 0 discarded
Rate info (interval 299 seconds):
     Input 00.00 Mbits/sec,          0 packets/sec, 0.00% of line-rate
     Output 00.00 Mbits/sec,         0 packets/sec, 0.00% of line-rate
Time since last interface status change: 00:00:27
```

Table 14-5.   Lines in show interfaces Command Example

Line	Description
TenGigabitEthernet 2/0...	Displays the interface's type, slot/port, and administrative and line protocol status.
Hardware is...	Displays the interface's hardware information and its assigned MAC address.
Interface index...	Displays the interface index number used by SNMP to identify the interface.
Internet address...	States whether an IP address is assigned to the interface. If one is, that address is displayed.
MTU 1554...	Displays link and IP MTU information.
	If the chassis is in Jumbo mode, this number can range from 576 to 9252.
LineSpeed	Displays the interface's line speed.
ARP type:...	Displays the ARP type and the ARP timeout value for the interface.
Last clearing...	Displays the time when the show interfaces counters where cleared.
Queuing strategy...	States the packet queuing strategy. FIFO means first in first out.

Table 14-5.   Lines in show interfaces Command Example

Line	Description

Input Statistics:	Displays all the input statistics including:
	
	• Number of packets and bytes into the interface
	• Number of packets with IP headers and VLAN tagged headers.
	
	Note: The sum of the number of packets may not be as expected since a VLAN tagged IP packet counts as both a VLAN packet and an IP packet.
	
	• Packet size and the number of those packets inbound to the interface
	• Number of symbol errors, runts, giants, and throttles packets:
	    symbol errors = number packets containing bad data. That is, the port MAC detected a physical coding error in the packet.
	    runts = number of packets that are less than 64B
	    giants = packets that are greater than the MTU size
	    throttles = packets containing PAUSE frames
	• Number of CRC, IP Checksum, overrun, and discarded packets:
	    CRC = packets with CRC/FCS errors
	    IP Checksum = packets with IP Checksum errors
	    overrun = number of packets discarded due to FIFO overrun conditions
	    discarded = the sum of input symbol errors, runts, giants, CRC, IP Checksum, and overrun packets discarded without any processing

Output Statistics:	Displays output statistics sent out of the interface including:
	
	• Number of packets, bytes and underruns out of the interface
	    packets = total number of packets
	    bytes = total number of bytes
	    underruns = number of packets with FIFO underrun conditions
	• Number of Multicast, Broadcast and Unicast packets:
	    Multicasts = number of MAC multicast packets
	    Broadcasts = number of MAC broadcast packets
	    Unicasts = number of MAC unicast packets
	• Number of throttles and discards packets:
	    throttles = packets containing PAUSE frames
	    discarded = number of packets discarded without any processing

Rate information...	Estimate of the input and output traffic rate over a designated interval (30 to 299 seconds). Traffic rate is displayed in bits, packets per second, and percent of line rate.
Time since...	Elapsed time since the last interface status change (hh:mm:ss format).

Example   **Figure 14-29.   show interfaces Command Example for 1G SFP Interface**

```
FTOS#show interfaces tengigabitethernet 0/44
TenGigabitEthernet 0/44 is up, line protocol is up
Hardware is DellForce10Eth, address is 00:01:e8:43:00:01
    Current address is 00:01:e8:43:00:01
Port is present
Pluggable media present, SFP+ type is 10GBASE-SR
    Medium is MultiRate, Wavelength is 850nm
    SFP+ receive power reading is -3.6041dBm
Interface index is 45420801
Internet address is not set
Mode of IP Address Assignment : NONE
DHCP Client-ID :tenG1730001e8430001
MTU 1554 bytes, IP MTU 1500 bytes
LineSpeed 10000 Mbit
Flowcontrol rx off tx off
ARP type: ARPA, ARP Timeout 04:00:00
Last clearing of "show interface" counters 21:14:32
Queueing strategy: fifo
Input Statistics:
     94322888 packets, 6036664832 bytes
     94322888 64-byte pkts, 0 over 64-byte pkts, 0 over 127-byte pkts
     0 over 255-byte pkts, 0 over 511-byte pkts, 0 over 1023-byte pkts
     0 Multicasts, 94322888 Broadcasts
     0 runts, 0 giants, 0 throttles
     0 CRC, 0 overrun, 0 discarded
Output Statistics:
     180384 packets, 11926850 bytes, 0 underruns
     172622 64-byte pkts, 7762 over 64-byte pkts, 0 over 127-byte pkts
     0 over 255-byte pkts, 0 over 511-byte pkts, 0 over 1023-byte pkts
     7762 Multicasts, 87726 Broadcasts, 84896 Unicasts
     0 throttles, 0 discarded, 0 collisions
Rate info (interval 299 seconds):
     Input 00.00 Mbits/sec,          0 packets/sec, 0.00% of line-rate
     Output 00.00 Mbits/sec,         0 packets/sec, 0.00% of line-rate
Time since last interface status change: 21:13:36FTOS#
```

Figure 14-30.   show interfaces ManagementEthernet Command Example

```
FTOS#show interface managementethernet ?
0/0                     Management Ethernet interface number
FTOS#show interface managementethernet 0/0
ManagementEthernet 0/0 is up, line protocol is up
Hardware is DellForce10Eth, address is 00:1e:c9:f1:00:05
    Current address is 00:1e:c9:f1:00:05
Pluggable media not present
Interface index is 235159752
Internet address is 10.11.209.87/16
Mode of IP Address Assignment : MANUAL
DHCP Client-ID: mgmt001ec9f10005
Virtual-IP is not set
Virtual-IP IPv6 address is not set
MTU 1554 bytes, IP MTU 1500 bytes
LineSpeed 100 Mbit, Mode full duplex
ARP type: ARPA, ARP Timeout 04:00:00
Last clearing of "show interface" counters 5d4h57m
Queueing strategy: fifo
    Input 3448753 packets, 950008323 bytes, 3442163 multicast
    Received 0 errors, 0 discarded
    Output 4627 packets, 814226 bytes, 0 multicast
    Output 0 errors, 0 invalid protocol
```

Usage   The interface counter "over 1023-byte pkts" does not increment for packets in the range 9216 > x <
Information 1023.

The Management port is enabled by default (no shutdown). If necessary, use the ip address command
to assign an IP address to the Management port.

show interfaces configured	Displays any interface with a non-default configuration.
show interfaces stack-unit	Displays information on all interfaces on a specific stack unit.
strict-priority unicast	Displays information of either rate limiting or rate policing on the interface.
show interfaces switchport	Displays Layer 2 information about the interfaces.
show inventory	Displays the MXL switch type, components (including media), FTOS version including hardware identification numbers and configured protocols.
show ip interface	Displays Layer 3 information about the interfaces.
show memory	Displays the stack unit(s) status.
show range	Displays all interfaces configured using the interface range command.

show interfaces configured

Display any interface with a non-default configuration.

Syntax   show interfaces configured

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 14-31.   show interfaces configured Command Example**

```
FTOS#show interfaces configured
TenGigabitEthernet 13/18 is up, line protocol is up
Hardware is DellForce10Eth, address is 00:01:e8:05:f7:fc
    Current address is 00:01:e8:05:f7:fc
Interface index is 474791997
Internet address is 1.1.1.1/24
MTU 1554 bytes, IP MTU 1500 bytes
LineSpeed 1000 Mbit, Mode full duplex, Master
ARP type: ARPA, ARP Timeout 04:00:00
Last clearing of "show interfaces" counters 00:12:42
Queueing strategy: fifo
Input Statistics:
     10 packets, 10000 bytes
     0 Vlans
     0 64-byte pkts, 0 over 64-byte pkts, 0 over 127-byte pkts
     0 over 255-byte pkts, 10 over 511-byte pkts, 0 over 1023-byte pkts
     0 Multicasts, 0 Broadcasts
     0 runts, 0 giants, 0 throttles
     0 CRC, 0 overrun, 0 discarded
Output Statistics:
     1 packets, 64 bytes, 0 underruns
     1 64-byte pkts, 0 over 64-byte pkts, 0 over 127-byte pkts
     0 over 255-byte pkts, 0 over 511-byte pkts, 0 over 1023-byte pkts
     0 Multicasts, 1 Broadcasts, 0 Unicasts
     0 Vlans, 0 throttles, 0 discarded, 0 collisions
Rate info (interval 299 seconds):
     Input 00.00 Mbits/sec,          0 packets/sec, 0.00% of line-rate
     Output 00.00 Mbits/sec,          0 packets/sec, 0.00% of line-rate
Time since last interface status change: 00:04:59
FTOS#
```

show interfaces	Displays information on a specific physical interface or virtual interface.

show interfaces dampening

Display interface dampening information.

Syntax   show interfaces dampening [[*interface*] [summary] [detail]]

Parameters

interface	(OPTIONAL) Enter one of the following keywords and slot/port or number information:
	• For a Port Channel interface, enter the keyword port-channel followed by a number:
	Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
summary	(OPTIONAL) Enter the keyword summary to display the current summary of dampening data, including the number of interfaces configured and the number of interfaces suppressed, if any.
detail	(OPTIONAL) Enter the keyword detail to display detailed interface dampening data.

Defaults   none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 14-32.   show interfaces dampening Command Example**

```
FTOS#show interfaces dampening
Interface      Supp    Flaps      Penalty      Half-Life    Reuse     Suppress    Max-Sup
               State
tengig 3/2      Up       0          0             20          800        4500        120
tengig 3/10     Up       0          0             5           750        2500        20
FTOS#
```

Related Commands

dampening	Configures dampening on an interface
show interfaces	Displays information on a specific physical interface or virtual interface.
show interfaces configured	Displays any interface with a non-default configuration.

show interfaces description

Display the descriptions configured on the interface.

Syntax	show interfaces [*interface*] description

Parameters

interface	Enter one of the following keywords and slot/port or number information:

- For Loopback interfaces, enter the keyword loopback followed by a number from 0 to 16383.
- For the management interface on the stack unit enter the keyword ManagementEthernet followed by the slot/port information. The slot range is 0-0 and the port range is 0.
- For the Null interface, enter the keywords null 0.
- For a Port Channel interface, enter the keyword port-channel followed by a number:
  Range: 1-128.
- For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
- For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
- For VLAN interfaces, enter the keyword vlan followed by a number from 1 to 4094.

Command Modes

EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 14-33.** **show interfaces description Command Example**

```
FTOS#show interface description
Interface            OK  Status     Protocol    Description
TenGigabitEthernet 0/1   NO  admin down down
TenGigabitEthernet 0/2   NO  admin down down
TenGigabitEthernet 0/3   NO  admin down down
TenGigabitEthernet 0/4   NO  admin down down
TenGigabitEthernet 0/5   NO  admin down down
TenGigabitEthernet 0/6   NO  admin down down
TenGigabitEthernet 0/7   NO  up         down
TenGigabitEthernet 0/8   YES up         up
TenGigabitEthernet 0/9   NO  admin down down
TenGigabitEthernet 0/10  NO  admin down down
TenGigabitEthernet 0/11  NO  admin down down
TenGigabitEthernet 0/12  NO  admin down down
TenGigabitEthernet 0/13  NO  admin down down
TenGigabitEthernet 0/14  NO  admin down down
TenGigabitEthernet 0/15  NO  admin down down
TenGigabitEthernet 0/16  YES up         up
TenGigabitEthernet 0/17  NO  admin down down
TenGigabitEthernet 0/18  NO  admin down down
TenGigabitEthernet 0/19  NO  admin down down
TenGigabitEthernet 0/20  NO  admin down down
TenGigabitEthernet 0/21  NO  admin down down
```

Table 14-6. **show interfaces description Command Example Fields**

Field	Description
Interface	Displays type of interface and associated slot and port number.
OK?	Indicates if the hardware is functioning properly.
Status	States whether the interface is enabled (up) or disabled (administratively down).

Table 14-6. show interfaces description Command Example Fields

Field	Description
Protocol	States whether IP is enabled (up) or disabled (down) on the interface.
Description	Displays the description (if any) manually configured for the interface.

Related Commands

show interfaces   Display information on a specific physical interface or virtual interface.

show interfaces stack-unit

Display information on all interfaces on a specific MXL Switch stack member.

Syntax   show interfaces stack-unit *unit-number*

Parameters

unit-number	Enter the stack member number (0 to 5).

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 14-34. show interfaces status Command Example**

```
FTOS#show interfaces stack-unit 0
TenGigabitEthernet 0/1 is down, line protocol is down
Hardware is DellForce10Eth, address is 00:1e:c9:f1:00:05
    Current address is 00:1e:c9:f1:00:05
Server Port AdminState is Down
Pluggable media not present
Interface index is 34148609
Internet address is not set
Mode of IP Address Assignment : NONE
DHCP Client-ID :tenG130001ec9f10005
MTU 1554 bytes, IP MTU 1500 bytes
LineSpeed auto
Flowcontrol rx off tx off
ARP type: ARPA, ARP Timeout 04:00:00
Last clearing of "show interface" counters 5d5h24m
Queueing strategy: fifo
Input Statistics:
     0 packets, 0 bytes
     0 64-byte pkts, 0 over 64-byte pkts, 0 over 127-byte pkts
     0 over 255-byte pkts, 0 over 511-byte pkts, 0 over 1023-byte pkts
     0 Multicasts, 0 Broadcasts
     0 runts, 0 giants, 0 throttles
     0 CRC, 0 overrun, 0 discarded
Output Statistics:
     0 packets, 0 bytes, 0 underruns
     0 64-byte pkts, 0 over 64-byte pkts, 0 over 127-byte pkts
     0 over 255-byte pkts, 0 over 511-byte pkts, 0 over 1023-byte pkts
     0 Multicasts, 0 Broadcasts, 0 Unicasts
     0 throttles, 0 discarded, 0 collisions
Rate info (interval 299 seconds):
     Input 00.00 Mbits/sec,          0 packets/sec, 0.00% of line-rate
     Output 00.00 Mbits/sec,         0 packets/sec, 0.00% of line-rate
Time since last interface status change: 5d5h23m
!-------------output truncated ---------------!
```

show interfaces status

Display a summary of interface information or specify a stack unit and interface to display status information for that specific interface only.

Syntax show interfaces [*interface* | stack-unit *unit-number*] status

Parameters

interface	(OPTIONAL) Enter one of the following keywords and slot/port or number information:
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults none

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 14-35.   show interfaces status Command Example**

```
FTOS#show interface status
Port      Description  Status Speed      Duplex Vlan
Te 0/1                 Down   Auto       Auto    --
Te 0/2                 Down   Auto       Auto    --
Te 0/3                 Down   Auto       Auto    --
Te 0/4                 Down   Auto       Auto    --
Te 0/5                 Down   Auto       Auto    --
Te 0/6                 Down   Auto       Auto    --
Te 0/7                 Down   Auto       Auto    --
Te 0/8                 Up     10000 Mbit Full    --
Te 0/9                 Down   Auto       Auto    --
Te 0/10                Down   Auto       Auto    --
Te 0/11                Down   Auto       Auto    --
Te 0/12                Down   Auto       Auto    --
Te 0/13                Down   Auto       Auto    --
Te 0/14                Down   Auto       Auto    --
Te 0/15                Down   Auto       Auto    --
Te 0/16                Up     10000 Mbit Full    --
FTOS#
```

Related Commands

show interfaces	Displays information on a specific physical interface or virtual interface.

show interfaces switchport

Display only virtual and physical interfaces in Layer 2 mode. This command displays the Layer 2 mode interfaces' IEEE 802.1Q tag status and VLAN membership.

Syntax show interfaces switchport [*interface* | stack-unit *unit-id*]

Parameters

interface	Enter one of the following keywords and slot/port or number information: • For a Port Channel interface, enter the keyword **port-channel** followed by a number: Range: 1-128 • For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information. • Enter the keyword **backup** to view the backup interface for this interface.
stack-unit *unit-id*	(OPTIONAL) Enter the keyword **stack-unit** followed by the stack member number. Range: 0 to 5

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 14-36.   show interfaces switchport Command Example**

```
FTOS#show interfaces switchport
 Codes:  U - Untagged, T - Tagged
         x - Dot1x untagged, X - Dot1x tagged
         G - GVRP tagged, M - Trunk, H - VSN tagged
         i - Internal untagged, I - Internal tagged, v - VLT untagged, V - VLT
tagged

Name: TenGigabitEthernet 3/20
802.1QTagged: Hybrid
Vlan membership:
Q       Vlans
U       20
T       10
Native VlanId:    20.
Name: TenGigabitEthernet 5/20
802.1QTagged: False
Vlan membership:
Q       Vlans
U       1

Name: TenGigabitEthernet 5/21
802.1QTagged: False
Vlan membership:
Q       Vlans
U       1

Name: TenGigabitEthernet 5/49 (Port-channel 128)
802.1QTagged: True
Vlan membership:
Q       Vlans
G       10

Name: Port-channel 128
802.1QTagged: True
Vlan membership:
Q       Vlans
FTOS#
```

Table 14-7.   Items in show interfaces switchport Command Example

Items	Description
Name	Displays the interface's type, slot and port number.
802.1QTagged	Displays whether if the VLAN tagged ("True"), untagged ("False"), or hybrid ("Hybrid"), which supports both untagged and tagged VLANs by port 13/0.
Vlan membership	Lists the VLANs to which the interface is a member. Starting with FTOS 7.6.1, this field can display native VLAN membership by port 13/0.

Related Commands

interface	Configures a physical interface on the switch.
show ip interface	Displays Layer 3 information about the interfaces.
show interfaces	Displays information on a specific physical interface or virtual interface.
show interfaces transceiver	Displays the physical status and operational status of an installed transceiver. The output also displays the transceiver's serial number.

show interfaces transceiver

Display the physical status and operational status of an installed transceiver. The output also displays the transceiver's serial number.

Syntax   **show interfaces** [**tengigabitethernet** *slot/port* | **fortyGigE** *slot/port*] **transceiver**

Parameters

tengigabitethernet	For a 10G interface, enter the keyword tengigabitethernet followed by the slot/port information.
fortyGigE	For a 40G interface, enter the keyword fortyGigE followed by the slot/port information.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage   See Figure 14-37 for an command example and see Table 14-8 for a description of the output fields.

Example   **Figure 14-37.   show interfaces tengigabitethernet transceiver Command Example**

```
FTOS#show interfaces tengigabitethernet 1/0 transceiver
SFP is present.

SFP 0 Serial Base ID fields
SFP 0 Id                 = 0x03
SFP 0 Ext Id             = 0x04
SFP 0 Connector          = 0x07
SFP 0 Transciever Code   = 0x00 0x00 0x00 0x01 0x20 0x40 0x0c 0x05
SFP 0 Encoding           = 0x01
SFP 0 BR Nominal         = 0x15
SFP 0 Length(9um)    Km  = 0x00
SFP 0 Length(9um)    100m = 0x00
SFP 0 Length(50um)   10m  = 0x1e
SFP 0 Length(62.5um) 10m  = 0x0f
SFP 0 Length(Copper) 10m  = 0x00
SFP 0 Vendor Rev         = A
SFP 0 Laser Wavelength   = 850 nm
SFP 0 CheckCodeBase      = 0x66
SFP 0 Serial Extended ID fields
SFP 0 Options= 0x00 0x12
SFP 0 BR max= 0
SFP 0 BR min= 0
SFP 0 Vendor SN= P5N1ACE
SFP 0 Datecode           = 040528
SFP 0 CheckCodeExt       = 0x5b

SFP 1 Diagnostic Information
===================================
SFP 1 Rx Power measurement type     = Average
===================================
SFP 1 Temp High Alarm threshold     = 95.000C
SFP 1 Voltage High Alarm threshold  = 3.900V
SFP 1 Bias High Alarm threshold     = 17.000mA
SFP 1 TX Power High Alarm threshold = 0.631mW
SFP 1 RX Power High Alarm threshold = 1.259mW
SFP 1 Temp Low Alarm threshold      = -25.000C
SFP 1 Voltage Low Alarm threshold   = 2.700V
SFP 1 Bias Low Alarm threshold      = 1.000mA
SFP 1 TX Power Low Alarm threshold  = 0.067mW
SFP 1 RX Power Low Alarm threshold  = 0.010mW
===================================
SFP 1 Temp High Warning threshold   = 90.000C
SFP 1 Voltage High Warning threshold = 3.700V
SFP 1 Bias High Warning threshold   = 14.000mA
SFP 1 TX Power High Warning threshold = 0.631mW
SFP 1 RX Power High Warning threshold = 0.794mW
SFP 1 Temp Low Warning threshold    = -20.000C
SFP 1 Voltage Low Warning threshold = 2.900V
SFP 1 Bias Low Warning threshold    = 2.000mA
SFP 1 TX Power Low Warning threshold = 0.079mW
SFP 1 RX Power Low Warning threshold = 0.016mW
===================================
SFP 1 Temperature                   = 39.930C
SFP 1 Voltage                       = 3.293V
SFP 1 Tx Bias Current               = 6.894mA
SFP 1 Tx Power                      = 0.328mW
SFP 1 Rx Power                      = 0.000mW
===================================
SFP 1 Data Ready state Bar          = False
SFP 1 Rx LOS state                  = True
SFP 1 Tx Fault state                = False
SFP 1 Rate Select state             = False
SFP 1 RS state                      = False
SFP 1 Tx Disable state              = False
===================================
SFP 1 Temperature High Alarm Flag   = False
SFP 1 Voltage High Alarm Flag       = False
SFP 1 Tx Bias High Alarm Flag       = False
SFP 1 Tx Power High Alarm Flag      = False
SFP 1 Rx Power High Alarm Flag      = False
SFP 1 Temperature Low Alarm Flag    = False
SFP 1 Voltage Low Alarm Flag        = False
SFP 1 Tx Bias Low Alarm Flag        = False
SFP 1 Tx Power Low Alarm Flag       = False
SFP 1 Rx Power Low Alarm Flag       = True
===================================
!-------output truncated ------------------------!
```

Table 14-8.   Diagnostic Data in show interfaces transceiver

Line	Description
Rx Power measurement type	Output depends on the vendor, typically either "Average" or "OMA" (Receiver optical modulation amplitude).
Temp High Alarm threshold	Factory-defined setting, typically in Centigrade. Value differs between SFPs and SFP+.
Voltage High Alarm threshold	Displays the interface index number used by SNMP to identify the interface.
Bias High Alarm threshold	Factory-defined setting. Value can differ between SFP and SFP+.
TX Power High Alarm threshold	Factory-defined setting. Value can differ between SFP and SFP+.
RX Power High Alarm threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Temp Low Alarm threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Voltage Low Alarm threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Bias Low Alarm threshold	Factory-defined setting. Value can differ between SFP and SFP+.
TX Power Low Alarm threshold	Factory-defined setting. Value can differ between SFP and SFP+.
RX Power Low Alarm threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Temp High Warning threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Voltage High Warning threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Bias High Warning threshold	Factory-defined setting. Value can differ between SFP and SFP+.
TX Power High Warning threshold	Factory-defined setting. Value can differ between SFP and SFP+.
RX Power High Warning threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Temp Low Warning threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Voltage Low Warning threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Bias Low Warning threshold	Factory-defined setting. Value can differ between SFP and SFP+.
TX Power Low Warning threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Power Low Warning threshold	Factory-defined setting. Value can differ between SFP and SFP+.
Temperature	Current temperature of the sfps.If this temperature crosses Temp High alarm/warning thresholds, then the temperature high alarm/warning flag is set to true.
Voltage	Current voltage of the sfps.If this voltage crosses voltage high alarm/warning thresholds, then the voltage high alarm/warning flag is set to true.
Tx Bias Current	Present Tx bias current of the SFP. If this crosses bias high alarm/warning thresholds, then the tx bias high alarm/warning flag is set to true. If it falls below the low alarm/warning thresholds, then the tx bias low alarm/warning flag is set to true.

Table 14-8.   Diagnostic Data in show interfaces transceiver (continued)

Line	Description
Tx Power	Present Tx power of the SFP. If this crosses Tx power alarm/warning thresholds, then the Tx power high alarm/warning flag is set to true. If it falls below the low alarm/warning thresholds, then the Tx power low alarm/ warning flag is set to true.
Rx Power	Present Rx power of the SFP. This value is either average Rx power or OMA.This depends upon on the Rx Power measurement type displayed above. If this crosses Rx power alarm/warning thresholds, then the Rx power high alarm/warning flag is set to true. If it falls below the low alarm/warning thresholds, then the Rx power low alarm/warning flag is set to true.
Data Ready state Bar	This field indicates that the transceiver has achieved power up and data is ready. This is set to true if data is ready to be sent, false if data is being transmitted.
Rx LOS state	This is the digital state of the Rx_LOS output pin.This is set to true if the operating status is down.
Tx Fault state	This is the digital state of the Tx Fault output pin.
Rate Select state	This is the digital state of the SFP rate_select input pin.
RS state	This is the reserved digital state of the pin AS(1) per SFF-8079 and RS(1) per SFF-8431.
Tx Disable state	If the admin status of the port is down then this flag will be set to true.
Temperature High Alarm Flag	This can be either true/False and it depends on the Current Temperature value displayed above.
Voltage High Alarm Flag	This can be either true or false, depending on the Current voltage value displayed above.
Tx Bias High Alarm Flag	This can be either true or false, depending on the present Tx bias current value displayed above.
Tx Power High Alarm Flag	This can be either true or false, depending on the Current Tx power value displayed above.
Rx Power High Alarm Flag	This can be either true or false, depending on the Current Rx power value displayed above.
Temperature Low Alarm Flag	This can be either true or false, depending on the Current Temperature value displayed above.
Voltage Low Alarm Flag	This can be either true or false, depending on the Current voltage value displayed above.
Tx Bias Low Alarm Flag	This can be either true or false, depending on the Tx bias current value displayed above.
Tx Power Low Alarm Flag	This can be either true or false, depending on the Current Tx power value displayed above.
Rx Power Low Alarm Flag	This can be either true or false, depending on the Current Rx power value displayed above.
Temperature High Warning Flag	This can be either true or false, depending on the Current Temperature value displayed above.
Voltage High Warning Flag	This can be either true or false, depending on the Current voltage value displayed above.
Tx Bias High Warning Flag	This can be either true or false, depending on the Tx bias current value displayed above.

Table 14-8. Diagnostic Data in show interfaces transceiver (continued)

Line	Description
Tx Power High Warning Flag	This can be either true or false, depending on the Current Tx power value displayed above.
Rx Power High Warning Flag	This can be either true or false, depending on the Current Tx power value displayed above.
Temperature Low Warning Flag	This can be either true or false, depending on the Current Temperature value displayed above.
Voltage Low Warning Flag	This can be either true or false, depending on the Current voltage value displayed above.
Tx Bias Low Warning Flag	This can be either true or false, depending on the present Tx bias current value displayed above.
Tx Power Low Warning Flag	This can be either true or false, depending on the Current Tx power value displayed above.
Rx Power Low Warning Flag	This can be either true or false, depending on the Current Rx power value displayed above.

Related Commands

interface	Configures a physical interface on the switch.
show ip interface	Displays Layer 3 information about the interfaces.
show interfaces	Displays information on a specific physical interface or virtual interface.
show inventory	Displays the switch type, FTOS version including hardware identification numbers and configured protocols.

show range

Display all interfaces configured using the interface range command.

Syntax　show range

Command Mode　INTERFACE RANGE (config-if-range)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example　**Figure 14-38.　show range Command Example**

```
FTOS(conf-if-range-te-0/16)#show range
interface tengigabitethernet 0/16
FTOS(conf-if-range-te-0/16)#
```

Related Commands

interface	Configures a physical interface on the switch.
show ip interface	Displays Layer 3 information about the interfaces.
show interfaces	Displays information on a specific physical interface or virtual interface.

shutdown

Disable an interface.

Syntax   shutdown

To activate an interface, enter no shutdown.

Defaults   The interface is disabled.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The shutdown command marks a physical interface as unavailable for traffic. To discover if an interface is disabled, use the show ip interface brief command. Disabled interfaces are listed as down.

Disabling a VLAN or a port channel causes different behavior. When a VLAN is disabled, the Layer 3 functions within that VLAN are disabled. Layer 2 traffic continues to flow. Entering the shutdown command on a port channel disables all traffic on the port channel and the individual interfaces within the port channel. To enable a port channel, you must enter no shutdown on the port channel interface and at least one interface within that port channel.

The shutdown and description commands are the only commands that you can configure on an interface that is a member of a port channel.

Related Commands

interface port-channel	Creates a port channel interface.
interface vlan	Creates a VLAN.
show ip interface	Displays the interface routing status. Add the keyword brief to display a table of interfaces and their status.

speed (for 1000/10000/auto interfaces)

Set the speed for 1000/10000 Base-T Ethernet interfaces. Both sides of a link must be set to the same speed (1000/10000) or to auto or the link may not come up.

Syntax   speed {1000 | 10000 | auto}

To return to the default setting, use the no speed {1000 | 10000 | auto} command.

Parameters

1000	Enter the keyword 1000 to set the interface's speed to 1000 Mb/s.
10000	Enter the keyword 10000 to set the interface's speed to 10000 Mb/s.
	(Auto-negotiation is enabled. See negotiation auto for more information)
auto	Enter the keyword auto to set the interface to auto-negotiate its speed.
	(Auto-negotiation is enabled. See negotiation auto for more information)

Defaults   auto

Command Modes   INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

This command is found on the 1000/10000 Base-T Ethernet interfaces.

When you enable auto, the system performs and automatic discovery to determine the optics installed and configure the appropriate speed.

When you configure a speed for the 1000/10000 interface, you should confirm negotiation auto command setting. Both sides of the link should have auto-negotiation either enabled or disabled. For speed settings of 1000 or auto, the software sets the link to auto-negotiation and you cannot change that setting.

In FTOS, the command **speed 1000** is an exact equivalent of **speed auto 1000** in IOS.

Related Commands

duplex (1000/10000 Interfaces)	Configures duplex mode on physical interfaces with the speed set to 1000/ 1000.
negotiation auto	Enables or disables auto-negotiation on an interface.

stack-unit portmode

Split a single 40G port into 4-10G ports on the MXL Switch.

Syntax

stack-unit *stack-unit* port *number* portmode quad

Parameters

stack-unit	Enter the stack member unit identifier of the stack member to reset.
	MXL Switch range: 0 to 5
	Note: The MXL Switch commands accept Unit ID numbers 0-5, though MXL Switch supports stacking up to 3 units only with FTOS version 8.3.7.1.
number	Enter the port number of the 40G port to be split.
	MXL Switch range: Enter one of the following port numbers: 48, 52, 56, or 60.

Defaults   Disabled

Command Modes   CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

Splitting a 40G port into 4x10G port is supported only on a standalone unit.

- Split ports cannot be used as stack-link to stack an **MXL Switch**.
- Split ports MXL Switch unit cannot be a part of any stacked system.
- The unit number with the split ports must be the default (stack-unit 0)
- This can be verified using CLI "show system brief". If the unit ID is different than 0, then it must be renumbered to 0 before ports are split. By using the stack unit id renumber 0 command in EXEC mode.

The quad port must be in a default configuration before it can be split into 4x10G ports. The 40G port is lost in the config when the port is split, so be sure the port is also removed from other L2/L3 feature configurations. The system must be reloaded after issuing the CLI for the change to take effect.

Port Channel Commands

A link aggregation group (LAG) is a group of links that appear to a MAC client as if they were a single link according to IEEE 802.3ad. In FTOS, a LAG is referred to as a Port Channel.

Table 14-9.   Port Channel Limits

Platform	Maximum Port Channel IDs	Maximum Members per Port Channel
MXL Switch	128	16

Because each port can be assigned to only one Port Channel, and each Port Channel must have at least one port, some of those nominally available Port Channels might have no function because they could have no members if there are not enough ports installed. In the MXL 10/40GbE Switch IO Module, those ports could be provided by stack members.

The commands in this section are specific to Port Channel interfaces:

*   channel-member
*   group
*   interface port-channel
*   minimum-links
*   port-channel failover-group
*   show config
*   show interfaces port-channel

> **Note:** The FTOS implementation of LAG or Port Channel requires that you configure a LAG on both switches manually. For information on FTOS Link Aggregation Control Protocol (LACP) for dynamic LAGs, refer to Chapter 17, Link Aggregation Control Protocol (LACP).
>
> For more information on configuring and using Port Channels, refer to the *FTOS Configuration Guide*.

channel-member

Add an interface to the Port Channel, while in the INTERFACE PORTCHANNEL mode.

Syntax   channel-member *interface*

To delete an interface from a Port Channel, use the no channel-member *interface* command.

Parameters

interface	Enter the following keywords and slot/port or number information:
	• For a Ten Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   Not configured.

Command Modes   INTERFACE PORTCHANNEL

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	Use the interface port-channel command to access this command.

You cannot add an interface to a Port Channel if the interface contains an IP address in its configuration.

Link MTU and IP MTU considerations for Port Channels are:

- All members must have the same link MTU value and the same IP MTU value.
- The Port Channel link MTU and IP MTU must be less than or equal to the link MTU and IP MTU values configured on the channel members.

For example, if the members have a link MTU of 2100 and an IP MTU 2000, the Port Channel's MTU values cannot be higher than 2100 for link MTU or 2000 bytes for IP MTU.

When an interface is removed from a Port Channel with the no channel-member command syntax, the interface reverts to its configuration prior to joining the Port Channel.

An interface can belong to only one Port Channel.

You can have sixteen interfaces per Port Channel on the MXL Switch. The interfaces can be located on different stack units but must be the same physical type and speed (for example, all 10-Gigabit Ethernet interfaces). However, you can combine 100/1000 interfaces and GE interfaces in the same Port Channel.

If the Port Channel contains a mix of interfaces with 100 Mb/s speed and 1000 Mb/s speed, the software disables those interfaces whose speed does not match the speed of the first interface configured and enabled in the Port Channel. If that first interface goes down, the Port Channel does not change its designated speed; you must disable and re-enable the Port Channel or change the order of the channel members configuration to change the designated speed. Refer to the *FTOS Configuration Guide* for more information on Port Channels.

Related Commands		
	description	Assigns a descriptive text string to the interface.
	interface port-channel	Creates a Port Channel interface.
	shutdown	Disables/Enables the port channel.

group

Group two LAGs in a supergroup ("fate-sharing group" or "failover group").

Syntax	group *group_number* port-channel *number* port-channel *number*

To remove an existing LAG supergroup, use the no group *group_number* command.

Parameters		
	group_number	Enter an integer from 1 to 32 that will uniquely identify this LAG fate-sharing group.
	port-channel *number*	Enter the keyword port-channel followed by an existing LAG *number*. Enter this keyword/variable combination twice, identifying the two LAGs to be paired.

Defaults	none

Command Modes	PORT-CHANNEL FAILOVER-GROUP (conf-po-failover-grp)

<table>
<tr><td>**Command
History**</td><td>Version 8.3.16.1</td><td>Introduced on MXL 10/40GbE Switch IO Module</td></tr>
</table>

Example   **Figure 14-39.   group Command Example**

```
FTOS(conf)#port-channel failover-group
FTOS(conf-po-failover-grp)#group 1 port-channel 1 port-channel 2
FTOS(conf-po-failover-grp)#
```

Related Commands	port-channel failover-group	Accesses the PORT-CHANNEL FAILOVER-GROUP mode to configure a LAG failover group.
	show interfaces port-channel	Displays information on configured Port Channel groups.

interface port-channel

Create a Port Channel interface, which is a link aggregation group containing up to 16 physical interfaces on an MXL Switch.

Syntax   interface port-channel *channel-number*

To delete a Port Channel, use the no interface port-channel *channel-number* command.

Parameters	*channel-number*	For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128

Defaults   Not configured.

Command Modes   CONFIGURATION

<table>
<tr><td>**Command
History**</td><td>Version 8.3.16.1</td><td>Introduced on MXL 10/40GbE Switch IO Module</td></tr>
</table>

Example   **Figure 14-40.   interface port-channel Command Example**

```
FTOS(conf)#int port-channel 2
FTOS(conf-if-po-2)#
```

Usage Information   Port Channel interfaces are logical interfaces and can be either in Layer 2 mode (by configuring port-channel with switchport command) or Layer 3 mode (by configuring an IP address). You can add a Port Channel in Layer 2 mode to a VLAN.

A Port Channel can contain both 100/1000 interfaces and GE interfaces. Based on the first interface configured in the Port Channel and enabled, FTOS determines if the Port Channel uses 100 Mb/s or 1000 Mb/s as the common speed. Refer to channel-member for more information.

If the stack unit is in a Jumbo mode chassis, then the mtu and ip mtu commands can also be configured. The Link MTU and IP MTU values configured on the channel members must be greater than the Link MTU and IP MTU values configured on the Port Channel interface.

> **Note:** In a Jumbo-enabled system, all members of a Port Channel must be configured with the same link MTU values and the same IP MTU values.

Related Commands	channel-member	Adds a physical interface to the LAG.
	interface	Configures a physical interface.
	interface loopback	Configures a Loopback interface.
	interface null	Configures a null interface.
	interface vlan	Configures a VLAN.
	shutdown	Disables/Enables the port channel.

minimum-links

Configure the minimum number of links in a LAG (Port Channel) that must be in "oper up" status for the LAG to be also in "oper up" status.

Syntax minimum-links *number*

Parameters

number	Enter the number of links in a LAG that must be in "oper up" status.
	Range: 1 to 16
	Default: 1

Defaults 1

Command Modes INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information If you use this command to configure the minimum number of links in a LAG that must be in "oper up" status, the LAG must have at least that number of "oper up" links before it can be declared as up.

For example, if the required minimum is four, and only three are up, then the LAG is considered down.

port-channel failover-group

Access the PORT-CHANNEL FAILOVER-GROUP mode to configure a LAG failover group.

Syntax port-channel failover-group

To remove all LAG failover groups, use the no port-channel failover-group command.

Defaults none

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information This feature groups two LAGs to work in tandem as a supergroup, so that, if one LAG goes down, the other LAG is taken down automatically, providing an alternate path to reroute traffic, avoiding oversubscription on the other LAG. You can use both static and dynamic (LACP) LAGs to configure failover groups. For details, refer to the Port Channel chapter in the *FTOS Configuration Guide*.

Related Commands	group	Groups two LAGs in a supergroup ("fate-sharing group").
	show interfaces port-channel	Displays information on configured Port Channel groups.

show config

Display the current configuration of the selected LAG.

Syntax   show config

Command Modes   INTERFACE PORTCHANNEL

Example   **Figure 14-41.   show config Command Sample Output for a Selected LAG**

```
FTOS(conf-if-po-1)#show config
!
interface Port-channel 1
 no ip address
 shutdown
FTOS(conf-if-po-1)#
```

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show interfaces port-channel

Display information on configured Port Channel groups.

Syntax   show interfaces port-channel [*channel-number*] [brief]

Parameters	*channel-number*	For a Port Channel interface, enter the keyword port-channel followed by a number:
		Range: 1-128
	brief	(OPTIONAL) Enter the keyword brief to display only the port channel number, the state of the port channel, and the number of interfaces in the port channel.

Command Modes   EXEC

EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 14-42.   show interfaces port-channel Command Example (EtherScale)**

```
FTOS#show interfaces port-channel
Port-channel 1 is down, line protocol is down
Hardware address is 00:1e:c9:f1:00:05, Current address is 00:1e:c9:f1:00:05
Interface index is 1107755009
Minimum number of links to bring Port-channel up is 1
Internet address is not set
Mode of IP Address Assignment : NONE
DHCP Client-ID :lag1001ec9f10005
MTU 1554 bytes, IP MTU 1500 bytes
LineSpeed auto
Members in this channel:
ARP type: ARPA, ARP Timeout 04:00:00
Last clearing of "show interface" counters 03:28:00
Queueing strategy: fifo
Input Statistics:
     0 packets, 0 bytes
     0 64-byte pkts, 0 over 64-byte pkts, 0 over 127-byte pkts
     0 over 255-byte pkts, 0 over 511-byte pkts, 0 over 1023-byte pkts
     0 Multicasts, 0 Broadcasts
     0 runts, 0 giants, 0 throttles
     0 CRC, 0 overrun, 0 discarded
Output Statistics:
     0 packets, 0 bytes, 0 underruns
     0 64-byte pkts, 0 over 64-byte pkts, 0 over 127-byte pkts
     0 over 255-byte pkts, 0 over 511-byte pkts, 0 over 1023-byte pkts
     0 Multicasts, 0 Broadcasts, 0 Unicasts
     0 throttles, 0 discarded, 0 collisions
```

Table 14-10.   show interfaces port-channel Command Example Fields

Field	Description
Port-Channel 1...	Displays the LAG's status. In the example, the status of the LAG's LAG fate-sharing group ("Failover-group") is listed.
Hardware is...	Displays the interface's hardware information and its assigned MAC address.
Port-channel is part...	Indicates whether the LAG is part of a LAG fate-sharing group ("Failover-group").
Internet address...	States whether an IP address is assigned to the interface. If one is, that address is displayed.
MTU 1554...	Displays link and IP MTU.
LineSpeed	Displays the interface's line speed. For a port channel interface, it is the line speed of the interfaces in the port channel.
Members in this...	Displays the interfaces belonging to this port channel.
ARP type:...	Displays the ARP type and the ARP timeout value for the interface.
Last clearing...	Displays the time when the show interfaces counters were cleared.
Queueing strategy.	States the packet queuing strategy. FIFO means first in first out.
packets input...	Displays the number of packets and bytes into the interface.
Input 0 IP packets...	Displays the number of packets with IP headers, VLAN tagged headers and MPLS headers. The number of packets may not add correctly because a VLAN tagged IP packet counts as both a VLAN packet and an IP packet.
0 64-byte...	Displays the size of packets and the number of those packets entering that interface. This information is displayed over two lines.
Received 0...	Displays the type and number of errors or other specific packets received. This information is displayed over three lines.

Table 14-10. show interfaces port-channel Command Example Fields (continued)

Field	Description
Output 0...	Displays the type and number of packets sent out the interface. This information is displayed over three lines.
Rate information...	Displays the traffic rate information into and out of the interface. Traffic rate is displayed in bits and packets per second.
Time since...	Displays the time since the last change in the configuration of this interface.

Figure 14-43. show interfaces port-channel brief Command Example

```
FTOS#show int po 1 brief
Codes: L - LACP Port-channel

    LAG  Mode  Status       Uptime      Ports
    1    L3    down         00:00:00    Te 0/16    (Down)
FTOS#
```

Table 14-11. show interfaces port-channel brief Command Example Fields

Field	Description
LAG	Lists the port channel number.
Mode	Lists the mode: • L3 - for Layer 3 • L2 - for Layer 2
Status	Displays the status of the port channel. • down - if the port channel is disabled (shutdown) • up - if the port channel is enabled (no shutdown)
Uptime	Displays the age of the port channel in hours:minutes:seconds.
Ports	Lists the interfaces assigned to this port channel.
(untitled)	Displays the status of the physical interfaces (up or down). In Layer 2 port channels, an * (asterisk) indicates which interface is the primary port of the port channel. The primary port sends out interface PDU. In Layer 3 port channels, the primary port is not indicated.

Related Commands

show lacp	Displays the LACP matrix.

Time Domain Reflectometer (TDR)

Time domain reflectormeter (TDR) is useful for troubleshooting an interface that is not establishing a link; either it is flapping or not coming up at all. TDR detects open or short conditions of copper cables on 100/1000 Base-T modules.

- tdr-cable-test
- show tdr

Important Points to Remember

- The interface and port must be enabled (configured—see the interface command) before running TDR. An error message is generated if you have not enabled the interface.
- The interface on the far-end device must be shut down before running TDR.
- Because TDR is an intrusive test on an interface that is not establishing a link, do not run TDR on an interface that is passing traffic.
- When testing between two devices, do not run the test on both ends of the cable.

tdr-cable-test

Test the condition of copper cables on 100/1000 Base-T modules.

Syntax **tdr-cable-test interface**

Parameters

interface	Enter the keyword TenGigabitEthernet followed by the slot/port information for the 100/1000 Ethernet interface.

Defaults none

Command Modes EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The interface must be enabled to run the test or an error message is generated:

```
FTOS#tdr-cable-test tengigabitethernet 5/2

%Error: Interface is disabled TenGIG 5/2
```

Related Commands

show tdr	Displays the results of the TDR test.

show tdr

Display the TDR test results.

Syntax show tdr *interface*

Parameters

interface	Enter the keyword TenGigabitEthernet followed by the slot/port information for the 100/1000 Ethernet interface.

Defaults   none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 14-44.   show tdr tengigabitethernet Command Example**

```
FTOS#show tdr tengigabitethernet 10/47
Time since last test: 00:00:02
  Pair A, Length: OK Status: Terminated
  Pair B, Length: 92 (+/- 1) meters, Status: Short
  Pair C, Length: 93 (+/- 1) meters, Status: Open
  Pair D, Length: 0 (+/- 1) meters, Status: Impedance Mismatch
```

Table 14-12.   TDR Test Status

Status	Definition
OK Status: Terminated	TDR test is complete, no fault is detected on the cable, and the test is terminated
Length: 92 (+/- 1) meters, Status: Shorted	A short is detected on the cable. The location, in this example is 92 meters, of the short is accurate to plus or minus one meter.
Length: 93 (+/- 1) meters, Status: Open	An opening is detected on the cable. The location, in this example is 93 meters, of the open is accurate to plus or minus one meter.
Status: Impedance Mismatch	There is an impedance mismatch in the cables.

Usage Information   If the TDR test has not been run, an error messages is generated:

```
%Error: Please run the TDR test first
```

Related Commands

tdr-cable-test	Runs the TDR test.

UDP Broadcast

The user datagram protocol (UDP) broadcast feature is a software-based method to forward low throughput (not to exceed 200 pps) IP/UDP broadcast traffic arriving on a physical or VLAN interface.

Important Points to Remember

- Routing information protocol (RIP) is not supported with the UDP broadcast feature.
- If this feature is configured on an interface using ip udp-helper udp-port, the ip directed-broadcast command becomes ineffective on that interface.
- The existing command show interface has been modified to display the configured broadcast address.

The commands for UDP Broadcast are:

- debug ip udp-helper
- ip udp-broadcast-address
- ip udp-helper udp-port
- show ip udp-helper

debug ip udp-helper

Enable UDP debug and display the debug information on a console.

Syntax   debug ip udp-helper

To disable debug information, use the no debug ip udp-helper command.

Defaults   Debug disabled

Command Modes   EXEC

EXEC Privilege

Example   **Figure 14-45.   Debug Output Command Example**

```
FTOS#debug ip udp-helper
UDP helper debugging is on

01:20:22: Pkt rcvd on TenGig 5/0 with IP DA (0xffffffff) will be sent on TenGig 5/1
TenGig 5/2 Vlan 3

01:44:54: Pkt rcvd on TenGig 7/0 is handed over for DHCP processing.
```

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

ip udp-broadcast-address	Configures a UDP IP address for broadcast
ip udp-helper udp-port	Enables the UDP broadcast feature on an interface.
show ip udp-helper	Displays the configured UDP helper(s) on all interfaces.

ip udp-broadcast-address

Configure an IP UDP address for broadcast.

Syntax	ip udp-broadcast-address *address*

To delete the configuration, use the no ip udp-broadcast-address *address* command.

Parameters	*address*	Enter an IP broadcast address in dotted decimal format (A.B.C.D).

Defaults   Not Configured

Command Modes   INTERFACE (config-if)

Usage Information   When a UDP broadcast packet is flooded out of an interface, and the outgoing interface is configured using this command, the outgoing packet's IP destination address is replaced with the configured broadcast address.

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	debug ip udp-helper	Enables debug and display the debug information on a console.
	show ip udp-helper	Displays the configured UDP helper(s) on all interfaces.

ip udp-helper udp-port

Enable the UDP broadcast feature on an interface either for all UDP ports or a specified list of UDP ports.

Syntax	ip udp-helper udp-port [*udp-port-list*]

To disable the UDP broadcast on a port, use the no ip udp-helper udp-port [*udp-port-list*] command.

Parameters	*udp-port-list*	(OPTIONAL) Enter up to 16 comma separated UDP port numbers.
		Note: If this option is not used, all UDP Ports are considered by default.

Defaults   none

Command Modes   INTERFACE (config-if)

Usage Information   If you configure the ip helper-address command and ip udp-helper udp-port command, the behavior is that the UDP broadcast traffic with port numbers 67/68 is unicast relayed to the DHCP server as per the ip helper-address configuration. This occurs regardless of whether the ip udp-helper udp-port command contains port numbers 67/68 or not.

If you only configure the ip udp-helper udp-port command, all the UDP broadcast traffic is flooded, including ports 67/68 traffic if those ports are part of the *udp-port-list.*

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	ip helper-address	Configures the destination broadcast or host address for DHCP server.
	debug ip udp-helper	Enables debug and display the debug information on a console.
	show ip udp-helper	Displays the configured UDP helper(s) on all interfaces.

show ip udp-helper

Display the configured UDP helper(s) on all interfaces.

Syntax   show ip udp-helper

Defaults   none

Command Modes   EXEC

Example   **Figure 14-46.   show ip udp-helper Command Example**

```
FTOS#show ip udp-helper
-------------------------------------------------
Port     UDP port list
-------------------------------------------------
TenGig 10/0  656, 658
TenGig 10/1  All
```

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	debug ip udp-helper	Enables debug and display the debug information on a console.
	ip udp-broadcast-address	Configures a UDP IP address for broadcast.
	ip udp-helper udp-port	Enables the UDP broadcast feature on an interface either for all UDP ports or a specified list of UDP ports.

15

IPv4 Routing

Commands

This chapter describes the IPv4-related commands. They are:

- arp
- arp learn-enable
- arp retries
- arp timeout
- clear arp-cache
- clear host
- clear ip fib stack-unit
- clear ip route
- clear tcp statistics
- debug arp
- debug ip dhcp
- debug ip icmp
- debug ip packet
- ip address
- ip directed-broadcast
- ip domain-list
- ip domain-lookup
- ip domain-name
- ip helper-address
- ip helper-address hop-count disable
- ip host
- ip max-frag-count
- ip name-server
- ip proxy-arp
- ip route
- ip source-route
- ip unreachables
- management route
- show arp
- show arp retries
- show hosts
- show ip cam stack-unit
- show ip fib stack-unit
- show ip interface

- show ip management-route
- show ip protocols
- show ip route
- show ip route list
- show ip route summary
- show ip traffic
- show tcp statistics

arp

Use the address resolution protocol (ARP) to associate an IP address with a MAC address in the switch.

Syntax   arp *ip-address mac-address interface*

To remove an ARP address, use the no arp *ip-address* command.

Parameters

ip-address	Enter an IP address in dotted decimal format.
mac-address	Enter a MAC address in nnnn.nnnn.nnnn format.
interface	Enter the following keywords and slot/port or number information:
	• For the Management interface, enter the keyword ManagementEthernet followed by the slot/port information. The slot range is 0-1 and the port range is 0.
	• For a Port Channel interface, enter the keyword port-channel followed by a number:
	Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   Not configured.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You cannot use Class D or Class E IP addresses or zero IP address (0.0.0.0) when creating a static ARP. Zero MAC addresses (00:00:00:00:00:00) are also invalid.

Related Commands

clear arp-cache	Clears dynamic ARP entries from the ARP table.
show arp	Displays the ARP table.

arp learn-enable

Enable ARP learning via Gratuitous ARP.

Syntax   arp learn-enable

Defaults	Disabled

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

arp retries

Set the number of ARP retries in case the system does not receive an ARP reply in response to an ARP request.

Syntax	arp retries *number*

Parameters	*number*	Enter the number of retries. Range: 5 to 20. Default: 5

Defaults	5

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	Retries are 20 seconds apart.

Related Commands	show arp retries	Displays the configured number of ARP retries.

arp timeout

Set the time interval for an ARP entry to remain in the ARP cache.

Syntax	arp timeout *minutes*

To return to the default value, use the no arp timeout command.

Parameters	*seconds*	Enter the number of minutes. Range: 0 to 35790 Default: 240 minutes

Defaults	240 minutes (4 hours)

Command Modes	INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	show interfaces	Displays the ARP timeout value for all available interfaces.

clear arp-cache

Clear the dynamic ARP entries from a specific interface or optionally delete (no-refresh) ARP entries from CAM.

Syntax   clear arp-cache [*interface* | ip *ip-address*] [no-refresh]

Parameters

interface	(OPTIONAL) Enter the following keywords and slot/port or number information: • For the Management interface, enter the keyword ManagementEthernet followed by the slot/port information. The slot range is 0 and the port range is 0. • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information. • For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.
ip *ip-address*	(OPTIONAL) Enter the keyword ip followed by the IP address of the ARP entry you wish to clear.
no-refresh	(OPTIONAL) Enter the keyword no-refresh to delete the ARP entry from CAM. Or use this option with *interface* or ip *ip-address* to specify which dynamic ARP entries you want to delete. **Note:** Transit traffic may not be forwarded during the period when deleted ARP entries are resolved again and re-installed in CAM. Use this option with extreme caution.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

clear host

Remove one or all dynamically learnt host table entries.

Syntax   clear host *name*

Parameters

name	Enter the name of the host to delete. Enter * to delete all host table entries.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

clear ip fib stack-unit

Clear all forwarding information base (fib) entries in the specified stack unit (use this command with caution, refer to Usage Information).

Syntax	clear ip fib stack-unit *unit-number*

Parameters		
	unit-number	Enter the stack-unit number.
		Range: 0 to 5

Command Mode EXEC

EXEC Privilege

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Use this command to clear Layer 3 CAM inconsistencies.

△ **Caution:** Executing this command causes traffic disruption.

Related Commands		
	show ip fib stack-unit	Shows the FIB entries.

clear ip route

Clear one or all routes in the routing table.

Syntax	clear ip route {*	*ip-address mask*}

Parameters		
	*	Enter an asterisk (*) to clear all learned IP routes.
	ip-address mask	Enter a specific IP address and mask in dotted decimal format to clear that IP address from the routing table.

Command Modes EXEC Privilege

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands		
	ip route	Assigns an IP route to the switch.
	show ip route	Views the routing table.
	show ip route summary	Views a summary of the routing table.

clear tcp statistics

Clear TCP counters.

Syntax	clear tcp statistics

Command Modes   EXEC Privilege

**Command
History**

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

debug arp

View information on ARP transactions.

Syntax   debug arp [*interface*] [count *value*]

To stop debugging ARP transactions, use the no debug arp command.

Parameters

interface	(OPTIONAL) Enter the following keywords and slot/port or number information:
	• For the Management interface, enter the keyword managementethernet followed by the slot/port information. The slot range is 0 and the port range is 0.
	• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword tengigabitethernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.
count *value*	(OPTIONAL) Enter the keyword count followed by the count value. Range: 1 to 65534

Defaults   none

Command Modes   EXEC Privilege

**Command
History**

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

**Usage
Information**   Use the count option to stop packets from flooding the user terminal when debugging is turned on.

debug ip dhcp

Enable debug information for DHCP relay transactions and display the information on the console.

Syntax   debug ip dhcp

To disable debug, use the no debug ip dhcp command.

Defaults   Debug disabled

Command Modes   EXEC Privilege

**Command
History**

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 15-1.   debug ip dhcp Command Example

```
FTOS#debug ip dhcp
00:12:21 : %RELAY-I-PACKET: BOOTP REQUEST (Unicast) received at interface 113.3.3.17 BOOTP
Request, hops = 0, XID = 0xbf05140f, secs = 0, hwaddr = 00:60:CF:20:7B:8C, giaddr = 0.0.0.0
00:12:21 : %RELAY-I-BOOTREQUEST: Forwarded BOOTREQUEST for 00:60:CF:20:7B:8C to 14.4.4.2
00:12:26 : %RELAY-I-PACKET: BOOTP REQUEST (Unicast) received at interface 113.3.3.17 BOOTP
Request, hops = 0, XID = 0xbf05140f, secs = 5, hwaddr = 00:60:CF:20:7B:8C, giaddr = 0.0.0.0
00:12:26 : %RELAY-I-BOOTREQUEST: Forwarded BOOTREQUEST for 00:60:CF:20:7B:8C to 14.4.4.2
00:12:40 : %RELAY-I-PACKET: BOOTP REQUEST (Unicast) received at interface 113.3.3.17 BOOTP
Request, hops = 0, XID = 0xda4f9503, secs = 0, hwaddr = 00:60:CF:20:7B:8C, giaddr = 0.0.0.0
00:12:40 : %RELAY-I-BOOTREQUEST: Forwarded BOOTREQUEST for 00:60:CF:20:7B:8C to 14.4.4.2
00:12:42 : %RELAY-I-PACKET: BOOTP REPLY (Unicast) received at interface 14.4.4.1 BOOTP Reply,
hops = 0, XID = 0xda4f9503, secs = 0, hwaddr = 00:60:CF:20:7B:8C, giaddr = 113.3.3.17
00:12:42 : %RELAY-I-BOOTREPLY: Forwarded BOOTREPLY for 00:60:CF:20:7B:8C to 113.3.3.254
00:12:42 : %RELAY-I-PACKET: BOOTP REQUEST (Unicast) received at interface 113.3.3.17 BOOTP
Request, hops = 0, XID = 0xda4f9503, secs = 0, hwaddr = 00:60:CF:20:7B:8C, giaddr = 0.0.0.0
00:12:42 : %RELAY-I-BOOTREQUEST: Forwarded BOOTREQUEST for 00:60:CF:20:7B:8C to 14.4.4.2
00:12:42 : %RELAY-I-PACKET: BOOTP REPLY (Unicast) received at interface 14.4.4.1 BOOTP Reply,
hops = 0, XID = 0xda4f9503, secs = 0, hwaddr = 00:60:CF:20:7B:8C, giaddr = 113.3.3.17
00:12:42 : %RELAY-I-BOOTREPLY: Forwarded BOOTREPLY for 00:60:CF:20:7B:8C to 113.3.3.254
FTOS#
```

Related Commands

ip helper-address	Specifies the destination broadcast or host address for the DHCP server request.
ip helper-address hop-count disable	Disables the hop-count increment for the DHCP relay agent.

debug ip icmp

View information on the internal control message protocol (ICMP).

Syntax   debug ip icmp [*interface*] [count *value*]

To disable debugging, use the no debug ip icmp command.

Parameters

interface	(OPTIONAL) Enter the following keywords and slot/port or number information:
	• For the Management interface, enter the keyword ManagementEthernet followed by the slot/port information. The slot range is 0 and the port range is 0.
	• For a Port Channel interface, enter the keyword port-channel followed by a number:
	Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For VLAN, enter the keyword vlan followed by a number from 1 to 4094.
count *value*	(OPTIONAL) Enter the keyword count followed by the count value.
	Range: 1 to 65534
	Default: Infinity

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 15-2.   debug ip icmp Command Example (Partial)**

```
ICMP: echo request rcvd from src 40.40.40.40
ICMP: src 40.40.40.40, dst 40.40.40.40, echo reply
ICMP: src 40.40.40.40, dst 40.40.40.40, echo reply
ICMP: echo request sent to dst 40.40.40.40
ICMP: echo request rcvd from src 40.40.40.40
ICMP: src 40.40.40.40, dst 40.40.40.40, echo reply
ICMP: src 40.40.40.40, dst 40.40.40.40, echo reply
ICMP: echo request sent to dst 40.40.40.40
```

Usage Information   Use the count option to stop packets from flooding the user terminal when debugging is turned on.

debug ip packet

View a log of IP packets sent and received.

Syntax   debug ip packet [access-group *name*] [count *value*] [*interface*]

To disable debugging, use the no debug ip packet [access-group *name*] [count *value*] [*interface*] command.

Parameters

access-group *name*	Enter the keyword access-group followed by the access list name (maximum 16 characters) to limit the debug output based on the defined rules in the ACL.
count *value*	(OPTIONAL) Enter the keyword count followed by the count value. Range: 1 to 65534 Default: Infinity
interface	(OPTIONAL) Enter the following keywords and slot/port or number information: • For the management interface, enter the keyword managementethernet followed by the slot/port information. The slot range is 0 and the port range is 0. • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128 • For a 10-Gigabit Ethernet interface, enter the keyword tengigabitethernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information. • For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.

Command Mode   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 15-3. debug ip packet Command Example (Partial)

```
IP: s=10.1.2.62 (local), d=10.1.2.206 (Ma 0/0), len 54, sending
    TCP src=23, dst=40869, seq=2112994894, ack=606901739, win=8191 ACK PUSH
IP: s=10.1.2.206 (Ma 0/0), d=10.1.2.62, len 40, rcvd
    TCP src=0, dst=0, seq=0, ack=0, win=0
IP: s=10.1.2.62 (local), d=10.1.2.206 (Ma 0/0), len 226, sending
    TCP src=23, dst=40869, seq=2112994896, ack=606901739, win=8192 ACK PUSH
IP: s=10.1.2.216 (Ma 0/0), d=10.1.2.255, len 78, rcvd
    UDP src=0, dst=0
IP: s=10.1.2.62 (local), d=10.1.2.3 (Ma 0/0), len 1500, sending fragment
    IP Fragment, Ident = 4741, fragment offset = 0
    ICMP type=0, code=0
IP: s=10.1.2.62 (local), d=10.1.2.3 (Ma 0/0), len 1500, sending fragment
    IP Fragment, Ident = 4741, fragment offset = 1480
IP: s=40.40.40.40 (local), d=224.0.0.5 (Te 4/11), len 64, sending broad/multicast
proto=89
IP: s=40.40.40.40 (local), d=224.0.0.6 (Te 4/11), len 28, sending broad/multicast
proto=2
IP: s=0.0.0.0, d=30.30.30.30, len 100, unroutable
    ICMP type=8, code=0
IP: s=0.0.0.0, d=30.30.30.30, len 100, unroutable
    ICMP type=8, code=0
```

Table 15-1. debug ip packet Command Example Fields

Field	Description
s=	Lists the source address of the packet and the name of the interface (in parentheses) that received the packet.
d=	Lists the destination address of the packet and the name of the interface (in parentheses) through which the packet is being sent out on the network.
len	Displays the packet's length.
sending rcvd fragment sending broad/multicast proto unroutable	The last part of each line lists the status of the packet.
TCP src=	Displays the source and destination ports, the sequence number, the acknowledgement number, and the window size of the packets in that TCP packets.
UDP src=	Displays the source and destination ports for the UDP packets.
ICMP type=	Displays the ICMP type and code.
IP Fragment	States that it is a fragment and displays the unique number identifying the fragment (Ident) and the offset (in 8-byte units) of this fragment (fragment offset) from the beginning of the original datagram.

Usage Information

Use the count option to stop packets from flooding the user terminal when debugging is turned on.

The access-group option supports only the equal to (eq) operator in TCP ACL rules. Port operators not equal to (neq), greater than (gt), less than (lt), or **range** are not supported in access-group option (see Figure 15-4). ARP packets (arp) and Ether-type (ether-type) are also not supported in access-group option. The entire rule is skipped to compose the filter.

The access-group option pertains to:

- IP Protocol Number 0 to 255
- Internet Control Message Protocol**   icmp
  * but not the ICMP message type (0-255)
- Any Internet Protocol   ip
- Transmission Control Protocol*   tcp
  * but not on the rst, syn, or urg bit
- User Datagram Protocol   udp

In the case of ambiguous access control list rules, the debug ip packet access-control command will be disabled. A message appears identifying the error (see Figure 15-4).

Example

Figure 15-4.   debug ip packet access-group Command Errors

```
FTOS#debug ip packet access-group test
%Error: port operator GT not supported in access-list debug
%Error: port operator LT not supported in access-list debug
%Error: port operator RANGE not supported in access-list debug
%Error: port operator NEQ not supported in access-list debug

%IPMGR-3-DEBUG_IP_PACKET_ACL_AMBIGUOUS_EXP: Ambiguous rules not
supported in access-list debug, access-list debugging is turned off
FTOS#
```

ip address

Assign a primary and secondary IP address to the interface.

Syntax

ip address *ip-address mask* [secondary]

To delete an IP address from an interface, use the no ip address [*ip-address*] command.

Parameters

ip-address	Enter an IP address in dotted decimal format.
mask	Enter the mask of the IP address in slash prefix format (for example, /24).
secondary	(OPTIONAL) Enter the keyword secondary to designate the IP address as the secondary address.

Defaults

Not configured.

Command Modes

INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

You must be in INTERFACE mode before you add an IP address to an interface. Assign an IP address to an interface prior to entering ROUTER OSPF mode.

ip directed-broadcast

Enables the interface to receive directed broadcast packets.

Syntax   ip directed-broadcast

To disable the interface from receiving directed broadcast packets, use the no ip directed-broadcast command.

Defaults   Disabled (that is, the interface does not receive directed broadcast packets)

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip domain-list

Configure names to complete unqualified host names.

Syntax   ip domain-list *name*

To remove the name, use the no ip domain-list *name* command.

Parameters

name	Enter a domain name to be used to complete unqualified names (that is, incomplete domain names that cannot be resolved).

Defaults   Disabled.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Configure the ip domain-list command up to 6 times to configure a list of possible domain names.

If both the ip domain-name and ip domain-list commands are configured, the software will try to resolve the name using the ip domain-name command. If the name is not resolved, the software goes through the list of names configured with the ip domain-list command to find a match.

Use the following steps to enable dynamic resolution of hosts:

*   specify a domain name server with the ip name-server command.
*   enable DNS with the ip domain-lookup command.

To view current bindings, use the show hosts command. To view DNS related configuration, use the show running-config resolve command.

Related Commands

ip domain-name	Specifies a DNS server.

ip domain-lookup

Enable dynamic host-name to address resolution (that is, DNS).

Syntax	ip domain-lookup
	To disable DNS lookup, use the no ip domain-lookup command.
Defaults	Disabled.
Command Mode	CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

To fully enable DNS, also specify one or more domain name servers with the ip name-server command.

FTOS does not support sending DNS queries over a VLAN. DNS queries are sent out all other interfaces, including the Management port.

To view current bindings, use the show hosts command.

Related Commands

ip name-server	Specifies a DNS server.
show hosts	Views current bindings.

ip domain-name

Configure one domain name for the switch.

Syntax	ip domain-name *name*
	To remove the domain name, use the no ip domain-name command.

Parameters

name	Enter one domain name to be used to complete unqualified names (that is, incomplete domain names that cannot be resolved).

Defaults	Not configured.
Command Modes	CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

You can only configure one domain name with the ip domain-name command. To configure more than one domain name, configure the ip domain-list command up to 6 times.

Use the following steps to enable dynamic resolution of hosts:

*   specify a domain name server with the ip name-server command.
*   enable DNS with the ip domain-lookup command.

To view current bindings, use the show hosts command.

Related Commands	ip domain-list	Configures additional names.

ip helper-address

Specify the address of a DHCP server so that DHCP broadcast messages can be forwarded when the DHCP server is not on the same subnet as the client.

Syntax   ip helper-address *ip-address*

To remove a DHCP server address, use the no ip helper-address command.

Parameters

ip-address	Enter an IP address in dotted decimal format (A.B.C.D).

Defaults   Not configured.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You can add multiple DHCP servers by entering the ip helper-address command multiple times. If multiple servers are defined, an incoming request is sent simultaneously to all configured servers and the reply is forwarded to the DHCP client.

FTOS uses standard DHCP ports, that is UDP ports 67 (server) and 68 (client) for DHCP relay services. It listens on port 67 and if it receives a broadcast, the software converts it to unicast, and forwards to it to the DHCP-server with source port=68 and destination port=67.

The server replies with source port=67, destination port=67 and FTOS forwards to the client with source port=67, destination port=68.

ip helper-address hop-count disable

Disable the hop-count increment for the DHCP relay agent.

Syntax   ip helper-address hop-count disable

To re-enable the hop-count increment, use the no ip helper-address hop-count disable command.

Defaults   Enabled; the hops field in the DHCP message header is incremented by default

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   This command disables the incrementing of the hops field when boot requests are relayed to a DHCP server through FTOS. If the incoming boot request already has a non-zero hops field, the message will be relayed with the same value for hops. However, the message is discarded if the hops field exceeds 16, to comply with the relay agent behavior specified in RFC 1542.

Related Commands	ip helper-address	Specifies the destination broadcast or host address for DHCP server requests.
	show running-config	Displays the current configuration and changes from the default values.

ip host

Assign a name and IP address to be used by the host-to-IP address mapping table.

Syntax ip host *name ip-address*

To remove an IP host, use the no ip host *name* [*ip-address*] command.

Parameters	*name*	Enter a text string to associate with one IP address.
	ip-address	Enter an IP address, in dotted decimal format, to be mapped to the name.

Defaults Not configured.

Command Modes CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip max-frag-count

Set the maximum number of fragments allowed in one packet for packet re-assembly.

Syntax ip max-frag-count *count*

To place no limit on the number of fragments allowed, use the no ip max-frag-count command.

Parameters	*count*	Enter a number for the number of fragments allowed for re-assembly.
		Range: 2 to 256

Defaults No limit is set on number of fragments allowed.

Command Modes CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information To avoid denial of service (DOS) attacks, keep the number of fragments allowed for re-assembly low.

ip name-server

Enter up to 6 IPv4 addresses of name servers. The order you enter the addresses determines the order of their use.

Syntax ip name-server *ipv4-address* [*ipv4-address2...ipv4-address6*]

To remove a name server, use the no ip name-server *ip-address* command.

Parameters	*ipv4-address*	Enter the IPv4 address, in dotted decimal format, of the name server to be used.
	ipv4-address2... *ipv4-address6*	(OPTIONAL) Enter up five more IPv4 addresses, in dotted decimal format, of name servers to be used. Separate the addresses with a space.

Defaults No name servers are configured.

Command Modes CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information FTOS does not support sending DNS queries over a VLAN. DNS queries are sent out all other interfaces, including the Management port.

ip proxy-arp

Enable Proxy ARP on an interface.

Syntax ip proxy-arp

To disable Proxy ARP, enter no ip proxy-arp.

Defaults Enabled.

Command Modes INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	show ip interface	Displays the interface routing status and configuration.

ip route

Assign a static route to the switch.

Syntax ip route *destination mask* {*ip-address* | *interface* [*ip-address*]} [*distance*] [permanent] [tag *tag-value*]

To delete a specific static route, use the no ip route *destination mask* {*address* | *interface* [*ip-address*]} command.

To delete all routes matching a certain route, use the no ip route *destination mask* command.

Parameters	*destination*	Enter the IP address in dotted decimal format of the destination device.
	mask	Enter the mask in slash prefix formation (/x) of the destination device's IP address.
	ip-address	Enter the IP address in dotted decimal format of the forwarding router.

interface	Enter the following keywords and slot/port or number information: • For a loopback interface, enter the keyword loopback followed by a number from zero (0) to 16383. • For the null interface, enter the keyword null followed by zero (0). • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information. • For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.
distance	(OPTIONAL) Enter a number as the distance metric assigned to the route. Range: 1 to 255
permanent	(OPTIONAL) Enter the keyword permanent to specify the route is not removed, even if the interface assigned to that route goes down. The route must be up initially to install it in the routing table. If you disable the interface with an IP address associated with the keyword permanent, the route disappears from the routing table.
tag *tag-value*	(OPTIONAL) Enter the keyword tag followed by a number to assign to the route. Range: 1 to 4294967295

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

Using the following example of a static route:
ip route 33.33.33.0 /24 tengigabitethernet 0/0 172.31.5.43

• The software installs a next hop that is not on the directly connected subnet but which recursively resolves to a next hop on the interface's configured subnet. In the example, if gig 0/0 has ip address on subnet 2.2.2.0 and if 172.31.5.43 recursively resolves to 2.2.2.0, FTOS installs the static route.
• When the interface goes down, FTOS withdraws the route.
• When the interface comes up, FTOS re-installs the route.
• When recursive resolution is "broken," FTOS withdraws the route.
• When recursive resolution is satisfied, FTOS re-installs the route.

Related Commands

show ip route	Views the switch routing table.

ip source-route

Enable FTOS to forward IP packets with source route information in the header.

Syntax ip source-route

To drop packets with source route information, use the no ip route-source command.

Enabled.

CONFIGURATION

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip unreachables

Enable the generation of Internet Control Message Protocol (ICMP) unreachable messages.

Syntax ip unreachables

To disable the generation of ICMP messages, use the no ip unreachables command.

Defaults Disabled

Command Modes INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

management route

Configure a static route that points to the Management interface or a forwarding router.

Syntax management route {*ipv4-address*}*/mask* {*forwarding-router-address* | managementethernet}

Parameters

{*ipv4-address*}*/mask*	Enter an IPv4 address (A.B.C.D) followed by the prefix-length for the IP address of the management interface.
forwarding-router-address	Enter an IPv4 address of a forwarding router.
managementethernet	Enter the keyword managementethernet for the Management interface.

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information When a static route (or a protocol route) overlaps with Management static route, the static route (or a protocol route) is preferred over the Management Static route. Also, Management static routes and the Management Connected prefix are not reflected in the hardware routing tables. Separate routing tables are maintained for IPv4 management routes. This command manages both tables.

Related Commands

interface ManagementEthernet	Configures the Management port on the system.

show arp

Display the ARP table.

Syntax	show arp [interface *interface*	ip *ip-address* [*mask*]	macaddress *mac-address* [*mac-address mask*]] [static	dynamic] [summary]

Parameters

interface *interface*	(OPTIONAL) Enter the following keywords and slot/port or number information:
	• For the Management interface, enter the keyword managementethernet followed by the slot/port information.
	• For a Port Channel interface, enter the keyword port-channel followed by a number:
	Range: 1 to 128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.
ip *ip-address mask*	(OPTIONAL) Enter the keyword ip followed by an IP address in the dotted decimal format. Enter the optional IP address mask in the slash prefix format (/x).
macaddress *mac-address mask*	(OPTIONAL) Enter the keyword macaddress followed by a MAC address in nn:nn:nn:nn:nn:nn format. Enter the optional MAC address mask in nn:nn:nn:nn:nn format also.
static	(OPTIONAL) Enter the keyword static to view entries entered manually.
dynamic	(OPTIONAL) Enter the keyword dynamic to view dynamic entries.
summary	(OPTIONAL) Enter the keyword summary to view a summary of ARP entries.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Figure 15-5 shows two VLANs that are associated with a private VLAN (PVLAN) (refer to Chapter 23, Private VLAN (PVLAN)).

Example   **Figure 15-5.   show arp Command Example (Partial)**

```
FTOS>show arp

Protocol   Address         Age(min)  Hardware Address    Interface  VLAN
CPU
--------------------------------------------------------------------------------
--------
Internet   10.11.8.6           167   00:01:e9:45:00:03   Ma 0/0      -
CP
Internet   10.11.68.14         124   00:01:e9:45:00:03   Ma 0/0      -
CP
Internet   10.11.209.254         0   00:01:e9:45:00:03   Ma 0/0      -
CP
```

Figure 15-6.   show arp Command Example with Private VLAN data

```
FTOS#show arp

Protocol   Address         Age(min)  Hardware Address   Interface  VLAN       CPU
--------------------------------------------------------------------------------
Internet   5.5.5.1             -     00:01:e8:43:96:5e      -       Vl 10 pv 200  CP
Internet   5.5.5.10            -     00:01:e8:44:99:55      -       Vl 10       CP
Internet   10.1.2.4            1     00:01:e8:d5:9e:e2   Ma 0/0     -           CP
Internet   10.10.10.4          1     00:01:e8:d5:9e:e2   Ma 0/0     -           CP
Internet   10.16.127.53        1     00:01:e8:d5:9e:e2   Ma 0/0     -           CP
Internet   10.16.134.254      20     00:01:e8:d5:9e:e2   Ma 0/0     -           CP
Internet   133.33.33.4         1     00:01:e8:d5:9e:e2   Ma 0/0     -           CP
```

Line 1 shows community VLAN 200 (in primary VLAN 10) in a PVLAN.

Line 2 shows primary VLAN 10.

Table 15-2.   show arp Command Example Fields

Row Heading	Description
Protocol	Displays the protocol type.
Address	Displays the IP address of the ARP entry.
Age(min)	Displays the age in minutes of the ARP entry.
Hardware Address	Displays the MAC address associated with the ARP entry.
Interface	Displays the first two letters of the interfaces type and the slot/port associated with the ARP entry.
VLAN	Displays the VLAN ID, if any, associated with the ARP entry.
CPU	Lists which CPU the entries are stored on.

Figure 15-7.   show arp summary Command Example

```
FTOS#show arp summary

Total Entries    Static Entries   Dynamic Entries   CPU
-----------------------------------------------------------------
---------------
3                0                3                 CP
FTOS#
```

Table 15-3.   show arp summary Command Example Fields

Row Heading	Description
Total Entries	Lists the total number of ARP entries in the ARP table.
Static Entries	Lists the total number of configured or static ARP entries.
Dynamic Entries	Lists the total number of learned or dynamic ARP entries.
CPU	Lists which CPU the entries are stored on.

Related Commands

ip local-proxy-arp	Enables/disables Layer 3 communication in secondary VLANs.
switchport mode private-vlan	Sets the PVLAN mode of the selected port.

show arp retries

Display the configured number of ARP retries.

Syntax	show arp retries
Command Modes	EXEC
	EXEC Privilege

Command History

Version 8.3.1.0	Introduced

Related Commands

arp retries	Sets the number of ARP retries in case the system does not receive an ARP reply in response to an ARP request.

show hosts

View the host table and DNS configuration.

Syntax	show hosts
Command Modes	EXEC
	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 15-8.   show hosts Command Example**

```
FTOS#show hosts
Default domain is not set
Name/address lookup uses static mappings
Name servers are not set
Host                    Flags      TTL    Type    Address
--------                -----      ----   ----    -------
ks                      (perm, OK) -             IP     2.2.2.2
4200-1                  (perm, OK) -             IP     192.68.69.2
1230-3                  (perm, OK) -             IP     192.68.99.2
ZZr                     (perm, OK) -             IP     192.71.18.2
Z10-3                   (perm, OK) -             IP     192.71.23.1
FTOS#
```

Table 15-4.   show hosts Command Example Fields

Field	Description
Default domain...	Displays the domain name (if configured).
Name/address lookup...	States if DNS is enabled on the system. If DNS is enabled, the Name/Address lookup is domain service. If DNS is not enabled, the Name/Address lookup is static mapping.
Name servers are...	Lists the name servers, if configured.
Host	Displays the host name assigned to the IP address.

Table 15-4. show hosts Command Example Fields (continued)

Field	Description
Flags	Classifies the entry as one of the following: • perm - the entry was manually configured and will not time out • temp - the entry was learned and will time out after 72 hours of inactivity. Also included in the flag is an indication of the validity of the route: • ok - the entry is valid. • ex - the entry expired. • ?? - the entry is suspect.
TTL	Displays the amount of time until the entry ages out of the cache. For dynamically learnt entries only.
Type	Displays IP as the type of entry.
Address	Displays the IP address(es) assigned to the host.

Related Commands

traceroute	Views the DNS resolution
ip host	Configures a host.

show ip cam stack-unit

Display content-addressable memory (CAM) entries.

Syntax show ip cam stack-unit *0-5* port-set *pipe-number* [*ip-address mask* [longer-prefixes] | detail | member-info | summary]

Parameters

0-5	Enter the stack-unit ID, from 0 to 5.
pipe-number	Enter the number of the Port-Pipe number. Range: 0 to 0
ip-address mask [longer-prefix]	(OPTIONAL) Enter the IP address and mask of a route to CAM entries for that route only. Enter the keyword longer-prefixes to view routes with a common prefix.
detail	Enter the keyword detail to display the group index ID used by the ecmp routes in the CAM.
member-info	Enter the keyword member-info to display the group index used by the ecmp, the number of egress ports (members) for the ecmp, and the port details of each member. The detail information under member-info will give the MAC address, VLAN ID and gateway of every member port of the ecmp.
summary	(OPTIONAL) Enter the keyword summary to view a table listing route prefixes and the total number routes which can be entered in to CAM.

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 15-9.   show ip cam stack-unit Command Example**

```
FTOS#show ip cam stack-unit 0 port-set 0 10.10.10.10/32 longer-prefixes

Destination      EC CG V C  VId     Mac-Addr         Port

---------------- -- -- - - ----- ---------------- -------------
10.10.10.10       0  0 1 1     0 00:00:00:00:00:00  3f01   CP

FTOS#
```

Table 15-5.   show ip cam Command Example Fields

Field	Description
Destination	Displays the destination route of the index.
CG	Displays 0.
V	Displays a 1 if the entry is valid and a 0 otherwise.
C	Displays the CPU bit. 1 indicates that a packet hitting this entry is forwarded to the control processor, depending on Egress port.
V Id	Displays the VLAN ID. If the entry is 0, the entry is not part of a VLAN.
Mac Addr	Displays the next-hop router's MAC address.
Port	Displays the egress interface. Use the second half of the entry to determine the interface. For example, in the entry 17cl CP, the CP is the pertinent portion. CP = control processor Fo= 40 Gigabit Ethernet interface Te = 10 Gigabit Ethernet interface

Figure 15-10.   show ip cam stack-unit ecmp-group detail Command Example

```
FTOS#show ip cam stack-unit 0 po 0 ecmp-group detail

Destination      EC CG V C  VId     Mac-Addr         Port       ECMP Group-Index

---------------- -- -- - - ----- ---------------- -------------
-------------------
1.1.1.2           0  0 1 0     0 00:01:e8:8a:d6:58  0004 Te 0/3        -
2.1.1.2           0  0 1 0     0 00:01:e8:8a:d6:58  0009 Te 0/8        -
1.1.1.1           0  0 1 1     0 00:00:00:00:00:00  3f01   CP          -
2.1.1.1           0  0 1 1     0 00:00:00:00:00:00  3f01   CP          -
1.1.1.0           0  0 1 1     0 00:00:00:00:00:00  3f01   CP          -
2.1.1.0           0  0 1 1     0 00:00:00:00:00:00  3f01   CP          -
100.1.1.0         1  0 1 0     0 00:01:e8:8a:d6:58  0004 Te 0/3        0
100.1.1.0         1  0 1 0     0 00:01:e8:8a:d6:58  0009 Te 0/8        0
0.0.0.0           0  0 1 1     0 00:00:00:00:00:00  3f01   CP          -
FTOS#
```

Figure 15-11.   show ip cam stack-unit ecmp-group member-info detail Command Example

```
FTOS#show ip cam stack-unit 0 po 0 ecmp-group member-info detail

Group Index   Member Count   Mac-Addr          Port      VLan ID    Gateway
-----------   ------------   ---------------   --------- ---------  ---------
    0         2              00:01:e8:8a:d6:58  Te 0/3      0        1.1.1.2
                             00:01:e8:8a:d6:58  Te 0/8      0        2.1.1.2
FTOS#
```

show ip fib stack-unit

View all forwarding information base (FIB) entries.

Syntax   show ip fib stack-unit *0-5* [*ip-address* [*mask*] [longer-prefixes] | summary]

Parameters

0-5	Enter the stack unit ID, from 0 to 5.
ip-address mask	(OPTIONAL) Enter the IP address of the network destination to view only information on that destination. Enter the IP address in dotted decimal format (A.B.C.D). You must enter the mask in slash prefix format (/X).
longer-prefixes	(OPTIONAL) Enter the keyword longer-prefixes to view all routes with a common prefix.
summary	(OPTIONAL) Enter the keyword summary to view the total number of prefixes in the FIB.

Command Mode   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 15-12.   show ip fib stack-unit Command Example**

```
FTOS#show ip fib stack-unit 0

  Destination              Gateway              First-Hop          Mac-Addr           Port     VId   EC
------------------  --------------------------  ----------------  -------------------  --------  -----  --
10.10.10.10/32       Direct, Nu 0              0.0.0.0           00:00:00:00:00:00 BLK HOLE     0   0

FTOS>
```

Table 15-6.   show ip fib stack-unit Command Example Fields

Field	Description
Destination	Lists the destination IP address.
Gateway	Displays either the word Direct and an interface for a directly connected route or the remote IP address to be used to forward the traffic.
First-Hop	Displays the first hop IP address.
Mac-Addr	Displays the MAC address.
Port	Displays the egress-port information.
VId	Displays the VLAN ID. If no VLAN is assigned, zero (0) is listed.
EC	Displays the number of ECMP paths.

Related Commands

clear ip fib stack-unit	Clears FIB entries on a specified stack unit.

show ip interface

View IP-related information on all interfaces.

Syntax show ip interface [*interface* | brief] [configuration]

Parameter

interface	(OPTIONAL) Enter the following keywords and slot/port or number information:
	• For a Loopback interface, enter the keyword Loopback followed by a number from 0 to 16383.
	• For the Management interface, enter the keyword ManagementEthernet followed by zero (0).
	• For the Null interface, enter the keyword null followed by zero (0).
	• For a Port Channel interface, enter the keyword port-channel followed by a number:
	Range: 1 to 128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.
brief	(OPTIONAL) Enter the keyword brief to view a brief summary of the interfaces and whether an IP address is assigned.
configuration	(OPTIONAL) Enter the keyword configuration to display the physical interfaces with non-default configurations only.

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 15-13.   show ip interface Command Example**

```
FTOS#show ip int te 0/0
TenGigabitEthernet 0/0 is down, line protocol is down
Internet address is not set
IP MTU is 1500 bytes
Inbound  access list is not set
Proxy ARP is enabled
Split Horizon is enabled
Poison Reverse is disabled
ICMP redirects are not sent
ICMP unreachables are not sent


FTOS#
```

Table 15-7.   show ip interface Command Example Items

Lines	Description
TenGigabitEthernet 0/0...	Displays the interface's type, slot/port and physical and line protocol status.
Internet address...	States whether an IP address is assigned to the interface. If one is, that address is displayed.

Table 15-7.   show ip interface Command Example Items (continued)

Lines	Description
IP MTU is...	Displays IP MTU value.
Inbound access...	Displays the name of the any configured incoming access list. If none is configured, the phrase "not set" is displayed.
Proxy ARP...	States whether proxy ARP is enabled on the interface.
Split horizon...	States whether split horizon for RIP is enabled on the interface.
Poison Reverse...	States whether poison for RIP is enabled on the interface
ICMP redirects...	States if ICMP redirects are sent.
ICMP unreachables...	States if ICMP unreachable messages are sent.

Figure 15-14.   show ip interface brief Command Example (Partial)

```
FTOS#show ip int brief
Interface             IP-Address      OK? Method Status        Protocol
TenGigabitEthernet 0/1   unassigned     NO  None   up               down
TenGigabitEthernet 0/2   unassigned     YES None   up               up
TenGigabitEthernet 0/3   unassigned     YES None   up               up
TenGigabitEthernet 0/4   unassigned     NO  None   up               down
TenGigabitEthernet 0/5   unassigned     NO  None   up               down
TenGigabitEthernet 0/6   unassigned     NO  None   up               down
TenGigabitEthernet 0/7   unassigned     NO  None   up               down
TenGigabitEthernet 0/8   unassigned     NO  None   up               down
TenGigabitEthernet 0/9   unassigned     NO  None   up               down
```

Table 15-8.   show ip interface brief Column Headings

Field	Description
Interface	Displays type of interface and the associated slot and port number.
IP-Address	Displays the IP address for the interface, if configured.
Ok?	Indicates if the hardware is functioning properly.
Method	Displays `Manual` if the configuration is read from the saved configuration.
Status	States whether the interface is enabled (`up`) or disabled (`administratively down`).
Protocol	States whether IP is enabled (`up`) or disabled (`down`) on the interface.

show ip management-route

View the IP addresses assigned to the Management interface.

Syntax   show ip management-route [all | connected | summary | static]

Parameters

all	(OPTIONAL) Enter the keyword all to view all IP addresses assigned to all Management interfaces on the switch.
connected	(OPTIONAL) Enter the keyword connected to view only routes directly connected to the Management interface.

summary	(OPTIONAL) Enter the keyword summary to view a table listing the number of active and non-active routes and their sources.
static	(OPTIONAL) Enter the keyword static to view non-active routes also.

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 15-15.   show ip management route Command Example**

```
FTOS#show ip management-route

Destination        Gateway                        State
-----------        -------                        -----
10.1.2.0/24        ManagementEthernet 0/0         Connected
172.16.1.0/24      10.1.2.4                       Active

FTOS#
```

show ip protocols

View information on all routing protocols enabled and active on the switch.

Syntax show ip protocols

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 15-16.   show ip protocols Command Example**

```
FTOS#show ip protocols
Routing Protocol is "bgp 1"
 Cluster Id is set to 20.20.20.3
 Router Id is set to 20.20.20.3
 Fast-external-fallover enabled
 Regular expression evaluation optimization enabled
 Capable of ROUTE_REFRESH
 For Address Family IPv4 Unicast
   BGP table version is 0, main routing table version 0
   Distance: external 20 internal 200 local 200
   Neighbor(s):
    Address : 20.20.20.2
     Filter-list in : foo
     Route-map in : foo
     Weight : 0
    Address : 5::6
     Weight : 0
FTOS#
```

show ip route

View information, including how they were learned, about the IP routes on the switch.

Syntax show ip route [*hostname* | *ip-address* [*mask*] [longer-prefixes] | list *prefix-list* [*process-id*] | all | connected | static | summary]

Parameter

ip-address	(OPTIONAL) Specify a name of a device or the IP address of the device to view more detailed information about the route.
mask	(OPTIONAL) Specify the network mask of the route. Use this parameter with the IP address parameter.
longer-prefixes	(OPTIONAL) Enter the keyword longer-prefixes to view all routes with a common prefix.
list *prefix-list*	(OPTIONAL) Enter the keyword list and the name of a configured prefix list. See show ip route list.
process-id	(OPTIONAL) Specify that only OSPF routes with a certain process ID must be displayed.
connected	(OPTIONAL) Enter the keyword connected to view only the directly connected routes.
all	(OPTIONAL) Enter the keyword all to view both active and non-active routes.
static	(OPTIONAL) Enter the keyword static to view only routes configured by the ip route command.
summary	(OPTIONAL) Enter the keyword summary. See show ip route summary.

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 15-17.   show ip route all Command Example**

```
FTOS#show ip route all

Codes: C - connected, S - static, R - RIP,
       B - BGP, IN - internal BGP, EX - external BGP,LO - Locally Originated,
       O - OSPF, IA - OSPF inter area, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type 2, E1 - OSPF external type 1,
       E2 - OSPF external type 2, i - IS-IS, L1 - IS-IS level-1,
       L2 - IS-IS level-2, IA - IS-IS inter area, * - candidate default,
       > - non-active route, + - summary route

Gateway of last resort is not set

     Destination        Gateway                       Dist/Metric Last Change
     -----------        -------                       ----------- -----------
FTOS#
```

Example   **Figure 15-18.   show ip route summary and show ip route static Command Examples**

```
FTOS#show ip route summary

Route Source            Active Routes    Non-active Routes
connected               2                0
static                  1                0
Total                   3                0
Total 3 active route(s) using 612 bytes
FTOS#show ip route static ?
|                    Pipe through a command
<cr>
FTOS#show ip route static
      Destination      Gateway                   Dist/Metric Last Change
      -----------      -------                   ----------- -----------
 *S   0.0.0.0/0        via 10.10.91.9, Te 1/2         1/0        3d2h
FTOS#
```

Table 15-9.   show ip route all Command Example Fields

Field	Description
(undefined)	Identifies the type of route: • `C` = connected • `S` = static • `R` = RIP • `B` = BGP • `IN` = internal BGP • `EX` = external BGP • `LO` = Locally Originated • `O` = OSPF • `IA` = OSPF inter area • `N1` = OSPF NSSA external type 1 • `N2` = OSPF NSSA external type 2 • `E1` = OSPF external type 1 • `E2` = OSPF external type 2 • `i` = IS-IS • `L1` = IS-IS level-1 • `L2` = IS-IS level-2 • `IA` = IS-IS inter-area • `*` = candidate default • `>` = non-active route • `+` = summary routes
Destination	Identifies the route's destination IP address.
Gateway	Identifies whether the route is directly connected and on which interface the route is configured.
Dist/Metric	Identifies if the route has a specified distance or metric.
Last Change	Identifies when the route was last changed or configured.

show ip route list

Display IP routes in an IP prefix list.

Syntax   show ip route list *prefix-list*

Command Modes EXEC

EXEC Privilege

Related Commands

ip prefix-list	Enters the CONFIGURATION-IP PREFIX-LIST mode and configure a prefix list.
show ip prefix-list summary	Displays a summary of the configured prefix lists.

Example **Figure 15-19. show ip route summary Command Example**

```
FTOS#show ip route list test

Codes: C - connected, S - static, R - RIP,
       B - BGP, IN - internal BGP, EX - external BGP,LO - Locally Originated,
       O - OSPF, IA - OSPF inter area, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type 2, E1 - OSPF external type 1,
       E2 - OSPF external type 2, i - IS-IS, L1 - IS-IS level-1,
       L2 - IS-IS level-2, IA - IS-IS inter area, * - candidate default,
       > - non-active route, + - summary route

Gateway of last resort is not set

      Destination       Gateway                  Dist/Metric Last Change
      -----------       -------                  ----------- -----------
  R   2.1.0.0/24        via 2.1.4.1, TenGig 4/43         120/2      3d0h
  R   2.1.1.0/24        via 2.1.4.1, TenGig 4/43         120/2      3d1h
  R   2.1.2.0/24        via 2.1.4.1, TenGig 4/43         120/1      3d0h
  R   2.1.3.0/24        via 2.1.4.1, TenGig 4/43         120/1      3d1h
  C   2.1.4.0/24        Direct, TenGig 4/43                0/0      3d1h
```

show ip route summary

View a table summarizing the IP routes in the switch.

Syntax show ip route summary

Command Modes EXEC

EXEC Privilege

Example   **Figure 15-20.   show ip route summary Command Example**

```
FTOS>show ip route summary

Route Source    Active Routes    Non-active Routes
connected       17               0
static          3                0
ospf 100        1368             2
  Intra-area: 762 Inter-area: 1 External-1: 600 External-2: 5
Total           1388             2
Total 1388 active route(s) using 222440 bytes
Total 2 non-active route(s) using 128 bytes
FTOS>
```

Table 15-10.   show ip route summary Column Headings

Column Heading	Description
Route Source	Identifies how the route is configured in FTOS.
Active Routes	Identifies the best route if a route is learned from two protocol sources.
Non-active Routes	Identifies the back-up routes when a route is learned by two different protocols. If the best route or active route goes down, the non-active route will become the best route.
ospf 100	If routing protocols (OSPF, RIP) are configured and routes are advertised, then information on those routes is displayed.
Total 1388 active...	Displays the number of active and non-active routes and the memory usage of those routes. If there are no routes configured in the FTOS, this line does not appear.

Related Commands

show ip route	Displays information about the routes found in switch.

show ip traffic

View IP, ICMP, UDP, TCP, and ARP traffic statistics.

Syntax   show ip traffic

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 15-21.   show ip traffic Command Example (partial)

```
FTOS#show ip traffic
IP statistics:
 Rcvd: 10021161 total, 3197480 local destination
     2501 format errors, 390 checksum errors, 0 bad hop count
     0 unknown protocol, 0 not a gateway
     115 security failures, 0 bad options
 Frags: 0 reassembled, 0 timeouts, 0 too big
      0 fragmented, 0 couldn't fragment
 Bcast: 6281 received, 0 sent; Mcast: 500 received, 0 sent
 Sent: 6573260 generated, 0 forwarded
     3830 encapsulation failed, 0 no route

 ICMP statistics:
 Rcvd: 0 format errors, 0 checksum errors, 0 redirects, 3 unreachable
     0 echo, 0 echo reply, 0 mask requests, 0 mask replies, 0 quench
     0 parameter, 0 timestamp, 0 info request, 0 other
 Sent: 0 redirects, 1 unreachable, 0 echo, 0 echo reply
     0 mask requests, 0 mask replies, 0 quench, 0 timestamp
     0 info reply, 0 time exceeded, 0 parameter problem

 UDP statistics:
 Rcvd: 2938110 total, 14 checksum errors, 1 no port
     0 short packets, 0 bad length, 1883908 no port broadcasts, 0 socket full
 Sent: 329731 total, 1883908 forwarded broadcasts
--More--
```

Table 15-11.   show ip traffic output definitions

Keyword	Definition
unknown protocol...	No receiver for these packets. Counts those packets whose protocol type field is not recognized by FTOS.
not a gateway...	Packets can not be routed; host/network is unreachable.
security failures...	Counts the number of received unicast/multicast packets that could not be forwarded due to: • route not found for unicast/multicast; ingress interfaces do not belong to the destination multicast group • destination IP address belongs to reserved prefixes; host/network unreachable
bad options...	Unrecognized IP option on a received packet.
Frags:	IP fragments received.
... reassembled	Number of IP fragments that were reassembled.
... timeouts	Number of times a timer expired on a reassembled queue.
... too big	Number of invalid IP fragments received.
... couldn't fragment	Number of packets that could not be fragmented and forwarded.
...encapsulation failed	Counts those packets which could not be forwarded due to ARP resolution failure. FTOS sends an arp request prior to forwarding an IP packet. If a reply is not received, FTOS repeats the request three times. These packets are counted in encapsulation failed.
Rcvd:	
...short packets	The number of bytes in the packet are too small.
...bad length	The length of the packet was not correct.
...no port broadcasts	The incoming broadcast/multicast packet did not have any listener.
...socket full	The applications buffer was full and the incoming packet had to be dropped.

Usage Information

The F10 monitoring MIB provides access to the statistics described below.

Table 15-12.   F10 Monitoring MIB

Command Display	Object	OIDs
IP statistics:		
Bcast:		
Received	f10BcastPktRecv	1.3.6.1.4.1.6027.3.3.5.1.1
Sent	f10BcastPktSent	1.3.6.1.4.1.6027.3.3.5.1.2
Mcast:		
Received	f10McastPktRecv	1.3.6.1.4.1.6027.3.3.5.1.3
Sent	f10McastPktSent	1.3.6.1.4.1.6027.3.3.5.1.4
ARP statistics:		
Rcvd:		
Request	f10ArpReqRecv	1.3.6.1.4.1.6027.3.3.5.2.1
Replies	f10ArpReplyRecv	1.3.6.1.4.1.6027.3.3.5.2.3
Sent:		
Request	f10ArpReqSent	1.3.6.1.4.1.6027.3.3.5.2.2
Replies	f10ArpReplySent	1.3.6.1.4.1.6027.3.3.5.2.4
Proxy	f10ArpProxySent	1.3.6.1.4.1.6027.3.3.5.2.5

show tcp statistics

View information on TCP traffic through the switch.

Syntax   show tcp statistics

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 15-22.   show tcp statistics cp Command Example**

```
FTOS#show tcp statistics

Rcvd: 9849 Total, 0 no port
    0 checksum error, 0 bad offset, 0 too short
    5735 packets (7919 bytes) in sequence
    20 dup packets (2 bytes)
    0 partially dup packets (0 bytes)
    1 out-of-order packets (0 bytes)
    0 packets ( 0 bytes) with data after window
    0 packets after close
    0 window probe packets, 0 window update packets
    0 dup ack packets, 0 ack packets with unsend data
    6671 ack packets (152813 bytes)
Sent: 6778 Total, 0 urgent packets
    7 control packets
    6674 data packets (152822 bytes)
    12 data packets (1222 bytes) retransmitted
    85 ack only packets (5677 delayed)
    0 window probe packets, 0 window update packets
0 Connections initiated, 7 connections accepted, 7 connections established
8 Connections closed (including 4 dropped, 0 embryonic dropped)
12 Total rxmt timeout, 1 connections dropped in rxmt timeout
26 Keepalive timeout, 25 keepalive probe, 1 Connections dropped in keepalive
FTOS#
```

Table 15-13.   show tcp statistics cp Command Example Fields

Field	Description
Rcvd:	Displays the number and types of TCP packets received by the switch. • Total = total packets received • no port = number of packets received with no designated port.
0 checksum error...	Displays the number of packets received with the following: • checksum errors • bad offset to data • too short
329 packets...	Displays the number of packets and bytes received in sequence.
17 dup...	Displays the number of duplicate packets and bytes received.
0 partially...	Displays the number of partially duplicated packets and bytes received.
7 out-of-order...	Displays the number of packets and bytes received out of order.
0 packets with data after window	Displays the number of packets and bytes received that exceed the switch's window size.
0 packets after close	Displays the number of packet received after the TCP connection was closed.
0 window probe packets...	Displays the number of window probe and update packets received.
41 dup ack...	Displays the number of duplicate acknowledgement packets and acknowledgement packets with data received.
10184 ack...	Displays the number of acknowledgement packets and bytes received.
Sent:	Displays the total number of TCP packets sent and the number of urgent packets sent.
25 control packets...	Displays the number of control packets sent and the number retransmitted.
11603 data packets...	Displays the number of data packets sent.
24 data packets retransmitted	Displays the number of data packets resent.

Table 15-13.   show tcp statistics cp Command Example Fields (continued)

Field	Description
355 ack...	Displays the number of acknowledgement packets sent and the number of packet delayed.
0 window probe...	Displays the number of window probe and update packets sent.
7 Connections initiated...	Displays the number of TCP connections initiated, accepted, and established.
14 Connections closed...	Displays the number of TCP connections closed, dropped.
20 Total rxmt...	Displays the number of times the switch tried to re-send data and the number of connections dropped during the TCP retransmit timeout period.
0 Keepalive....	Lists the number of keepalive packets in timeout, the number keepalive probes and the number of TCP connections dropped during keepalive.

iSCSI Optimization

Overview

Internet Small Computer System Interface (iSCSI) optimization enables quality-of-service (QoS) treatment for iSCSI storage traffic on an MXL Switch.

The following FTOS commands are used to configure and verify the iSCSI Optimization feature:

- advertise dcbx-app-tlv
- iscsi aging time
- iscsi cos
- iscsi enable
- iscsi priority-bits
- iscsi profile-compellant
- iscsi target port
- show iscsi
- show iscsi sessions
- show iscsi sessions detailed
- show run iscsi

advertise dcbx-app-tlv

Configure DCBX to send iSCSI TLV advertisements.

Syntax   advertise dcbx-app-tlv iscsi

To disable DCBX iSCSI TLV advertisements, use the no advertise dcbx-app-tlv iscsi command.

Defaults   Enabled.

Command Mode   PROTOCOL LLDP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You can configure iSCSI TLVs to be sent either globally or on a specified interface. The interface configuration takes priority over global configuration.

iscsi aging time

Set the aging time for iSCSI sessions.

Syntax   iscsi aging time *time*

To remove the iSCSI session aging time, use the no iscsi aging time command.

Parameters

time	Enter the aging time for the iSCSI session.
	Valid values: 5 to 43,200 minutes.

Defaults   10 minutes.

Command Mode   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

iscsi cos

Set the QoS policy that will be applied to the iSCSI flows.

Syntax   iscsi cos {enable | disable | dot1p *vlan-priority-value* [remark] | dscp *dscp-value* [remark]}

To disable the QoS policy, use the no iscsi cos dscp command.

Parameters

enable	Enter the keyword enable to allow the application of preferential QoS treatment to iSCSI traffic so that the iSCSI packets are scheduled in the switch with a dot1p priority 4 regardless of the VLAN priority tag in the packet.
	Default: iSCSI packets are handled with dotp1 priority 4 without remark.
disable	Enter the keyword disable to disable the application of preferential QoS treatment to iSCSI frames.
dot1p *vlan-priority-value*	Enter the dot1p value of the VLAN priority tag assigned to the incoming packets in an iSCSI session.
	The valid range is 0 to 7.
	Default: The dot1p value in ingress iSCSI frames is not changed and is used in iSCSI TLV advertisements if you did not enter the iSCSI priority-bits command.
dscp *dscp-value*	Enter the DSCP value assigned to the incoming packets in an iSCSI session.
	The valid range is 0 to 63.
	Default: The DSCP value in ingress packets is not changed.
remark	Marks the incoming iSCSI packets with the configured dot1p or DSCP value when they egress to the switch.
	Default: The dot1and DSCP values in egress packets are not changed.

Defaults   See above.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

iscsi enable

Globally enable iSCSI optimization.

Syntax	iscsi enable

To disable iSCSI optimization, use the no iscsi command.

Parameters		
enable	Enter the keyword enable to enable the iSCSI optimization feature.

Defaults	Enabled.

Command Modes	CONFIGURATION

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	When you enable the iSCSI feature using the iscsi enable command, flow control settings are set to **rx on tx off** on all interfaces.

iscsi priority-bits

Configure the priority bitmap to be advertised in iSCSI application TLVs.

Syntax	iscsi priority-bits

To remove the configured priority bitmap, use the no iscsi priority-bits command.

Defaults	4 (0x10 in the bitmap)

Command Modes	PROTOCOL LLDP (only on global, not on interface)

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

iscsi profile-compellant

Configure the auto-detection of Compellent arrays on a port.

Syntax	iscsi profile-compellent

Defaults	Compellent disk arrays are not detected.

Command Modes	INTERFACE

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

iscsi target port

Configure the iSCSI target ports and optionally, the IP addresses on which iSCSI communication will be monitored.

Syntax   iscsi target port tcp-port-1[*tcp-port-2...tcp-port-16*][address *ip-address*]

To remove the configured iSCSI target ports or IP addresses, use the no iscsi target port command.

Parameters

tcp-port-2...tcp-port-16	Enter the tcp-port number of the iSCSI target ports.
	The tcp-port-n is the TCP port number or a list of TCP port numbers on which the iSCSI target listens to requests. Separate port numbers with a comma.
	Default: 860, 3260.
ip-address	(OPTIONAL) Enter the ip-address that the iSCSI will monitor.
	The ip-address specifies the IP address of the iSCSI target.

Defaults   860, 3260.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You can configure up to 16 target TCP ports on the switch in one command or multiple commands.

When you use the no iscsi target port command, and the TCP port to be deleted is one bound to a specific IP address, the IP address value must be included in the command.

show iscsi

Display the currently configured iSCSI settings.

Syntax   show iscsi

Command Mode   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 16-1.   show iscsi Command Example

```
FTOS# show isci

iSCSI is enabled
iSCSI COS : dot1p is 4 no-remark
Session aging time: 10
Maximum number of connections is 256
-------------------------------------------------
iSCSI Targets and TCP Ports:
-------------------------------------------------
TCP Port    Target IP Address
3260
860
```

show iscsi sessions	Display information on active iSCSI sessions on the switch.
show iscsi sessions detailed	Display detailed information on active iSCSI sessions on the switch.
show run iscsi	show run iscsi

show iscsi sessions

Display information on active iSCSI sessions on the switch.

Syntax   show iscsi sessions

Command Mode   EXEC

EXEC Privilege

Command
History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 16-2.   show iscsi sessions Command Example**

```
FTOS# show isci sessions
Session 0:
--------------------------------------------------------------------------------
----------
Target: iqn.2001-05.com.equallogic:0-8a0906-0e70c2002-10a0018426a48c94-iom010
Initiator: iqn.1991-05.com.microsoft:win-x9l8v27yajg
ISID: 400001370000

Session 1:
--------------------------------------------------------------------------------
----------
Target: iqn.2001-05.com.equallogic:0-8a0906-0f60c2002-0360018428d48c94-iom011
Initiator: iqn.1991-05.com.microsoft:win-x9l8v27yajg
ISID: 400001370000.
```

show iscsi	Display the currently configured iSCSI settings.
show iscsi sessions detailed	Display detailed information on active iSCSI sessions on the switch.
show run iscsi	show run iscsi

show iscsi sessions detailed

Display detailed information on active iSCSI sessions on the switch.

Syntax   show iscsi sessions detailed [session *isid*]

Parameters

isid	Enter the session's iSCSi ID to display detailed information on specified iSCSi session.

Command Mode   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 16-3.   show iscsi sessions detailed Command Example**

```
 FTOS# show isci sessions detailed
Session 0      :
-----------------------------------------------------------------------------
Target:iqn.2010-11.com.ixia:ixload:iscsi-TG1
Initiator:iqn.2010-11.com.ixia.ixload:initiator-iscsi-2c
Up Time:00:00:01:28(DD:HH:MM:SS)
Time for aging out:00:00:09:34(DD:HH:MM:SS)
ISID:806978696102
Initiator       Initiator       Target          Target      Connection
IP Address      TCP Port        IP Address      TCPPort     ID
10.10.0.44         33345        10.10.0.101      3260        0
Session 1      :
-----------------------------------------------------------------------------
Target:iqn.2010-11.com.ixia:ixload:iscsi-TG1
Initiator:iqn.2010-11.com.ixia.ixload:initiator-iscsi-35
Up Time:00:00:01:22(DD:HH:MM:SS)
Time for aging out:00:00:09:31(DD:HH:MM:SS)
ISID:806978696102
Initiator       Initiator       Target          Target      Connection
IP Address      TCP Port        IP Address      TCPPort     ID
10.10.0.53         33432        10.10.0.101      3260        0
```

Related Commands

show iscsi	Display the currently configured iSCSI settings.
show iscsi sessions	Display information on active iSCSI sessions on the switch.
show run iscsi	show run iscsi

show run iscsi

Display all globally-configured non-default iSCSI settings in the current FTOS session.

Syntax	show run iscsi
Command Mode	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show iscsi	Display the currently configured iSCSI settings.
show iscsi sessions	Display information on active iSCSI sessions on the switch.
show iscsi sessions detailed	Display detailed information on active iSCSI sessions on the switch.

Link Aggregation Control Protocol (LACP)

Overview

This chapter contains commands for Dell Force10's implementation of the link aggregation control protocol (LACP) for the creation of dynamic link aggregation groups (LAGs — called *port-channels* in FTOS parlance). For static LAG commands, refer to the section Port Channel Commands in the *Interfaces* chapter), based on the standards specified in the IEEE 802.3 Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications.

Commands

Use the following commands for LACP:

- clear lacp counters
- debug lacp
- lacp long-timeout
- lacp port-priority
- lacp system-priority
- port-channel mode
- port-channel-protocol lacp
- show lacp

clear lacp counters

Clear Port Channel counters.

Syntax   clear lacp *port-channel-number* counters

Parameters

port-channel-number	Enter a port-channel number:
	Range: 1 to 128

Defaults   Without a Port Channel specified, the command clears all Port Channel counters.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	show lacp	Displays the LACP configuration

debug lacp

Debug LACP (configuration, events etc.)

Syntax   debug lacp [config | events | pdu [in | out | [*interface* [in | out]]]]

To disable LACP debugging, use the no debug lacp [config | events | pdu [in | out | [interface [in | out]]]] command.

Parameters

config	(OPTIONAL) Enter the keyword config to debug the LACP configuration.
events	(OPTIONAL) Enter the keyword events to debug LACP event information.
pdu in | out	(OPTIONAL) Enter the keyword pdu to debug LACP Protocol Data Unit information. Optionally, enter an in or out parameter to: • Receive enter in • Transmit enter out
interface in | out	Enter the following keywords and slot/port or number information: • For a Ten Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information. Optionally, enter an in or out parameter: • Receive enter in • Transmit enter out

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

lacp long-timeout

Configure a long timeout period (30 seconds) for an LACP session.

Syntax   lacp long-timeout

To reset the timeout period to a short timeout (1 second), use the no lacp long-timeout command.

Defaults   1 second

Command Modes   INTERFACE (conf-if-po-*number*)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	This command applies to dynamic port-channel interfaces only. When applied on a static port-channel, the command has no effect.

Related Commands	show lacp	Displays the lacp configuration

lacp port-priority

Configure the port priority to influence which ports will be put in standby mode when there is a hardware limitation that prevents all compatible ports from aggregating.

Syntax	lacp port-priority *priority-value*

To return to the default setting, use the no lacp port-priority *priority-value* command.

Parameters	*priority-value*	Enter the port-priority value. The higher the value number the lower the priority. Range: 1 to 65535 Default: 32768

Defaults	32768

Command Modes	INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

lacp system-priority

Configure the LACP system priority.

Syntax	lacp system-priority *priority-value*

Parameters	*priority-value*	Enter the system-priority value. The higher the value, the lower the priority. Range: 1 to 65535 Default: 32768

Defaults	32768

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

port-channel mode

Configure the LACP port channel mode.

Syntax	port-channel *number* mode [active] [passive] [off]

Parameters		
number	Enter the keyword port-channel followed by a number: Range: 1 to 128
active	Enter the keyword active to set the mode to the active state.*
passive	Enter the keyword passive to set the mode to the passive state.*
off	Enter the keyword off to set the mode to the off state.*

* The LACP modes are defined in Table 17-1.

Defaults   off

Command Modes   INTERFACE-LACP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Table 17-1 lists the LACP modes.

Table 17-1.   LACP Modes

Mode	Function
active	An interface is in an active negotiating state in this mode. LACP runs on any link configured in the active state and also automatically initiates negotiation with other ports by initiating LACP packets.
passive	An interface is not in an active negotiating state in this mode. LACP runs on any link configured in the passive state. Ports in a passive state respond to negotiation requests from other ports that are in active states. Ports in a passive state respond to LACP packets.
off	An interface can not be part of a dynamic port channel in the off mode. LACP will not run on a port configured in the off mode.

port-channel-protocol lacp

Enable LACP on any LAN port.

Syntax   port-channel-protocol lacp

To disable LACP on a LAN port, use the no port-channel-protocol lacp command.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 17-1.   port-channel-protocol lacp Command Example**

```
FTOS(conf)#interface TenGigabitethernet 3/15
FTOS(conf-if-tengig-3/15)#no shutdown
FTOS(conf-if-tengig-3/15)#port-channel-protocol lacp
FTOS(conf-if-tengig-3/15-lacp)#port-channel 32 mode active
...
FTOS(conf)#interface TenGigabitethernet 3/16
FTOS(conf-if-tengig-3/16)#no shutdown
FTOS(conf-if-tengig-3/16)#port-channel-protocol lacp
FTOS(conf-if-tengig-3/16-lacp)#port-channel 32 mode active
```

show lacp

Display the LACP matrix.

Syntax	show lacp *port-channel-number* [sys-id	counters]

Parameters

port-channel-number	Enter a port-channel number:
	Range: 1 to 128
sys-id	(OPTIONAL) Enter the keyword sys-id and the value that identifies a system.
counters	(OPTIONAL) Enter the keyword counters to display the LACP counters.

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1 **Figure 17-2.   show lacp port-channel-number Command Example**

```
FTOS#show lacp 1
Port-channel 1 admin up, oper up, mode lacp
Actor    System ID:   Priority 32768, Address 0001.e800.a12b
Partner System ID:   Priority 32768, Address 0001.e801.45a5
                 Actor Admin Key 1, Oper Key 1, Partner Oper Key 1
                 LACP LAG 1 is an aggregatable link

A - Active LACP, B - Passive LACP, C - Short Timeout, D - Long Timeout
E - Aggregatable Link, F - Individual Link, G - IN_SYNC, H - OUT_OF_SYNC
I - Collection enabled, J - Collection disabled, K - Distribution enabled L - Distribution disabled,
M - Partner Defaulted, N - Partner Non-defaulted, O - Receiver is in expired state,
P - Receiver is not in expired state

Port Te 10/6 is enabled, LACP is enabled and mode is lacp
  Actor    Admin: State ACEHJLMP Key 1      Priority 128
           Oper: State ACEGIKNP Key 1      Priority 128
  Partner Admin: State BDFHJLMP Key 0      Priority 0
           Oper: State BCEGIKNP Key 1      Priority 128
FTOS#
```

Example 2 **Figure 17-3.   show lacp sys-id Command Example**

```
FTOS#show lacp 1 sys-id
Actor    System ID:  Priority 32768, Address 0001.e800.a12b
Partner System ID:  Priority 32768, Address 0001.e801.45a5

FTOS#
```

Example 3   **Figure 17-4.   show lacp counter Command Example**

```
FTOS#show lacp 1 counters
--------------------------------------------------------------------
               LACP PDU            Marker PDU          Unknown  Illegal
Port     Xmit          Recv       Xmit      Recv       Pkts Rx  Pkts Rx
--------------------------------------------------------------------
TenGig 10/6  200           200        0         0          0        0
FTOS#
```

Related Commands

clear lacp counters	Clears the LACP counters.
show interfaces port-channel	Displays the information on configured Port Channel groups.

18

Layer 2

Overview

This chapter describes commands to configure Layer 2 features. It contains the following sections:

MAC Addressing Commands

The following commands are related to configuring, managing, and viewing MAC addresses:

clear mac-address-table dynamic

Clear the MAC address table of all MAC address learned dynamically.

Syntax clear mac-address-table dynamic {address *mac-address* | all | interface *interface* | vlan *vlan-id*}

Parameters

address *mac-address*	Enter the keyword address followed by a MAC address in nn:nn:nn:nn:nn:nn format.
all	Enter the keyword all to delete all MAC address entries in the MAC address table.

interface *interface*	Enter the following keywords and slot/port or number information:
	• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
vlan *vlan-id*	Enter the keyword vlan followed by a VLAN ID number from 1 to 4094.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

mac-address-table aging-time

Specify an aging time for MAC addresses to be removed from the MAC Address Table.

Syntax   mac-address-table aging-time *seconds*

Parameters

seconds	Enter either zero (0) or a number as the number of seconds before MAC addresses are relearned. To disable aging of the MAC address table, enter 0. Range: 10 - 1000000 Default: 1800 seconds

Defaults   1800 seconds

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

mac learning-limit	Sets the MAC address learning limits for a selected interface.
show mac-address-table aging-time	Displays the MAC aging time.

mac-address-table static

Associate specific MAC or hardware addresses to an interface and VLANs.

Syntax   mac-address-table static *mac-address* output *interface* vlan *vlan-id*

To remove a MAC address, use the no mac-address-table static *mac-address* output *interface* vlan *vlan-id* command.

mac-address	Enter the 48-bit hexidecimal address in nn:nn:nn:nn:nn:nn format.
output *interface*	Enter the keyword output followed by one of the following interfaces: • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
vlan *vlan-id*	Enter the keyword vlan followed by a VLAN ID. Range:1 to 4094.

Defaults   Not configured.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show mac-address-table	Displays the MAC address table.

mac-address-table station-move refresh-arp

Ensure that ARP refreshes the egress interface when a station move occurs due to a topology change.

Syntax   [no] mac-address-table station-move refresh-arp

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   For details about using this command, refer to the "NIC Teaming" section of the Layer 2 chapter in the *FTOS Configuration Guide*.

mac learning-limit

Limit the maximum number of MAC addresses (static + dynamic) learned on a selected interface.

Syntax   mac learning-limit *address_limit* [dynamic] [no-station-move | station-move] [sticky]

Parameters

address_limit	Enter the maximum number of MAC addresses that can be learned on the interface. Range: 1 to 1000000
dynamic	(OPTIONAL) Enter the keyword dynamic to allow aging of MACs even though a learning limit is configured.

no-station-move	(OPTIONAL) Enter the keyword no-station-move to disallow a station move (associate the learned MAC address with the most recently accessed port) on learned MAC addresses.
station-move	(OPTIONAL) Enter the keyword station-move to allow a station move on learned MAC addresses.
sticky	(OPTIONAL) Enter the keyword sticky to allow configuring the sticky mac feature along with the learning limit.

Defaults

The default behavior is dynamic.

"Static" means manually entered addresses, which do not age.

Command Modes

INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

This command and its options are supported on physical interfaces, static LAGs, LACP LAGs, and VLANs.

If the vlan option is not specified, the MAC address counters is not VLAN-based. That is, the sum of the addresses learned on all VLANs (not having any learning limit configuration) is counted against the MAC learning limit.

MAC learning limit violation logs and actions are not available on a per-VLAN basis.

With the no-station-move option, MAC addresses learned through this feature on the selected interface persist on a per-VLAN basis, even if received on another interface. Enabling or disabling this option has no effect on already learned MAC addresses.

After the MAC address learning limit is reached, the MAC addresses do not age out unless you add the dynamic option. To clear statistics on MAC address learning, use the clear counters command with the learning-limit parameter.

When a channel member is added to a port-channel and there is not enough ACL CAM space, the MAC limit functionality on that port-channel is undefined. When this occurs, un-configure the existing configuration first and then reapply the limit with a lower value.

Related Commands

clear counters	Clears counters used in the show interface command
clear mac-address-table dynamic	Clears the MAC address table of all MAC address learned dynamically.
show mac learning-limit	Displays MAC learning-limit configuration.

mac learning-limit learn-limit-violation

Configure an action for a MAC address learning-limit violation.

Syntax   mac learning-limit learn-limit-violation {log | shutdown}

To return to the default, use the no mac learning-limit learn-limit-violation {log | shutdown} command.

Parameters

log	Enter the keyword log to generate a syslog message on a learning-limit violation.
shutdown	Enter the keyword shutdown to shut down the port on a learning-limit violation.

Defaults   none

Command Modes   INTERFACE (conf-if-*interface-slot/port*)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   This is supported on physical interfaces, static LAGs, and LACP LAGs.

Related Commands

show mac learning-limit	Displays details of the mac learning-limit

mac learning-limit station-move-violation

Specify the actions for a station move violation.

Syntax   mac learning-limit station-move-violation {log | shutdown-both | shutdown-offending | shutdown-original}

To disable a configuration, use the no mac learning-limit station-move-violation command, followed by the configured keyword.

Parameters

log	Enter the keyword log to generate a syslog message on a station move violation.
shutdown-both	Enter the keyword shutdown to shut down both the original and offending interface and generate a syslog message.
shutdown-offending	Enter the keyword shutdown-offending to shut down the offending interface and generate a syslog message.
shutdown-original	Enter the keyword shutdown-original to shut down the original interface and generate a syslog message.

Defaults   none

Command Modes   INTERFACE (conf-if-*interface-slot/port*)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

| **Usage Information** | This is supported on physical interfaces, static LAGs, and LACP LAGs. |

| **Related Commands** | show mac learning-limit | Displays details of the mac learning-limit. |

mac learning-limit reset

Reset the MAC address learning-limit error-disabled state.

| **Syntax** | mac learning-limit reset |

| **Defaults** | none |

| **Command Modes** | EXEC |
| | EXEC Privilege |

| **Command History** | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

show cam mac stack-unit

Display the Content Addressable Memory (CAM) size and the portions allocated for MAC addresses and for MAC ACLs.

| **Syntax** | show cam mac stack-unit *unit_number* port-set *port-pipe* count [vlan *vlan-id*] [interface *interface*] |

Parameters

stack-unit *unit_number*	(REQUIRED) Enter the keyword stack-unit followed by a stack member number to select the stack unit for which to gather information. Range: 0 to 5
port-set *port-pipe*	(REQUIRED) Enter the keyword port-set followed by a Port-Pipe number to select the Port-Pipe for which to gather information. Range: 0
address *mac-addr*	(OPTIONAL) Enter the keyword address followed by a MAC address in the nn:nn:nn:nn:nn:nn format to display information on that MAC address.
dynamic	(OPTIONAL) Enter the keyword dynamic to display only those MAC addresses learned dynamically by the switch.
static	(OPTIONAL) Enter the keyword static to display only those MAC address specifically configured on the switch.

interface *interface*	(OPTIONAL) Enter the keyword interface followed by the interface type, slot and port information: • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
vlan *vlan-id*	(OPTIONAL) Enter the keyword vlan followed by the VLAN ID to display the MAC address assigned to the VLAN. Range: 1 to 4094.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show mac-address-table

Display the MAC address table.

Syntax   show mac-address-table [dynamic | static] [address *mac-address* | interface *interface* | vlan *vlan-id*] [count [vlan *vlan-id*] [interface *interface-type* [*slot* [/*port*]]]]

Parameters

dynamic	(OPTIONAL) Enter the keyword dynamic to display only those MAC addresses learned dynamically by the switch. Optionally, you can also add one of these combinations: address/*mac-address*, interface/*interface*, or vlan *vlan-id.*
static	(OPTIONAL) Enter the keyword static to display only those MAC address specifically configured on the switch. Optionally, you can also add one of these combinations: address/*mac-address*, interface/*interface*, or vlan *vlan-id.*
address *mac-address*	(OPTIONAL) Enter the keyword address followed by a MAC address in the nn:nn:nn:nn:nn:nn format to display information on that MAC address.
interface *interface*	(OPTIONAL) Enter the keyword interface followed by the interface type, slot and port information: • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
interface *interface-type*	(OPTIONAL) Instead of entering the keyword interface followed by the interface type, slot and port information, as above, you can enter the interface type, followed by just a slot number.

vlan *vlan-id*	(OPTIONAL) Enter the keyword **vlan** followed by the VLAN ID to display the MAC address assigned to the VLAN. Range: 1 to 4094.
count	(OPTIONAL) Enter the keyword **count**, followed optionally, by an interface or VLAN ID, to display total or interface-specific static addresses, dynamic addresses, and MAC addresses in use.

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 18-1.   show mac-address-table Command Example**

```
FTOS#show mac-address-table

VlanId    Mac Address              Type     Interface        State
 20       00:00:c9:ad:f6:12        Dynamic Te 0/3            Active
FTOS#
```

Table 18-1.   show mac-address-table Command Information

Column Heading	Description
VlanId	Displays the VLAN ID number.
Mac Address	Displays the MAC address in nn:nn:nn:nn:nn:nn format.
Type	Lists whether the MAC address was manually configured (Static) or learned dynamically (Dynamic).
Interface	Displays the interface type and slot/port information. The following abbreviations describe the interface types: • tengig — Ten Gigabit Ethernet followed by a slot/port. • po — Port Channel followed by a number. Range: 1 to 32 for EtherScale, 1 to 255 for TeraScale • so — Sonet followed by a slot/port. • te — 10-Gigabit Ethernet followed by a slot/port.
State	Lists if the MAC address is in use (Active) or not in use (Inactive).

Figure 18-2.   show mac-address-table count Command Example

```
FTOS#show mac-address-table count
MAC Entries for all vlans :
Dynamic Address Count :              5
Static Address (User-defined) Count :    0
Total MAC Addresses in Use:          5
FTOS#
```

Table 18-2.   show mac-address-table count Command Information

Line Beginning with	Description
MAC Entries...	Displays the number of MAC entries learnt per VLAN.
Dynamic Address...	Lists the number of dynamically learned MAC addresses.
Static Address...	Lists the number of user-defined MAC addresses.
Total MAC...	Lists the total number of MAC addresses used by the switch.

Related Commands

show mac-address-table aging-time	Displays MAC aging time.

show mac-address-table aging-time

Display the aging times assigned to the MAC addresses on the switch.

Syntax   show mac-address-table aging-time [vlan *vlan-id*]

Parameters

vlan *vlan-id*	Enter the keyword vlan followed by the VLAN ID to display the MAC address aging time for MAC addresses on the VLAN. Range: 1 to 4094.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 18-3.   show mac-address-table aging-time Command Example**

```
FTOS#show mac-address-table aging-time
 Mac-address-table aging time : 1800

FTOS#
```

Related Commands

show mac-address-table	Displays the current MAC address configuration.

show mac learning-limit

Display MAC address learning limits set for various interfaces.

Syntax   show mac learning-limit [violate-action] [detail] [interface *interface*

Parameters

violate-action	(OPTIONALY) Enter the keyword violate-action to display the MAC learning limit violation status.
detail	(OPTIONAL) Enter the keyword detail to display the MAC learning limit in detail.
interface *interface*	(OPTIONAL) Enter the keyword interface with the following keywords and slot/port or number information:

- For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
- For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
- For a Port Channel interface, enter the keyword port-channel followed by a number:

  Range: 1 to 128

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 18-4.   show mac learning-limit Command Example**

```
FTOS#show mac learning-limit
Interface      Learning      Dynamic        Static         Unknown SA
Slot/port      Limit         MAC count      MAC count      Drops
FTOS#
```

Virtual LAN (VLAN) Commands

The following commands configure and monitor virtual local area networks (VLANs). VLANs are a virtual interface and use many of the same commands as physical interfaces.

You can configure an IP address and Layer 3 protocols on a VLAN called Inter-VLAN routing. FTP, TFTP, ACLs, and SNMP are not supported on a VLAN.

Occasionally, while sending broadcast traffic over multiple Layer 3 VLANs, the virtual router redundancy protocol (VRRP) state of a VLAN interface may continually switch between Master and Backup.

*   description
*   default vlan-id
*   default-vlan disable
*   name
*   show config
*   show vlan
*   tagged
*   track ip
*   untagged

For more information, also refer to VLAN Stacking and VLAN-related commands, such as portmode hybrid, in Chapter 14, Interfaces.

description

Add a description about the selected VLAN.

Syntax	description *description*

To remove the description from the VLAN, use the no description command.

Parameters	*description*	Enter a text string description to identify the VLAN (80 characters maximum).

Defaults	none
Command Modes	INTERFACE VLAN

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	show vlan	Displays VLAN configuration.

default vlan-id

Specify a VLAN as the Default VLAN.

Syntax	default vlan-id *vlan-id*

To remove the default VLAN status from a VLAN and VLAN 1 does not exist, use the no default vlan-id *vlan-id* command.

Parameters		
	vlan-id	Enter the VLAN ID number of the VLAN to become the new Default VLAN.
		Range: 1 to 4094.
		Default: 1

Defaults	The Default VLAN is VLAN 1.

Command Modes	CONFIGURATION

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

To return VLAN 1 as the Default VLAN, use this command syntax (default-vlan-id 1).

The default VLAN contains only untagged interfaces.

Related Commands		
	interface vlan	Configures a VLAN.

default-vlan disable

Disable the default VLAN so that all switchports are placed in the Null VLAN until they are explicitly configured as a member of another VLAN.

Defaults	The default VLAN is enabled.

Command Modes	CONFIGURATION

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The no default vlan disable command is not listed in the running-configuration, but when you disable the default VLAN, default-vlan disable is listed in the running-configuration.

name

Assign a name to the VLAN.

Syntax	name *vlan-name*

To remove the name from the VLAN, use the no name command.

Parameters		
	vlan-name	Enter up to 32 characters as the name of the VLAN.

Defaults	Not configured.
Command Modes	INTERFACE VLAN

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information To display information about a named VLAN, enter the show vlan command with the name parameter or the show interfaces description command.

Related Commands		
	description	Assigns a descriptive text string to the interface.
	interface vlan	Configures a VLAN.
	show vlan	Displays the current VLAN configurations on the switch.

show config

Display the current configuration of the selected VLAN.

Syntax show config

Command Modes INTERFACE VLAN

Example **Figure 18-5.   show config Command Example for a Selected VLAN**

```
FTOS(conf-if-vl-100)#show config
!
interface Vlan 1
 description a
 no ip address
 mtu 2500
 shutdown
FTOS(conf-if-vl-100)#
```

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show vlan

Display the current VLAN configurations on the switch.

Syntax show vlan [brief | id *vlan-id* | name *vlan-name*]

Parameters		
	brief	(OPTIONAL) Enter the keyword brief to display the following information:
		• VLAN ID
		• VLAN name (left blank if none is configured.)
		• Spanning Tree Group ID
		• MAC address aging time
		• IP address

id *vlan-id*	(OPTIONAL) Enter the keyword id followed by a number from 1 to 4094. Only information on the VLAN specified is displayed.
name *vlan-name*	(OPTIONAL) Enter the keyword name followed by the name configured for the VLAN. Only information on the VLAN named is displayed.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 18-6.   show vlan Command Example**

```
FTOS#show vlan

Codes: * - Default VLAN, G - GVRP VLANs, R - Remote Port Mirroring VLANs, P -
Primary, C - Community, I - Isolated
Q: U - Untagged, T - Tagged
   x - Dot1x untagged, X - Dot1x tagged
   G - GVRP tagged, M - Vlan-stack, H - VSN tagged
   i - Internal untagged, I - Internal tagged, v - VLT untagged, V - VLT tagged

   NUM    Status    Description                    Q Ports
   1      Inactive  a
   2      Inactive
*  20     Active                                   U Te 0/3,5,13,53-56
   1002   Active                                   T Te 0/3,13,55-56
FTOS#
```

Table 18-3.   show vlan Command Information

Column Heading	Description
(Column 1 — no heading)	asterisk symbol (*) = Default VLAN G = GVRP VLAN P = primary VLAN C = community VLAN I = isolated VLAN
NUM	Displays existing VLAN IDs.
Status	Displays the word Inactive for inactive VLANs and the word Active for active VLANs.
Q	Displays G for GVRP tagged, M for member of a VLAN-Stack VLAN, T for tagged interface, U (for untagged interface), x (uncapitalized x) for Dot1x untagged, or X (capitalized X) for Dot1x tagged.
Ports	Displays the type, slot, and port information. For the type, Po = port channel, Fo= fortygigabit ethernet, and Te = ten gigabit ethernet.

Figure 18-7.   show vlan id Command Example

```
FTOS# show vlan id 40

Codes: * - Default VLAN, G - GVRP VLANs, R - Remote Port Mirroring
VLANs, P - Primary, C - Community, I - Isolated
Q: U - Untagged, T - Tagged
   x - Dot1x untagged, X - Dot1x tagged
   G - GVRP tagged, M - Vlan-stack, H - VSN tagged
   i - Internal untagged, I - Internal tagged, v - VLT untagged, V
- VLT tagged

    NUM    Status    Description                Q Ports
    1      Inactive  a
FTOS#
```

Figure 18-8.   show vlan brief Command Example

```
FTOS#show vlan brief
VLAN Name                                STG   MAC Aging IP Address
---- -------------------------------- ---- --------- ------------------
1                                        0     0         unassigned
2                                        0     0         unassigned
20                                       0     0         unassigned
1002                                     0     0         unassigned
FTOS#
```

Figure 18-9.   Using a VLAN Name Example

```
FTOSconf)#interface vlan 222
FTOS(conf-if-vl-222)#name test
FTOS(conf-if-vl-222)#do show vlan name test

Codes: * - Default VLAN, G - GVRP VLANs
Q: U - Untagged, T - Tagged
   x - Dot1x untagged, X - Dot1x tagged
   G - GVRP tagged, M - Vlan-stack

    NUM     Status   Description                Q Ports
    222     Inactive                            U TenGig 1/22
FTOS(conf-if-vl-222)#
FTOS#
```

Related Commands

vlan-stack compatible	Enables the Stackable VLAN feature on the selected VLAN.
interface vlan	Configures a VLAN.

tagged

Add a Layer 2 interface to a VLAN as a tagged interface.

Syntax   tagged *interface*

To remove a tagged interface from a VLAN, use no tagged *interface* command.

Parameters	*interface*	Enter the following keywords and slot/port or number information:
		• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128
		• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
		• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults All interfaces in Layer 2 mode are untagged.

Command Modes INTERFACE VLAN

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information When you use the no tagged command, the interface is automatically placed in the default VLAN as an untagged interface unless the interface is a member of another VLAN. If the interface belongs to several VLANs, you must remove it from all VLANs to change it to an untagged interface.

Tagged interfaces can belong to multiple VLANs, while untagged interfaces can only belong to one VLAN at a time.

Related Commands

interface vlan	Configures a VLAN.
untagged	Specifies which interfaces in a VLAN are untagged.

track ip

Track the Layer 3 operational state of a Layer 3 VLAN, using a subset of the VLAN member interfaces.

Syntax track ip *interface*

To remove the tracking feature from the VLAN, use the no track ip *interface* command.

Parameters

interface	Enter the following keywords and slot/port or number information:
	• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults Not configured

Command Modes INTERFACE VLAN

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	When you configure this command, the VLAN is operationally UP if any of the interfaces specified in the track ip command are operationally UP. The VLAN is operationally DOWN if none of the tracking interfaces are operationally UP.

If you do not configure the track ip command, the VLAN's Layer 3 operational state depends on all the members of the VLAN.

The Layer 2 state of the VLAN, and hence the Layer 2 traffic, is not affected by the track ip command configuration.

Related Commands

interface vlan	Configures a VLAN.
tagged	Specifies which interfaces in a VLAN are tagged.

untagged

Add a Layer 2 interface to a VLAN as an untagged interface.

Syntax

untagged *interface*

To remove an untagged interface from a VLAN, use the no untagged *interface* command.

Parameters

interface	Enter the following keywords and slot/port or number information:
	• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   All interfaces in Layer 2 mode are untagged.

Command Modes   INTERFACE VLAN

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Untagged interfaces can only belong to one VLAN.

In the default VLAN, you cannot use the no untagged *interface* command. To remove an untagged interface from all VLANs, including the default VLAN, enter INTERFACE mode and use the no Port Channel Commands command.

Related Commands

interface vlan	Configures a VLAN.
tagged	Specifies which interfaces in a VLAN are tagged.

Link Layer Discovery Protocol (LLDP)

Overview

The link layer discovery protocol (LLDP) advertises connectivity and management from the local station to the adjacent stations on an IEEE 802 LAN. LLDP facilitates multi-vendor interoperability by using standard management tools to discover and make available a physical topology for network management. The Dell Fore10 operating software (FTOS) implementation of LLDP is based on IEEE standard 801.1ab.

Commands

This chapter contains the following commands, in addition to the commands in the related section — LLDP-MED Commands.

- advertise dot1-tlv
- advertise dot3-tlv
- advertise management-tlv
- clear lldp counters
- clear lldp neighbors
- debug lldp interface
- disable
- hello
- mode
- multiplier
- protocol lldp (Configuration)
- protocol lldp (Interface)
- show lldp neighbors
- show lldp statistics
- show running-config lldp

The starting point for using LLDP is invoking LLDP with the protocol lldp command in either CONFIGURATION or INTERFACE mode.

The information distributed by LLDP is stored by its recipients in a standard management information base (MIB). The information can be accessed by a network management system through a management protocol such as SNMP.

For details about implementing LLDP/LLDP-MED, refer to the Link Layer Discovery Protocol chapter of the *FTOS Configuration Guide*.

advertise dot1-tlv

Advertise dot1 TLVs (Type, Length, Value).

Syntax advertise dot1-tlv {port-protocol-vlan-id | port-vlan-id | vlan-name}

To remove advertised dot1-tlv, use the no advertise dot1-tlv {port-protocol-vlan-id | port-vlan-id | vlan-name} command.

Parameters

port-protocol-vlan-id	Enter the keyword port-protocol-vlan-id to advertise the port protocol VLAN identification TLV.
port-vlan-id	Enter the keyword port-vlan-id to advertise the port VLAN identification TLV.
vlan-name	Enter the keyword vlan-name to advertise the vlan-name TLV.

Defaults Disabled

Command Modes CONFIGURATION (conf-lldp) and INTERFACE (conf-if-*interface*-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

protocol lldp (Configuration)	Enables LLDP globally.
debug lldp interface	Debugs LLDP.
show lldp neighbors	Displays the LLDP neighbors.
show running-config lldp	Displays the LLDP running configuration.

advertise dot3-tlv

Advertise dot3 TLVs (Type, Length, Value).

Syntax advertise dot3-tlv {max-frame-size}

To remove advertised dot3-tlv, use the no advertise dot3-tlv {max-frame-size} command.

Parameters

max-frame-size	Enter the keyword max-frame-size to advertise the dot3 maximum frame size.

Defaults none

Command Modes CONFIGURATION (conf-lldp) and INTERFACE (conf-if-*interface*-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

advertise management-tlv

Advertise management TLVs (Type, Length, Value).

Syntax   advertise management -tlv {system-capabilities | system-description | system-name}

To remove advertised management TLVs, use the no advertise management -tlv {system-capabilities | system-description | system-name} command.

Parameters

system-capabilities	Enter the keyword system-capabilities to advertise the system capabilities TLVs.
system-description	Enter the keyword system-description to advertise the system description TLVs.
system-name	Enter the keyword system-description to advertise the system description TLVs.

Defaults   none

Command Modes   CONFIGURATION (conf-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   All three command options — system-capabilities, system-description, and system-name —-can be invoked individually or together, in any sequence.

clear lldp counters

Clear LLDP transmitting and receiving counters for all physical interfaces or a specific physical interface.

Syntax   clear lldp counters *interface*

Parameters

interface	Enter the following keywords and slot/port or number information:
	• For a 10-Gigabit Ethernet interface, enter the keyword tenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   none

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

clear lldp neighbors

Clear LLDP neighbor information for all interfaces or a specific interfaces.

Syntax   clear lldp neighbors { *interface*}

Parameters	*interface*	Enter the following keywords and slot/port or number information:
		• For a 10-Gigabit Ethernet interface, enter the keyword tenGigabitEthernet followed by the slot/port information.
		• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   none

Command Modes   EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

debug lldp interface

Enable LLDP debugging to display timer events, neighbor additions or deletions, and other information about incoming and outgoing packets.

Syntax   debug lldp interface {*interface* | all}{events | packet {brief | detail} {tx | rx | both}}

To disable debugging, use the no debug lldp interface {*interface* | all}{events} {packet {brief | detail} {tx | rx | both}} command.

Parameters	*interface*	Enter the following keywords and slot/port or number information:
		• For a 10-Gigabit Ethernet interface, enter the keyword tenGigabitEthernet followed by the slot/port information.
		• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	all	(OPTIONAL) Enter the keyword all to display information on all interfaces.
	events	(OPTIONAL) Enter the keyword events to display major events such as timer events.
	packet	(OPTIONAL) Enter the keyword packet to display information regarding packets coming in or going out.
	brief	(OPTIONAL) Enter the keyword brief to display brief packet information.
	detail	(OPTIONAL) Enter the keyword detail to display detailed packet information.
	tx	(OPTIONAL) Enter the keyword tx to display transmit only packet information.
	rx	(OPTIONAL) Enter the keyword rx to display receive only packet information
	both	(OPTIONAL) Enter the keyword both to display both receive and transmit packet information.

Defaults   none

Command Modes   EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

disable

Enable or disable LLDP.

Syntax	disable
	To enable LLDP, use the no disable

Defaults	Enabled, that is no disable

Command Modes	CONFIGURATION (conf-lldp) and INTERFACE (conf-if-*interface*-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

protocol lldp (Configuration)	Enables LLDP globally.
debug lldp interface	Debugs LLDP
show lldp neighbors	Displays the LLDP neighbors
show running-config lldp	Displays the LLDP running configuration

hello

Configure the rate at which the LLDP control packets are sent to its peer.

Syntax	hello *seconds*
	To revert to the default, use the no hello *seconds* command.

Parameters

seconds	Enter the rate, in seconds, at which the control packets are sent to its peer.
	Rate: 5 to 180 seconds
	Default: 30 seconds

Defaults	30 seconds

Command Modes	CONFIGURATION (conf-lldp) and INTERFACE (conf-if-*interface*-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

mode

Set LLDP to receive or transmit.

Syntax	mode {tx	rx}
	To return to the default, use the no mode {tx	rx} command.

Parameters

tx	Enter the keyword tx to set the mode to transmit.
rx	Enter the keyword rx to set the mode to receive.

Defaults	Both transmit and receive

Command Modes   CONFIGURATION (conf-lldp) and INTERFACE (conf-if-*interface*-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

protocol lldp (Configuration)	Enables LLDP globally.
show lldp neighbors	Displays the LLDP neighbors

multiplier

Set the number of consecutive misses before LLDP declares the interface dead.

Syntax   multiplier *integer*

To return to the default, use the no multiplier *integer* command.

Parameters

integer	Enter the number of consecutive misses before the LLDP declares the interface dead. Range: 2 - 10

Defaults   4 x hello

Command Modes   CONFIGURATION (conf-lldp) and INTERFACE (conf-if-*interface*-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

protocol lldp (Configuration)

Enable LLDP globally on the switch.

Syntax   protocol lldp

To disable LLDP globally on the chassis, use the no protocol lldp command.

Defaults   Disabled

Command Modes   CONFIGURATION (conf-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

protocol lldp (Interface)

Enter the LLDP protocol in the INTERFACE mode.

Syntax   [no] protocol lldp

To return to the global LLDP configuration mode, use the no protocol lldp command from the Interface mode.

Defaults   LLDP is not enabled on the interface.

Command Modes   INTERFACE (conf-if-*interface*-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

You must enable LLDP globally from CONFIGURATION mode before you can configure it on an interface. This command places you in LLDP mode on the interface; it does not enable the protocol.

When you enter the LLDP protocol in the Interface context, it overrides global configurations. When you execute the no protocol lldp from INTERFACE mode, interfaces begin to inherit the configuration from global LLDP CONFIGURATION mode.

show lldp neighbors

Display LLDP neighbor information for all interfaces or a specified interface.

Syntax   show lldp neighbors [*interface*] [detail]

Parameters

interface	(OPTIONAL) Enter the following keywords and slot/port or number information:
	• For a 10-Gigabit Ethernet interface, enter the keyword tenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
detail	(OPTIONAL) Enter the keyword detail to display all the TLV information, timers, and LLDP tx and rx counters.

Defaults   none

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 19-1.   show lldp neighbors Command Example**

```
R1(conf-if-te-1/31)#do show lldp neighbors
 Loc PortID    Rem Host Name      Rem Port Id           Rem Chassis Id
 --------------------------------------------------------------------

 TenGig 1/21    R2                 TenGigabitEthernet 2/11  00:01:e8:06:95:3e
 TenGig 1/31    R3                 TenGigabitEthernet 3/11  00:01:e8:09:c2:4a
```

Usage Information

Omitting the keyword detail displays only the remote chassis ID, Port ID, and Dead Interval.

show lldp statistics

Display the LLDP statistical information.

Syntax   show lldp statistics

Defaults   none

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 19-2.   show lldp statistics Command Example**

```
FTOS#show lldp statistics
--------- LLDP GLOBAL STATISTICS ON CHASSIS -----------
Total number of neighbors: 2
Last table change time: 1w5d4h, In ticks: 52729764
Total number of Table Inserts: 56
Total number of Table Deletes: 54
Total number of Table Drops: 0
Total number of Table Age Outs: 12
FTOS#
```

show running-config lldp

Display the current global LLDP configuration.

Syntax   show running-config lldp

Defaults   none

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 19-3.   show running-config lldp Command Example**

```
FTOS#show running-config lldp
!
protocol lldp
 advertise dot1-tlv port-protocol-vlan-id port-vlan-id
 advertise dot3-tlv max-frame-size
 advertise management-tlv system-capabilities system-description
 hello 15
 multiplier 3
 no disable
FTOS#
```

LLDP-MED Commands

The LLDP-media endpoint discovery (MED) commands in this section are:

- advertise med guest-voice
- advertise med guest-voice-signaling
- advertise med location-identification
- advertise med power-via-mdi
- advertise med softphone-voice
- advertise med streaming-video
- advertise med video-conferencing
- advertise med video-signaling
- advertise med voice
- advertise med voice-signaling

FTOS LLDP-MED commands are an extension of the set of LLDP TLV advertisement commands.

As defined by ANSI/TIA-1057, LLDP-MED provides organizationally specific type length value (TLVs), so that endpoint devices and network connectivity devices can advertise their characteristics and configuration information. The Organizational Unique Identifier (OUI) for the Telecommunications Industry Association (TIA) is 00-12-BB.

- **LLDP-MED Endpoint Device** — any device that is on an IEEE 802 LAN network edge, can communicate using IP, and uses the LLDP-MED framework.
- **LLDP-MED Network Connectivity Device** — any device that provides access to an IEEE 802 LAN to an LLDP-MED endpoint device, and supports IEEE 802.1AB (LLDP) and TIA-1057 (LLDP-MED). The Dell Force10 system is an LLDP-MED network connectivity device.

With regard to connected endpoint devices, LLDP-MED provides network connectivity devices with the ability to:

- manage inventory
- manage Power over Ethernet (POE)
- identify physical location
- identify network policy

advertise med guest-voice

Configure the system to advertise a separate limited voice service for a guest user with their own IP telephony handset or other appliances that support interactive voice services.

Syntax advertise med guest-voice { *vlan-id layer2_priority DSCP_value*} | {priority-tagged *number*}

To return to the default, use the no advertise med guest-voice { *vlan-id layer2_priority DSCP_value*} | {priority-tagged *number*} command.

Parameters

vlan-id	Enter the VLAN ID. Range: 1 to 4094
layer2_priority	Enter the Layer 2 priority. Range: 0 to 7

DSCP_value	Enter the DSCP value.
	Range: 0 to 63
priority-tagged *number*	Enter the keyword **priority-tagged** followed the Layer 2 priority.
	Range: 0 to 7

Defaults Unconfigured

Command Modes CONFIGURATION (conf-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

protocol lldp (Configuration)	Enables LLDP globally.
debug lldp interface	Debugs LLDP.
show lldp neighbors	Displays the LLDP neighbors.
show running-config lldp	Displays the LLDP running configuration.

advertise med guest-voice-signaling

Configure the system to advertise a separate limited voice service for a guest user when the guest voice control packets use a separate network policy than the voice data.

Syntax advertise med guest-voice-signaling { *vlan-id layer2_priority DSCP_value*} | {priority-tagged *number*}

To return to the default, use the no advertise med guest-voice-signaling { *vlan-id layer2_priority DSCP_value*} | {priority-tagged *number*} command.

Parameters

vlan-id	Enter the VLAN ID.
	Range: 1 to 4094
layer2_priority	Enter the Layer 2 priority.
	Range: 0 to 7
DSCP_value	Enter the DSCP value.
	Range: 0 to 63
priority-tagged *number*	Enter the keyword **priority-tagged** followed the Layer 2 priority.
	Range: 0 to 7

Defaults unconfigured

Command Modes CONFIGURATION (conf-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

debug lldp interface	Debugs LLDP
show lldp neighbors	Displays the LLDP neighbors
show running-config lldp	Displays the LLDP running configuration

advertise med location-identification

Configure the system to advertise a location identifier.

Syntax   advertise med location-identification {coordinate-based *value* | civic-based *value* | ecs-elin *value*}

To return to the default, use the no advertise med location-identification {coordinate-based *value* | civic-based *value* | ecs-elin *value*} command.

Parameters

coordinate-based *value*	Enter the keyword coordinate-based followed by the coordinated based location in hexadecimal value of 16 bytes.
civic-based *value*	Enter the keyword civic-based followed by the civic based location in hexadecimal format. Range: 6 to 255 bytes
ecs-elin *value*	Enter the keyword ecs-elin followed by the Emergency Call Service (ecs) Emergency Location Identification Number (elin) numeric location string. Range: 10 to 25 characters

Defaults   unconfigured

Command Modes   CONFIGURATION (conf-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   **ECS** — Emergency Call Service such as defined by TIA or National Emergency Numbering Association (NENA)

ELIN — Emergency Location Identification Number, a valid North America Numbering Plan format telephone number supplied for ECS purposes.

Related Commands

debug lldp interface	Debugs LLDP
show lldp neighbors	Displays the LLDP neighbors
show running-config lldp	Displays the LLDP running configuration

advertise med power-via-mdi

Configure the system to advertise the Extended Power via MDI TLV.

Syntax   advertise med power-via-mdi

To return to the default, use the no advertise med power-via-mdi command.

Defaults   unconfigured

Command Modes   CONFIGURATION (conf-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Advertise the Extended Power via MDI on all ports that are connected to an 802.3af powered, LLDP-MED endpoint device.

Related Commands	debug lldp interface	Debugs LLDP
	show lldp neighbors	Displays the LLDP neighbors
	show running-config lldp	Displays the LLDP running configuration

advertise med softphone-voice

Configure the system to advertise softphone to enable IP telephony on a computer so that the computer can be used as a phone.

Syntax   advertise med softphone-voice { *vlan-id*} | {priority-tagged *number*}

To return to the default, use the no advertise med softphone-voice { *vlan-id*} | {priority-tagged *number*} command.

Parameters

vlan-id	Enter the VLAN ID.
	Range: 1 to 4094
priority-tagged *number*	Enter the keyword priority-tagged followed the Layer 2 priority.
	Range: 0 to 7

Defaults   unconfigured

Command Modes   CONFIGURATION (conf-lldp)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

debug lldp interface	Debugs LLDP
show lldp neighbors	Displays the LLDP neighbors
show lldp neighbors	Displays the LLDP running configuration

advertise med streaming-video

Configure the system to advertise streaming video services for broadcast or multicast-based video. This does not include video applications that rely on TCP buffering.

Syntax   advertise med streaming-video { *vlan-id*} | {priority-tagged *number*}

To return to the default, use the no advertise med streaming-video { *vlan-id*} | {priority-tagged *number*} command.

Parameters

vlan-id	Enter the VLAN ID.
	Range: 1 to 4094
priority-tagged *number*	Enter the keyword priority-tagged followed the Layer 2 priority.
	Range: 0 to 7

Defaults   unconfigured

Command Modes   CONFIGURATION (conf-lldp)

Related Commands	debug lldp interface	Debugs LLDP
	show lldp neighbors	Displays the LLDP neighbors
	show lldp neighbors	Displays the LLDP running configuration

advertise med video-conferencing

Configure the system to advertise dedicated video conferencing and other similar appliances that support real-time interactive video.

Syntax advertise med video-conferencing { *vlan-id*} | {priority-tagged *number*}

To return to the default, use the no advertise med video-conferencing { *vlan-id layer2_priority DSCP_value*} | {priority-tagged *number*} command.

Parameters

vlan-id	Enter the VLAN ID. Range: 1 to 4094
priority-tagged *number*	Enter the keyword priority-tagged followed the Layer 2 priority. Range: 0 to 7

Defaults unconfigured

Command Modes CONFIGURATION (conf-lldp)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	debug lldp interface	Debugs LLDP
	show lldp neighbors	Displays the LLDP neighbors
	show running-config lldp	Displays the LLDP running configuration

advertise med video-signaling

Configure the system to advertise video control packets that use a separate network policy than video data.

Syntax advertise med video-signaling { *vlan-id*} | {priority-tagged *number*}

To return to the default, use the no advertise med video-signaling { *vlan-id layer2_priority DSCP_value*} | {priority-tagged *number*} command.

Parameters

vlan-id	Enter the VLAN ID. Range: 1 to 4094
priority-tagged *number*	Enter the keyword priority-tagged followed the Layer 2 priority. Range: 0 to 7

Defaults unconfigured

Command Modes	CONFIGURATION (conf-lldp)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	debug lldp interface	Debugs LLDP
	show lldp neighbors	Displays the LLDP neighbors
	show lldp neighbors	Displays the LLDP running configuration

advertise med voice

Configure the system to advertise a dedicated IP telephony handset or other appliances supporting interactive voice services.

Syntax advertise med voice { *vlan-id*} | {priority-tagged *number*}

To return to the default, use the no advertise med voice { *vlan-id layer2_priority DSCP_value*} | {priority-tagged *number*} command.

Parameters	*vlan-id*	Enter the VLAN ID.
		Range: 1 to 4094
	priority-tagged *number*	Enter the keyword priority-tagged followed the Layer 2 priority.
		Range: 0 to 7

Defaults unconfigured

Command Modes CONFIGURATION (conf-lldp)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	debug lldp interface	Debugs LLDP
	show lldp neighbors	Displays the LLDP neighbors
	show running-config lldp	Displays the LLDP running configuration

advertise med voice-signaling

Configure the system to advertise when voice control packets use a separate network policy than voice data.

Syntax advertise med voice-signaling { *vlan-id*} | {priority-tagged *number*}

To return to the default, use the no advertise med voice-signaling { *vlan-id layer2_priority DSCP_value*} | {priority-tagged *number*} command.

Parameters	*vlan-id*	Enter the VLAN ID.
		Range: 1 to 4094
	priority-tagged *number*	Enter the keyword priority-tagged followed the Layer 2 priority.
		Range: 0 to 7

| **Defaults** | unconfigured |

| **Command Modes** | CONFIGURATION (conf-lldp) |

**Command
History**

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

**Related
Commands**

debug lldp interface	Debugs LLDP
show lldp neighbors	Displays the LLDP neighbors
show lldp neighbors	Displays the LLDP running configuration

20

Multiple Spanning Tree Protocol (MSTP)

Overview

The multiple spanning tree protocol (MSTP), as implemented by the Dell Force10 operating software (FTOS), conforms to IEEE 802.1s.

Commands

The following commands configure and monitor MSTP:

- debug spanning-tree mstp
- disable
- edge-port bpdufilter default
- hello-time
- max-age
- max-hops
- msti
- name
- protocol spanning-tree mstp
- revision
- show config
- show spanning-tree mst configuration
- show spanning-tree msti
- spanning-tree
- spanning-tree msti
- spanning-tree mstp
- tc-flush-standard

debug spanning-tree mstp

Enable debugging of the multiple spanning tree protocol and view information on the protocol.

Syntax   debug spanning-tree mstp [all | bpdu *interface* {in | out} | events]

To disable debugging, use the no debug spanning-tree mstp command.

Parameters

all	(OPTIONAL) Enter the keyword all to debug all spanning tree operations.
bpdu *interface* {in | out}	(OPTIONAL) Enter the keyword bpdu to debug Bridge Protocol Data Units. (OPTIONAL) Enter the interface keyword along with the type slot/port of the interface you want displayed. Type slot/port options are the following: • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information. Optionally, enter an in or out parameter in conjunction with the optional interface: • For Receive, enter **in** • For Transmit, enter **out**
events	(OPTIONAL) Enter the keyword events to debug MSTP events.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 20-1.   debug spanning-tree mstp bpdu Command Example**

```
FTOS#debug spanning-tree mstp bpdu tengigabitethernet 0/16 ?
in Receive (in)
out Transmit (out)
FTOS#
```

description

Enter a description of the multiple spanning tree protocol.

Syntax   description {*description*}

To remove the description, use the no description {*description*} command.

Parameters

description	Enter a description to identify the Multiple Spanning Tree (80 characters maximum).

Defaults   none

Command Modes   SPANNING TREE (The prompt is "config-mstp".)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	protocol spanning-tree mstp	Enters MULTIPLE SPANNING TREE mode on the switch.

disable

Globally disable the multiple spanning tree protocol on the switch.

Syntax   disable

To enable Multiple Spanning Tree Protocol, use the no disable command.

Defaults   MSTP is disabled

Command Modes   MULTIPLE SPANNING TREE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	protocol spanning-tree mstp	Enters MULTIPLE SPANNING TREE mode.

edge-port bpdufilter default

Enable bridge protocol data units (BPDU) filter globally to filter transmission of BPDU on port-fast enabled interfaces.

Syntax   edge-port bpdufilter default

To disable global bpdu filter default, use the no edge-port bpdufilter default command.

Defaults   Disable

Command Modes   MULTIPLE SPANNING TREE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

forward-delay

The amount of time the interface waits in the Blocking State and the Learning State before transitioning to the Forwarding State.

Syntax   forward-delay *seconds*

To return to the default setting, use the no forward-delay command.

Parameters	*seconds*	Enter the number of seconds the interface waits in the Blocking State and the Learning State before transiting to the Forwarding State.
		Range: 4 to 30
		Default: 15 seconds.

Defaults	15 seconds

Command Modes	MULTIPLE SPANNING TREE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	max-age	Changes the wait time before MSTP refreshes protocol configuration information.
	hello-time	Changes the time interval between BPDUs.

hello-time

Set the time interval between generation of Multiple Spanning Tree Bridge Protocol Data Units (BPDUs).

Syntax	hello-time *seconds*

To return to the default value, use the no hello-time command.

Parameters	*seconds*	Enter a number as the time interval between transmission of BPDUs.
		Range: 1 to 10.
		Default: 2 seconds.

Defaults	2 seconds

Command Modes	MULTIPLE SPANNING TREE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	edge-port bpdufilter default	The amount of time the interface waits in the Blocking State and the Learning State before transitioning to the Forwarding State.
	max-age	Changes the wait time before MSTP refreshes protocol configuration information.

max-age

Set the time interval for the MSTP bridge to maintain configuration information before refreshing that information.

Syntax	max-age *seconds*

To return to the default values, use the no max-age command.

Parameters		
max-age	Enter a number of seconds the FTOS waits before refreshing configuration information. Range: 6 to 40 Default: 20 seconds.	

Defaults   20 seconds

Command Modes   MULTIPLE SPANNING TREE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

edge-port bpdufilter default	The amount of time the interface waits in the Blocking State and the Learning State before transitioning to the Forwarding State.
hello-time	Changes the time interval between BPDUs.

max-hops

Configure the maximum hop count.

Syntax   max-hops *number*

To return to the default values, use the no max-hops command.

Parameters		
range	Enter a number for the maximum hop count. Range: 1 to 40 Default: 20	

Defaults   20 hops

Command Modes   MULTIPLE SPANNING TREE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The max-hops is a configuration command that applies to both the IST and all MST instances in the MSTP region. The BPDUs sent out by the root switch set the remaining-hops parameter to the configured value of max-hops. When a switch receives the BPDU, it decrements the received value of the remaining hops and uses the resulting value as remaining-hops in the BPDUs. If the remaining-hops reaches zero, the switch discards the BPDU and ages out any information that it holds for the port.

msti

Configure multiple spanning tree instance, bridge priority, and one or multiple VLANs mapped to the MST instance.

Syntax   msti *instance* {vlan *range* | bridge-priority *priority*}

To disable mapping or bridge priority, use the no msti *instance* {vlan *range* | bridge-priority *priority*} command.

Parameters

msti *instance*	Enter the MST instance number. Range: 0 to 4094.
vlan *range*	Enter the keyword **vlan** followed by the identifier range value. Range: 1 to 4094
bridge-priority *priority*	Enter the keyword **bridge-priority** followed by a value in increments of 4096 as the bridge priority. Range: zero (0) to 61440 Valid priority values are: 0, 4096, 8192, 12288, 16384, 20480, 24576, 28672, 32768, 36864, 40960, 45056, 49152, 53248, 57344, and 61440. All other values are rejected.

Defaults

default bridge-priority is 32768

Command Modes

INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

By default, all VLANs are mapped to MST instance zero (0) unless you use the **vlan** *range* command to map it to a non-zero instance.

Although MSTP instance IDs range from 0 to 4094, only 64 active instances are supported on the switch.

name

The name you assign to the multiple spanning tree region.

Syntax

name *region-name*

To remove the region name, use the **no name** command.

Parameters

region-name	Enter the MST region name. Range: 32 character limit

Defaults

Command Modes

MULTIPLE SPANNING TREE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

For two MSTP switches to be within the same MSTP region, the switches must share the same region name (including matching case).

Related Commands

msti	Maps the VLAN(s) to an MST instance.
revision	Assigns the revision number to the MST configuration.

protocol spanning-tree mstp

Enter MULTIPLE SPANNING TREE mode to enable and configure the multiple spanning tree group.

Syntax protocol spanning-tree mstp

To disable the multiple spanning tree group, use the no protocol spanning-tree mstp command.

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 20-2.   protocol spanning-tree mstp Command Example**

```
FTOS(conf)#protocol spanning-tree mstp
FTOS(conf-mstp)#no disable
```

Usage Information MSTP is not enabled when you enter the MULTIPLE SPANNING TREE mode. To enable MSTP globally on the switch, enter no disable while in MULTIPLE SPANNING TREE mode.

For more information about the multiple spanning tree protocol, refer to the *FTOS Configuration Guide*.

Related Commands

disable	Disables MSTP.

revision

The revision number for the multiple spanning tree configuration

Syntax revision *range*

To return to the default values, use the no revision command.

Parameters

range	Enter the revision number for the MST configuration.
	Range: 0 to 65535
	Default: 0

Defaults 0

Command Modes MULTIPLE SPANNING TREE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information For two MSTP switches to be within the same MST region, the switches must share the same revision number.

Related Commands

msti	Maps the VLAN(s) to an MST instance
name	Assigns the region name to the MST region.

show config

View the current configuration for the mode. Only non-default values are shown.

Syntax show config

Command Modes MULTIPLE SPANNING TREE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 20-3. show config Command Example**

```
FTOS(conf-mstp)#show config
!
protocol spanning-tree mstp
 no disable
 name CustomerSvc
 revision 2
 MSTI 10 VLAN 101-105
 max-hops 5
FTOS(conf-mstp)#
```

show spanning-tree mst configuration

View the multiple spanning tree configuration.

Syntax show spanning-tree mst configuration

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 20-4. show spanning-tree mst configuration Command Example**

```
FTOS#show spanning-tree mst configuration
MST region name: CustomerSvc
Revision: 2
MSTI    VID
  10      101-105
FTOS#
```

Usage Information You must enable the multiple spanning tree protocol prior to using this command.

show spanning-tree msti

View the Multiple Spanning Tree instance.

Syntax show spanning-tree msti [*instance-number* [brief]] [guard]

instance-number	[OPTIONAL] Enter the MST instance number.
	Range: 0 to 4094.
brief	[OPTIONAL] Enter the keyword **brief** to view a synopsis of the MST instance.
guard	[OPTIONAL] Enter the keyword guard to display the type of guard enabled on an MSTP interface and the current port state.

Command Modes   EXEC

EXEC Privilege

Usage Information   You must enable the multiple spanning tree protocol prior to using this command.

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 20-5.   show spanning-tree msti [instance-number] Command Example**

```
FTOS#show spanning-tree msti 0 brief
MSTI 0 VLANs mapped  1-4094
Executing IEEE compatible Spanning Tree Protocol
Root ID    Priority 32768, Address 0001.e800.0204
Root Bridge hello time 2, max age 20, forward delay 15, max hops 20
Bridge ID    Priority 32768, Address 0001.e800.0204
We are the root of MSTI 0 (CIST)
Configured hello time 2, max age 20, forward delay 15, max hops 20
Bpdu filter disabled globally
CIST regional root ID Priority 32768, Address 0001.e800.0204
CIST external path cost 0

Interface                                       Designated
 Name      PortID   Prio Cost   Sts        Cost       Bridge ID          PortID
---------- -------- ---- ------- ----------- ------- --------------------
--------
Te 0/41   128.170  128  2000    FWD         0       32768 0001.e800.0204 128.170
Te 0/42   128.171  128  2000    FWD         0       32768 0001.e800.0204 128.171
Te 0/43   128.172  128  2000    FWD         0       32768 0001.e800.0204 128.172

Interface                                                             Bpdu
 Name      Role   PortID   Prio Cost   Sts        Cost   Link-type Edge Filter
Boundary
---------- ------ -------- ---- ------- ----------- ------- --------- ----
------ --------
Te 0/41   Desg   128.170  128  2000    FWD         0       P2P       No   No
No
Te 0/42   Desg   128.171  128  2000    FWD         0       P2P       No   No
No
Te 0/43   Desg   128.172  128  2000    FWD         0       P2P       No   No
No
FTOS#
```

Example 2   **Figure 20-6.   show spanning-tree msti Command Example with EDS and LBK**

```
FTOS#show spanning-tree msti 0 brief
MSTI 0 VLANs mapped  1-4094

Executing IEEE compatible Spanning Tree Protocol
Root ID    Priority 32768, Address 0001.e801.6aa8
Root Bridge hello time 2, max age 20, forward delay 15, max hops 20
Bridge ID    Priority 32768, Address 0001.e801.6aa8
We are the root of MSTI 0 (CIST)
Configured hello time 2, max age 20, forward delay 15, max hops 20
CIST regional root ID Priority 32768, Address 0001.e801.6aa8
CIST external path cost 0

Interface                                    Designated
 Name      PortID   Prio Cost    Sts Cost    Bridge ID           PortID
---------- -------- ---- ------- --- ------- ------------------- --------
TenGig 0/0    128.257  128  20000   EDS 0      32768 0001.e801.6aa8 128.257

Interface
 Name      Role   PortID   Prio Cost    Sts Cost   Link-type Edge Boundary
---------- ------ -------- ---- ------- --- ------- --------- ---- --------
TenGig 0/0    ErrDis 128.257  128  20000   EDS 0      P2P       No   No

FTOS#show spanning-tree msti 0
MSTI 0 VLANs mapped  1-4094

Root Identifier has priority 32768, Address 0001.e801.6aa8
Root Bridge hello time 2, max age 20, forward delay 15, max hops 20
Bridge Identifier has priority 32768, Address 0001.e801.6aa8
Configured hello time 2, max age 20, forward delay 15, max hops 20
We are the root of MSTI 0 (CIST)
Current root has priority 32768, Address 0001.e801.6aa8
CIST regional root ID Priority 32768, Address 0001.e801.6aa8
CIST external path cost 0
Number of topology changes 1, last change occured 00:00:15 ago on Te 0/0

Port 257 (TenGigabitEthernet 0/0) is LBK_INC Discarding
Port path cost 20000, Port priority 128, Port Identifier 128.257
Designated root has priority 32768, address 0001.e801.6aa8
Designated bridge has priority 32768, address 0001.e801.6aa8
Designated port id is 128.257, designated path cost 0
Number of transitions to forwarding state 1
BPDU (MRecords): sent 21, received 9
The port is not in the Edge port mode
```

← **Loopback BPDU Inconsistency (LBK_INC)**

Example 3   **Figure 20-7.   show spanning-tree msti guard Command Example**

```
FTOS#show spanning-tree msti 0 guard
Executing IEEE compatible Spanning Tree Protocol
Bpdu filter disabled globally

Interface
 Name      Instance   Sts        Guard type   Bpdu Filter
--------- --------   ---------   ----------   ----------
Te 0/41   0          FWD         None         No
Te 0/42   0          FWD         None         No
Te 0/43   0          FWD         None         No
```

Table 20-1.   show spanning-tree msti guard Command Information

Field	Description
Interface Name	MSTP interface
Instance	MSTP instance

Table 20-1. show spanning-tree msti guard Command Information

Field	Description
Sts	Port state: root-inconsistent (INCON Root), forwarding (FWD), listening (LIS), blocking (BLK), or shut down (EDS Shut)
Guard Type	Type of STP guard configured (Root or BPDU guard)
BPDU Filter	BPDU filter enabled (Yes) or BPDU filter disabled (No)

spanning-tree

Enable the multiple spanning tree protocol on the interface.

Syntax   spanning-tree

To disable the multiple spanning tree protocol on the interface, use the no spanning-tree command.

Parameters

spanning-tree	Enter the keyword spanning-tree to enable the MSTP on the interface. Default: Enable

Defaults   Enable

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

spanning-tree msti

Configure multiple spanning tree instance cost and priority for an interface.

Syntax   spanning-tree msti *instance* {cost *cost* | priority *priority*}

Parameters

msti *instance*	Enter the MST instance number. Range: 0 to 4094.
cost *cost*	(OPTIONAL) Enter the keyword cost followed by the port cost value. Range: 1 to 200000 Defaults: • 40-Gigabit Ethernet interface = 1400 • 10-Gigabit Ethernet interface = 2000 • Port Channel interface with one 10-Gigabit Ethernet = 2000 • Port Channel with two 10-Gigabit Ethernet = 1800 • Port Channel with two 100-Mbps Ethernet = 180000
priority *priority*	Enter keyword priority followed by a value in increments of 16 as the priority. Range: 0 to 240. Default: 128

Defaults   *cost* = depends on the interface type; *priority* = 128

Command Modes   INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

spanning-tree mstp

Configures a Layer 2 MSTP interface as an edge port with (optionally) a BPDU guard, a BPDU filter or enables the root guard feature on the interface.

Syntax	spanning-tree mstp {edge-port [bpduguard [shutdown-on-violation	bpdufilter]	rootguard}

Parameters		
edge-port	Enter the keyword edge-port to configure the interface as a Multiple Spanning Tree edge port.
bpduguard	(OPTIONAL) Enter the keyword edgeport to enable edge port configuration to move the interface into forwarding mode immediately after the root fails. Enter the keyword bpduguard to disable the port when it receives a BPDU.
bpdufilter	(OPTIONAL) Enter the keyword edgeport to enable edge port configuration to move the interface into forwarding mode immediately after the root fails. Enter the keyword bpdufilter to stop sending and receiving BPDUs on the port-fast enabled ports.
shutdown-on-violation	(OPTIONAL) Enter the keyword shutdown-on-violation to hardware disable an interface when a BPDU is received and the port is disabled.
rootguard	Enter the keyword rootguard to enable root guard on an MSTP port or port-channel interface.

Command Modes	INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

On an MSTP switch, a port configured as an edge port will immediately transition to the forwarding state. Only ports connected to end-hosts should be configured as an edge port. Consider an edge port similar to a port with spanning-tree portfast enabled.

Root guard and loop guard cannot be enabled at the same time on a port. For example, if you configure loop guard on a port on which root guard is already configured, the following error message is displayed:

```
% Error: RootGuard is configured. Cannot configure LoopGuard.
```

When used in an MSTP network, if root guard blocks a boundary port in the CIST, the port is also blocked in all other MST instances.

Enabling Portfast BPDU guard and loop guard at the same time on a port results in a port that remains in a blocking state and prevents traffic from flowing through it. For example, when Portfast BPDU guard and loop guard are both configured:

- If a BPDU is received from a remote device, BPDU guard places the port in an err-disabled blocking state and no traffic is forwarded on the port.
- If no BPDU is received from a remote device, loop guard places the port in a loop-inconsistent blocking state and no traffic is forwarded on the port.

tc-flush-standard

Enable the MAC address flushing after receiving every topology change notification.

Syntax	tc-flush-standard
	To disable, use the no tc-flush-standard command.
Defaults	Disabled
Command Modes	CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

By default, FTOS implements an optimized flush mechanism for MSTP. This helps in flushing the MAC addresses only when necessary (and less often) allowing for faster convergence during topology changes. However, if a standards-based flush mechanism is needed, you can turn on the knob command to enable flushing MAC addresses after receiving every topology change notification.

21

Open Shortest Path First (OSPFv2)

Overview

The MXL 10/40GbE Switch IO Module platform supports open shortest path first (OSPFv2) only. Up to 16 OSPF instances can be run simultaneously on the MXL Switch.

OSPF is an interior gateway protocol (IGP), which means that it distributes routing information between routers in a single autonomous system (AS). OSPF is also a link-state protocol in which all routers contain forwarding tables derived from information about their links to their neighbors.

OSPFv2 Commands

The Dell Force10 implementation of OSPFv2 is based on IETF RFC 2328. The following commands allow you to configure and enable OSPFv2.

- area default-cost
- area nssa
- area range
- area stub
- auto-cost
- clear ip ospf
- clear ip ospf statistics
- debug ip ospf
- default-information originate
- default-metric
- description
- distance
- distance ospf
- distribute-list in
- distribute-list out
- fast-converge
- flood-2328
- graceful-restart helper-reject
- ip ospf auth-change-wait-time
- ip ospf authentication-key
- ip ospf cost
- ip ospf dead-interval
- ip ospf hello-interval

- ip ospf message-digest-key
- ip ospf mtu-ignore
- ip ospf network
- ip ospf priority
- ip ospf retransmit-interval
- ip ospf transmit-delay
- log-adjacency-changes
- maximum-paths
- mib-binding
- network area
- passive-interface
- redistribute
- router-id
- router ospf
- show config
- show ip ospf
- show ip ospf asbr
- show ip ospf database
- show ip ospf database asbr-summary
- show ip ospf database external
- show ip ospf database network
- show ip ospf database nssa-external
- show ip ospf database opaque-area
- show ip ospf database opaque-as
- show ip ospf database opaque-link
- show ip ospf database router
- show ip ospf database summary
- show ip ospf interface
- show ip ospf neighbor
- show ip ospf routes
- show ip ospf statistics
- show ip ospf timers rate-limit
- show ip ospf topology
- summary-address
- timers spf
- timers throttle lsa all
- timers throttle lsa arrival

area default-cost

Set the metric for the summary default route generated by the area border router (ABR) into the stub area. Use this command on the border routers at the edge of a stub area.

Syntax

area *area-id* **default-cost** *cost*

To return default values, use the **no area** *area-id* **default-cost** command.

Parameters

area-id	Specify the OSPF area in dotted decimal format (A.B.C.D.) or enter a number from zero (0) to 65535.
cost	Specifies the stub area's advertised external route metric. Range: zero (0) to 65535.

Defaults

cost = 1; no areas are configured.

Command Modes

ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

In FTOS, cost is defined with reference to bandwidth.

Related Commands

area stub	Creates a stub area.

area nssa

Specify an area as a not so stubby area (NSSA).

Syntax

area *area-id* **nssa** [**default-information-originate**] [**no-redistribution**] [**no-summary**]

To delete an NSSA, use the **no area** *area-id* **nssa** command.

Parameters

area-id	Specify the OSPF area in dotted decimal format (A.B.C.D) or enter a number from 0 and 65535.
no-redistribution	(OPTIONAL) Specify that the redistribute command should not distribute routes into the NSSA. You should only use this command in a NSSA Area Border Router (ABR).
default-information-originate	(OPTIONAL) Allows external routing information to be imported into the NSSA by using Type 7 default.
no-summary	(OPTIONAL) Specify that no summary LSAs should be sent into the NSSA.

Defaults

Not configured

Command Mode

ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

area range

Summarize routes matching an address/mask at an area border router (ABR).

Syntax **area** *area-id* **range** *ip-address mask* [**not-advertise**]

To disable route summarization, use the **no area** *area-id* **range** *ip-address mask* command.

Parameters

area-id	Specify the OSPF area in dotted decimal format (A.B.C.D.) or enter a number from zero (0) to 65535.
ip-address	Specify an IP address in dotted decimal format.
mask	Specify a mask for the destination prefix. Enter the full mask (for example, 255.255.255.0).
not-advertise	(OPTIONAL) Enter the keyword **not-advertise** to set the status to DoNotAdvertise (that is, the Type 3 summary-LSA is suppressed and the component networks remain hidden from other areas.)

Defaults No range is configured.

Command Modes ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Only the routes within an area are summarized, and that summary is advertised to other areas by the ABR. External routes are not summarized.

Related Commands

area stub	Creates a stub area.
router ospf	Enters ROUTER OSPF mode to configure an OSPF instance.

area stub

Configure a stub area, which is an area not connected to other areas.

Syntax **area** *area-id* **stub** [**no-summary**]

To delete a stub area, use the **no area** *area-id* **stub** command.

Parameters

area-id	Specify the stub area in dotted decimal format (A.B.C.D.) or enter a number from zero (0) to 65535.
no-summary	(OPTIONAL) Enter the keyword **no-summary** to prevent the ABR from sending summary Link State Advertisements (LSAs) into the stub area.

Defaults Disabled

Command Modes ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Use this command to configure all routers and access servers within a stub.

auto-cost

Specify how the OSPF interface cost is calculated based on the reference bandwidth method.

Syntax	**auto-cost** [**reference-bandwidth** *ref-bw*]

To return to the default bandwidth or to assign cost based on the interface type, use the **no auto-cost** [**reference-bandwidth**] command.

Parameters	*ref-bw*	(OPTIONAL) Specify a reference bandwidth in megabits per second.
		Range: 1 to 4294967
		Default: 100 megabits per second.

Defaults	100 megabits per second.

Command Modes	ROUTER OSPF

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

clear ip ospf

Clear all OSPF routing tables.

Syntax	**clear ip ospf** *process-id* [**process**]

Parameters	*process-id*	Enter the OSPF Process ID to clear a specific process.
		If no Process ID is entered, all OSPF processes are cleared.
	process	(OPTIONAL) Enter the keyword **process** to reset the OSPF process.

Command Modes	EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

clear ip ospf statistics

Clear the packet statistics in interfaces and neighbors.

| Syntax | **clear ip ospf** *process-id* **statistics** [**interface** *name* {**neighbor** *router-id*}] |

Parameters

process-id	Enter the OSPF Process ID to clear statistics for a specific process.
	If no Process ID is entered, all OSPF processes are cleared.
interface *name*	(OPTIONAL) Enter the keyword **interface** followed by one of the following interface keywords and slot/port or number information:
	• For Port Channel groups, enter the keyword **port-channel** followed by a number:
	• Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information.
	• For a VLAN, enter the keyword **vlan** followed by a number from 1 to 4094.
	• For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.
neighbor *router-id*	(OPTIONAL) Enter the keyword **neighbor** followed by the neighbor's router-id in dotted decimal format (A.B.C.D.).

| Defaults | none |

| Command Modes | EXEC Privilege |

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show ip ospf statistics	Displays OSPF statistics.

debug ip ospf

Display debug information on OSPF. Entering **debug ip ospf** enables OSPF debugging for the first OSPF process.

| Syntax | **debug ip ospf** *process-id* [**event** | **packet** | **spf** | **database-timer rate-limit**] |

To cancel the debug command, enter **no debug ip ospf**.

Parameters

process-id	Enter the OSPF Process ID to debug a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.
event	(OPTIONAL) Enter the keyword **event** to debug only OSPF event information.
packet	(OPTIONAL) Enter the keyword **packet** to debug only OSPF packet information.
spf	(OPTIONAL) Enter the keyword **spf** to display the Shortest Path First information.
database-timer rate-limit	(OPTIONAL) Enter the keyword **database-timer rate-limit** to display the LSA throttling timer information.

| Command Modes | EXEC Privilege |

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Example   **Figure 21-1.**   **debug ip ospf** *process-id* **packet Command Example**

```
FTOS#debug ip ospf 1 packet
OSPF process 1, packet debugging is on

FTOS#
08:14:24 : OSPF(100:00):
Xmt. v:2 t:1(HELLO) l:44 rid:192.1.1.1
        aid:0.0.0.1 chk:0xa098 aut:0 auk: keyid:0 to:TenGig 4/3 dst:224.0.0.5
            netmask:255.255.255.0 pri:1 N-, MC-, E+, T-,
            hi:10 di:40 dr:90.1.1.1 bdr:0.0.0.0
```

Table 21-1.   **debug ip ospf** *process-id* **packet Output Descriptions**

Field	Description
8:14	Displays the time stamp.
OSPF	Displays the OSPF process ID: instance ID.
v:	Displays the OSPF version. FTOS supports version 2 only.
t:	Displays the type of packet sent: • 1 - Hello packet • 2 - database description • 3 - link state request • 4 - link state update • 5 - link state acknowledgement
l:	Displays the packet length.
rid:	Displays the OSPF router ID.
aid:	Displays the Autonomous System ID.
chk:	Displays the OSPF checksum.
aut:	States if OSPF authentication is configured. One of the following is listed: • 0 - no authentication configured • 1 - simple authentication configured using the ip ospf authentication-key command) • 2 - MD5 authentication configured using the ip ospf message-digest-key command.
auk:	If the ip ospf authentication-key command is configured, this field displays the key used.
keyid:	If the ip ospf message-digest-key command is configured, this field displays the MD5 key
to:	Displays the interface to which the packet is intended.
dst:	Displays the destination IP address.
netmask:	Displays the destination IP address mask.
pri:	Displays the OSPF priority

Table 21-1. debug ip ospf *process-id* **packet Output Descriptions**

Field	Description
N, MC, E, T	Displays information available in the Options field of the HELLO packet: • N + (N-bit is set) • N - (N-bit is not set) • MC+ (bit used by MOSPF is set and router is able to forward IP multicast packets) • MC- (bit used by MOSPF is not set and router cannot forward IP multicast packets) • E + (router is able to accept AS External LSAs) • E - (router cannot accept AS External LSAs) • T + (router can support TOS) • T - (router cannot support TOS)
hi:	Displays the amount of time configured for the HELLO interval.
di:	Displays the amount of time configured for the DEAD interval.
dr:	Displays the IP address of the designated router.
bdr:	Displays the IP address of the Border Area Router.

default-information originate

Configure the FTOS to generate a default external route into an OSPF routing domain.

Syntax **default-information originate** [**always**] [**metric** *metric-value*] [**metric-type** *type-value*] [**route-map** *map-name*]

To return to the default values, use the **no default-information originate** command.

Parameters

always	(OPTIONAL) Enter the keyword **always** to specify that default route information must always be advertised.
metric *metric-value*	(OPTIONAL) Enter the keyword metric followed by a number to configure a metric value for the route. Range: 1 to 16777214
metric-type *type-value*	(OPTIONAL) Enter the keyword **metric-type** followed by an OSPF link state type of 1 or 2 for default routes. The values are: • 1 = Type 1 external route • 2 = Type 2 external route.
route-map *map-name*	(OPTIONAL) Enter the keyword **route-map** followed by the name of an established route map.

Defaults Disabled.

Command Modes ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

redistribute	Redistributes routes from other routing protocols into OSPF.

default-metric

Change the metrics of redistributed routes to a value useful to OSPF. Use this command with the redistribute command.

Syntax	**default-metric** *number*
	To return to the default values, use the **no default-metric** [*number*] command.

Parameters	*number*	Enter a number as the metric. Range: 1 to 16777214.

Defaults	Disabled.
Command Modes	ROUTER OSPF

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	redistribute	Redistributes routes from other routing protocols into OSPF.

description

Add a description about the selected OSPF configuration.

Syntax	**description** *description*
	To remove the OSPF description, use the **no description** command.

Parameters	*description*	Enter a text string description to identify the OSPF configuration (80 characters maximum).

Defaults	none
Command Modes	ROUTER OSPF

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	show ip ospf asbr	Displays the VLAN configuration.

distance

Define an administrative distance for particular routes to a specific IP address.

Syntax	**distance** *weight* [*ip-address mask access-list-name*]
	To delete the settings, use the **no distance** *weight* [*ip-address mask access-list-name*] command.

Parameters		
weight	Specify an administrative distance. Range: 1 to 255. Default: 110	
ip-address	(OPTIONAL) Enter a router ID in the dotted decimal format. If you enter a router ID, you must include the mask for that router address.	
mask	(OPTIONAL) Enter a mask in dotted decimal format or /n format.	
access-list-name	(OPTIONAL) Enter the name of an IP standard access list, up to 140 characters.	

Defaults   110

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

distance ospf

Configure an OSPF distance metric for different types of routes.

Syntax   **distance ospf** [**external** *dist3*] [**inter-area** *dist2*] [**intra-area** *dist1*]

To delete these settings, use the **no distance ospf** command.

Parameters

external *dist3*	(OPTIONAL) Enter the keyword **external** followed by a number to specify a distance for external type 5 and 7 routes. Range: 1 to 255 Default: 110.
inter-area *dist2*	(OPTIONAL) Enter the keyword **inter-area** followed by a number to specify a distance metric for routes between areas. Range: 1 to 255 Default: 110.
intra-area *dist1*	(OPTIONAL) Enter the keyword **intra-area** followed by a number to specify a distance metric for all routes within an area. Range: 1 to 255 Default: 110.

Defaults   **external** *dist3* = 110; **inter-area** *dist2* = 110; **intra-area** *dist1* = 110.

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   To specify a distance for routes learned from other routing domains, use the redistribute command.

distribute-list in

Apply a filter to incoming routing updates from OSPF to the routing table.

Syntax   **distribute-list** *prefix-list-name* **in** [*interface*]

To delete a filter, use the **no distribute-list** *prefix-list-name* **in** [*interface*] command.

Parameters

prefix-list-name	Enter the name of a configured prefix list.
interface	(OPTIONAL) Enter one of the following keywords and slot/port or number information:
	• For Port Channel groups, enter the keyword **port-channel** followed by a number:
	Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information.
	• For a VLAN, enter the keyword **vlan** followed by a number from 1 to 4094.
	• For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.

Defaults   Not configured.

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

distribute-list out

Apply a filter to restrict certain routes destined for the local routing table after the SPF calculation.

Syntax   **distribute-list** *prefix-list-name* **out** [**connected** | **rip** | **static**]

To remove a filter, use the **no distribute-list** *prefix-list-name* **out** [**connected** | **rip** | **static**] command.

Parameters

prefix-list-name	Enter the name of a configured prefix list.
connected	(OPTIONAL) Enter the keyword **connected** to specify that connected routes are distributed.
rip	(OPTIONAL) Enter the keyword **rip** to specify that RIP routes are distributed.*
static	(OPTIONAL) Enter the keyword **static** to specify that only manually configured routes are distributed.

Defaults   Not configured.

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

| Usage Information | The distribute-list out command applies to routes being redistributed by autonomous system boundary routers (ASBRs) into OSPF. It can be applied to external type 2 and external type 1 routes, but not to intra-area and inter-area routes. |

fast-converge

This command sets the minimum LSA origination and arrival times to zero (0), allowing more rapid route computation so that convergence takes less time.

Syntax

fast-converge {*number*}

To cancel fast-convergence, use the **no fast converge** command.

Parameters

number	Enter the convergence level desired. The higher this parameter is set, the faster OSPF converge takes place.
	Range: 1-4

Defaults none

Command Modes ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The higher this parameter is set, the faster OSPF converge takes place. Note that the faster the convergence, the more frequent the route calculations and updates. This will impact CPU utilization and may impact adjacency stability in larger topologies.

Generally, convergence level 1 meets most convergence requirements. Higher convergence levels should only be selected following consultation with Dell Force10 Technical Support.

flood-2328

Enable RFC-2328 flooding behavior.

Syntax

flood-2328

To disable, use the **no flood-2328** command.

Defaults Disabled

Command Modes ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

In OSPF, flooding is the most resource-consuming task. The flooding algorithm, described in RFC-2328, requires that OSPF flood LSAs (Link State Advertisements) on all interfaces, as governed by LSA's flooding scope (see Section 13 of the RFC). When multiple direct links connect two routers, the RFC-2328 flooding algorithm generates significant redundant information across all links.

By default, FTOS implements an enhanced flooding procedure that dynamically and intelligently determines when to optimize flooding. Whenever possible, the OSPF task attempts to reduce flooding overhead by selectively flooding on a subset of the interfaces between two routers.

When **flood-2328** is enabled, this command configures FTOS to flood LSAs on all interfaces.

graceful-restart helper-reject

Specify the OSPF router to not act as a helper during graceful restart.

Syntax   **graceful-restart helper-reject** *ip-address*

To return to default value, enter **no graceful-restart helper-reject**.

Parameters

ip-address	Enter the OSPF router-id, in IP address format, of the restart router that *will not* act as a helper during graceful restart.

Defaults   Not Configured

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip ospf auth-change-wait-time

OSPF provides a grace period while OSPF changes its interface authentication type. During the grace period, OSPF sends out packets with new and old authentication scheme till the grace period expires.

Syntax   **ip ospf auth-change-wait-time** *seconds*

To return to the default, use the **no ip ospf auth-change-wait-time** command.

Parameters

seconds	Enter seconds Range: 0 to 300

Defaults   zero (0) seconds

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip ospf authentication-key

Enable authentication and set an authentication key on OSPF traffic on an interface.

Syntax **ip ospf authentication-key** [*encryption-type*] *key*

To delete an authentication key, use the **no ip ospf authentication-key** command.

Parameters

encryption-type	(OPTIONAL) Enter 7 to encrypt the key.
key	Enter an 8 character string. Strings longer than 8 characters are truncated.

Defaults Not configured.

Command Modes INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information All neighboring routers in the same network must use the same password to exchange OSPF information.

ip ospf cost

Change the cost associated with the OSPF traffic on an interface.

Syntax **ip ospf cost** *cost*

To return to default value, use the **no ip ospf cost** command.

Parameters

cost	Enter a number as the cost. Range: 1 to 65535.

Defaults The default cost is based on the reference bandwidth.

Command Modes INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information If this command is not configured, cost is based on the auto-cost command.

When you configure OSPF over multiple vendors, use the ip ospf cost command to ensure that all routers use the same cost. Otherwise, OSPF routes improperly.

Related Commands

auto-cost	Controls how the OSPF interface cost is calculated.

ip ospf dead-interval

Set the time interval since the last hello-packet was received from a router. After the interval elapses, the neighboring routers declare the router dead.

Syntax   **ip ospf dead-interval** *seconds*

To return to the default values, use the **no ip ospf dead-interval** command.

Parameters

seconds	Enter the number of seconds for the interval. Range: 1 to 65535. Default: 40 seconds.

Defaults   40 seconds

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   By default, the dead interval is four times the default hello-interval.

Related Commands

ip ospf hello-interval	Sets the time interval between hello packets.

ip ospf hello-interval

Specify the time interval between the hello packets sent on the interface.

Syntax   **ip ospf hello-interval** *seconds*

To return to the default value, use the **no ip ospf hello-interval** command.

Parameters

seconds	Enter a the number of second as the delay between hello packets. Range: 1 to 65535. Default: 10 seconds.

Defaults   10 seconds

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The time interval between hello packets must be the same for routers in a network.

Related Commands

ip ospf dead-interval	Sets the time interval before a router is declared dead.

ip ospf message-digest-key

Enable OSPF MD5 authentication and send an OSPF message digest key on the interface.

Syntax   **ip ospf message-digest-key** *keyid* **md5** *key*

To delete a key, use the **no ip ospf message-digest-key** *keyid* command.

Parameters

keyid	Enter a number as the key ID.
	Range: 1 to 255.
key	Enter a continuous character string as the password.

Defaults   No MD5 authentication is configured.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   To change to a different key on the interface, enable the new key while the old key is still enabled. The FTOS will send two packets: the first packet authenticated with the old key, and the second packet authenticated with the new key. This process ensures that the neighbors learn the new key and communication is not disrupted by keeping the old key enabled.

After the reply is received and the new key is authenticated, you must delete the old key. Dell Force10 recommends keeping only one key per interface.

> **Note:** The MD5 secret is stored as plain text in the configuration file with service password encryption.

ip ospf mtu-ignore

Disable OSPF MTU mismatch detection upon receipt of database description (DBD) packets.

Syntax   **ip ospf mtu-ignore**

To return to the default, use the **no ip ospf mtu-ignore** command.

Defaults   Enabled

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip ospf network

Set the network type for the interface.

Syntax   **ip ospf network** {**broadcast** | **point-to-point**}

To return to the default, use the **no ip ospf network** command.

Parameters

broadcast	Enter the keyword **broadcast** to designate the interface as part of a broadcast network.
point-to-point	Enter the keyword **point-to-point** to designate the interface as part of a point-to-point network.

Defaults   Not configured.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip ospf priority

Set the priority of the interface to determine the Designated Router for the OSPF network.

Syntax   **ip ospf priority** *number*

To return to the default setting, use the **no ip ospf priority** command.

Parameters

number	Enter a number as the priority. Range: 0 to 255. The default is 1.

Defaults   1

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Setting a priority of 0 makes the router ineligible for election as a Designated Router or Backup Designated Router.

Use this command for interfaces connected to multi-access networks, not point-to-point networks.

ip ospf retransmit-interval

Set the retransmission time between lost link state advertisements (LSAs) for adjacencies belonging to the interface.

Syntax   **ip ospf retransmit-interval** *seconds*

To return to the default values, use the **no ip ospf retransmit-interval** command.

Parameters		
	seconds	Enter the number of seconds as the interval between retransmission.
		Range: 1 to 3600.
		Default: 5 seconds.
		This interval must be greater than the expected round-trip time for a packet to travel between two routers.

Defaults   5 seconds

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Set the time interval to a number large enough to prevent unnecessary retransmissions.

ip ospf transmit-delay

Set the estimated time elapsed to send a link state update packet on the interface.

Syntax   **ip ospf transmit-delay** *seconds*

To return to the default value, use the **no ip ospf transmit-delay** command.

Parameters		
	seconds	Enter the number of seconds as the transmission time. This value should be greater than the transmission and propagation delays for the interface.
		Range: 1 to 3600.
		Default: 1 second.

Defaults   1 second

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

log-adjacency-changes

Set FTOS to send a Syslog message about changes in the OSPF adjacency state.

Syntax   **log-adjacency-changes**

To disable the Syslog messages, use the **no log-adjacency-changes** command.

Defaults   Disabled.

Command Mode   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

maximum-paths

Enable the software to forward packets over multiple paths.

Syntax	**maximum-paths** *number*

To disable packet forwarding over multiple paths, use the **no maximum-paths** command.

Parameters

number	Specify the number of paths.
	Range: 1 to 64.
	Default: 4 paths.

Defaults 4

Command Modes ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

mib-binding

Enable this OSPF process ID to manage the SNMP traps and process SNMP queries.

Syntax	**mib-binding**

To mib-binding on this OSPF process, use the **no mib-binding** command.

Defaults none

Command Modes ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

This command is either enabled or disabled. If no OSPF process is identified as the MIB manager, the first OSPF process will be used.

If an OSPF process has been selected, it must be disabled prior to assigning new process ID the MIB responsibility.

network area

Define which interfaces run OSPF and the OSPF area for those interfaces.

Syntax	**network** *ip-address mask* **area** *area-id*

To disable an OSPF area, use the **no network** *ip-address mask* **area** *area-id* command.

Parameters

ip-address	Specify a primary or secondary address in dotted decimal format. The primary address is required before adding the secondary address.

mask	Enter a network mask in /prefix format. (/x)
area-id	Enter the OSPF area ID as either a decimal value or in a valid IP address.
	Decimal value range: 0 to 65535
	IP address format: dotted decimal format A.B.C.D.
	Note: If the area ID is smaller than 65535, it will be converted to a decimal value. For example, if you use an area ID of 0.0.0.1, it will be converted to 1.

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   To enable OSPF on an interface, the network area command must include, in its range of addresses, the primary IP address of an interface.

    📖   **Note:** An interface can be attached only to a single OSPF area.

If you delete all the network area commands for Area 0, the show ip ospf command output will not list Area 0.

passive-interface

Suppress both receiving and sending routing updates on an interface.

Syntax   **passive-interface** {**default** | *interface*}

To enable both the receiving and sending routing, enter the **no passive-interface** *interface* command.

To return all OSPF interfaces (current and future) to active, enter the **no passive-interface default** command.

Parameters

default	Enter the keyword **default** to make all OSPF interfaces (current and future) passive.
interface	Enter the following keywords and slot/port or number information:
	• For Port Channel groups, enter the keyword **port-channel** followed by a number: Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information.
	• For a VLAN, enter the keyword **vlan** followed by a number from 1 to 4094.
	• For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Although the passive interface will neither send nor receive routing updates, the network on that interface will still be included in OSPF updates sent via other interfaces.

The default keyword sets all interfaces as passive. You can then configure individual interfaces, where adjacencies are desired, using the **no passive-interface** *interface* command. The no form of this command is inserted into the configuration for individual interfaces when the **no passive-interface** *interface* command is issued while **passive-interface default** is configured.

This command behavior has changed as follows:

passive-interface *interface*

*   The previous **no passive-interface** *interface* is removed from the running configuration.
*   The ABR status for the router is updated.
*   Save **passive-interface** *interface* into the running configuration.

passive-interface default

*   All present and future OSPF interface are marked as *passive*.
*   Any adjacency are explicitly terminated from all OSPF interfaces.
*   All previous **passive-interface** *interface* commands are removed from the running configuration.
*   All previous **no passive-interface** *interface* commands are removed from the running configuration.

no passive-interface *interface*

*   Remove the interface from the passive list.
*   The ABR status for the router is updated.
*   If **passive-interface default** is specified, then save **no passive-interface** *interface* into the running configuration.

No passive-interface default

*   Clear everything and revert to the default behavior.
*   All previously marked passive interfaces are removed.
*   May update ABR status.

redistribute

Redistribute information from another routing protocol throughout the OSPF process.

Syntax **redistribute** {**connected** | **rip** | | **ospf** | **static**} [**metric** *metric-value* | **metric-type** *type-value*] [**route-map** *map-name*] [**tag** *tag-value*]

To disable redistribution, use the **no redistribute** {**connected** | **ospf** | **rip** | **static**} command.

Parameters

connected	Enter the keyword **connected** to specify that information from active routes on interfaces is redistributed.
rip	Enter the keyword **rip** to specify that RIP routing information is redistributed.
ospf	Enter the keyword **ospf** to specify that RIP routing information is redistributed.
static	Enter the keyword **static** to specify that information from static routes is redistributed.
metric *metric-value*	(OPTIONAL) Enter the keyword **metric** followed by a number. Range: 0 (zero) to 16777214.

metric-type *type-value*	(OPTIONAL) Enter the keyword **metric-type** followed by one of the following:
	• 1 = OSPF External type 1
	• 2 = OSPF External type 2
route-map *map-name*	(OPTIONAL) Enter the keyword **route-map** followed by the name of the route map.
tag *tag-value*	(OPTIONAL) Enter the keyword **tag** followed by a number. Range: 0 to 4294967295

Defaults   Not configured.

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   To redistribute the default route (0.0.0.0/0), configure the default-information originate command.

Related Commands

default-information originate	Generates a default route into the OSPF routing domain.

router-id

Use this command to configure a fixed router ID.

Syntax   **router-id** *ip-address*

To remove the fixed router ID, use the **no router-id** *ip-address* command.

Parameters

ip-address	Enter the router ID in the IP address format

Defaults   none

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 21-2.   router-id Command Example**

```
FTOS(conf)#router ospf  100
FTOS(conf-router_ospf)#router-id 1.1.1.1
Changing router-id will bring down existing OSPF adjacency [y/n]:


FTOS(conf-router_ospf)#show config
!
router ospf 100
router-id 1.1.1.1
FTOS(conf-router_ospf)#no router-id
Changing router-id will bring down existing OSPF adjacency [y/n]:
FTOS#
```

Usage Information You can configure an arbitrary value in the IP address format for each router. However, each router ID must be unique. If this command is used on an OSPF router process, which is already active (that is, has neighbors), a prompt reminding you that changing router-id will bring down the existing OSPF adjacency. The new router ID is effective at the next reload

router ospf

Enter the ROUTER OSPF mode to configure an OSPF instance.

Syntax **router ospf** *process-id*

To clear an OSPF instance, use the **no router ospf** *process-id* command.

Parameters

process-id	Enter a number for the OSPF instance.
	Range: 1 to 65535.

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 21-3.   router ospf Command Example**

```
FTOS(conf)#router ospf 2
FTOS(conf-router_ospf)#
```

Usage Information You must have an IP address assigned to an interface to enter the ROUTER OSPF mode and configure OSPF.

show config

Display the non-default values in the current OSPF configuration.

Syntax **show config**

Command Modes ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 21-4.   show config Command Example**

```
FTOS(conf-router_ospf)#show config
!
router ospf 1
FTOS(conf-router_ospf-1)#
```

show ip ospf

Display information on the OSPF process configured on the switch.

Syntax	**show ip ospf** *process-id*

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   If you delete all the network area commands for Area 0, the show ip ospf command output will not list Area 0.

Example   **Figure 21-5.   show ip ospf** *process-id* **Command Example**

```
FTOS#show ip ospf 10
Routing Process ospf 10 with ID 1.1.1.1 Virtual router default-vrf
Supports only single TOS (TOS0) routes
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Convergence Level 0
Min LSA origination 0 msec, Min LSA arrival 1000 msec
Min LSA hold time 5000 msec, Max LSA wait time 5000 msec
Number of area in this router is 1, normal 1 stub 0 nssa 0
    Area BACKBONE (0)
        Number of interface in this area is 1
        SPF algorithm executed 205 times
        Area ranges are

FTOS#
```

Table 21-2.   show ip ospf *process-id* **Command Descriptions:**

Line Beginning with	Description
"Routing Process..."	Displays the OSPF process ID and the IP address associated with the process ID.
"Supports only..."	Displays the number of Type of Service (TOS) rouse supported.
"SPF schedule..."	Displays the delay and hold time configured for this process ID.
"Convergence Level"	
"Min LSA...."	Displays the intervals set for LSA transmission and acceptance.
"Number of..."	Displays the number and type of areas configured for this process ID.

Related Commands

show ip ospf database	Displays information about the OSPF routes configured.
show ip ospf interface	Displays the OSPF interfaces configured.
show ip ospf neighbor	Displays the OSPF neighbors configured.

show ip ospf asbr

Display all ASBR routers visible to OSPF.

Syntax   **show ip ospf** *process-id* **asbr**

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.

Defaults   No default values or behavior

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Use this command to isolate problems with external routes. In OSPF, external routes are calculated by adding the LSA cost to the cost of reaching the ASBR router. If an external route does not have the correct cost, use this command to determine if the path to the originating router is correct. The display output is not sorted in any order.

> 📝 **Note:** ASBRs that are not in directly connected areas are also displayed.

Example   **Figure 21-6.   show ip ospf** *process-id* **asbr Command Example**

```
FTOS#show ip ospf 1 asbr

RouterID       Flags    Cost   Nexthop         Interface     Area
3.3.3.3        -/-/-/   2      10.0.0.2        TenGig 0/1    1
1.1.1.1        E/-/-/   0      0.0.0.0         -             0 FTOS#
```

You can determine if an ASBR is in a directly connected area (or not) by the flags. For ASBRs in a directly connected area, E flags are set. In the figure above, router 1.1.1.1 is in a directly connected area since the Flag is E/-/-/. For remote ASBRs, the E flag is clear (-/-/-/)

show ip ospf database

Display all LSA information. If OSPF is not enabled on the switch, no output is generated.

Syntax   **show ip ospf** *process-id* **database** [**database-summary**]

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.
database-summary	(OPTIONAL) Enter the keywords **database-summary** to the display the number of LSA types in each area and the total number of LSAs.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example

Figure 21-7.   show ip ospf *process-id* **database Command Example**

```
FTOS>show ip ospf 1 database

           OSPF Router with ID (11.1.2.1) (Process ID 1)
                Router (Area 0.0.0.0)
Link ID           ADV Router        Age      Seq#           Checksum     Link count
11.1.2.1          11.1.2.1          673      0x80000005     0x707e          2
13.1.1.1          13.1.1.1          676      0x80000097     0x1035          2
192.68.135.2      192.68.135.2      1419     0x80000294     0x9cbd          1

                Network (Area 0.0.0.0)
Link ID           ADV Router        Age      Seq#           Checksum
10.2.3.2          13.1.1.1          676      0x80000003     0x6592
10.2.4.2          192.68.135.2      908      0x80000055     0x683e

                Type-5 AS External
Link ID           ADV Router        Age      Seq#           Checksum  Tag
0.0.0.0           192.68.135.2      908      0x80000052     0xeb83    100
1.1.1.1           192.68.135.2      908      0x8000002a     0xbd27    0
10.1.1.0          11.1.2.1          718      0x80000002     0x9012    0
10.1.2.0          11.1.2.1          718      0x80000002     0x851c    0
10.2.2.0          11.1.2.1          718      0x80000002     0x7927    0
10.2.3.0          11.1.2.1          718      0x80000002     0x6e31    0
10.2.4.0          13.1.1.1          1184     0x80000068     0x45db    0
11.1.1.0          11.1.2.1          718      0x80000002     0x831e    0
11.1.2.0          11.1.2.1          718      0x80000002     0x7828    0
12.1.2.0          192.68.135.2      1663     0x80000054     0xd8d6    0
13.1.1.0          13.1.1.1          1192     0x8000006b     0x2718    0
13.1.2.0          13.1.1.1          1184     0x8000006b     0x1c22    0
172.16.1.0        13.1.1.1          148      0x8000006d     0x533b    0
FTOS>
```

Table 21-3.   show ip ospf *process-id* **database Command Description**

Field	Description
Link ID	Identifies the router ID.
ADV Router	Identifies the advertising router's ID.
Age	Displays the link state age.
Seq#	Identifies the link state sequence number. This number enables you to identify old or duplicate link state advertisements.
Checksum	Displays the Fletcher checksum of an LSA's complete contents.
Link count	Displays the number of interfaces for that router.

Related Commands

show ip ospf database asbr-summary	Displays only ASBR summary LSA information.

show ip ospf database asbr-summary

Display information about AS Boundary LSAs.

Syntax   **show ip ospf** *process-id* **database asbr-summary** [*link-state-id*] [**adv-router** *ip-address*]

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.
link-state-id	(OPTIONAL) Specify LSA ID in dotted decimal format. The LSA ID value depends on the LSA type, and it can be one of the following:
	• the network's IP address for Type 3 LSAs or Type 5 LSAs
	• the router's OSPF router ID for Type 1 LSAs or Type 4 LSAs
	• the default destination (0.0.0.0) for Type 5 LSAs
adv-router *ip-address*	(OPTIONAL) Enter the keywords **adv-router** ip-address to display only the LSA information about that router.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 21-8.   show ip ospf database asbr-summary Command Example (Partial)**

```
FTOS#show ip ospf 100 database asbr-summary

           OSPF Router with ID (1.1.1.10) (Process ID 100)

               Summary Asbr (Area 0.0.0.0)

  LS age: 1437
  Options: (No TOS-capability, No DC, E)
  LS type: Summary Asbr
  Link State ID: 103.1.50.1
  Advertising Router: 1.1.1.10
  LS Seq Number: 0x8000000f
  Checksum: 0x8221
  Length: 28
  Network Mask: /0
      TOS: 0 Metric: 2

  LS age: 473
  Options: (No TOS-capability, No DC, E)
  LS type: Summary Asbr
  Link State ID: 104.1.50.1
  Advertising Router: 1.1.1.10
  LS Seq Number: 0x80000010
  Checksum: 0x4198
  Length: 28
--More--
```

Table 21-4.   show ip ospf database asbr-summary Command Description

Item	Description
LS Age	Displays the LSA's age.
Options	Displays the optional capabilities available on router. The following options can be found in this item:
	• TOS-capability or No TOS-capability is displayed depending on whether the router can support Type of Service.
	• DC or No DC is displayed depending on whether the originating router can support OSPF over demand circuits.
	• E or No E is displayed on whether the originating router can accept AS External LSAs.
LS Type	Displays the LSA's type.

Table 21-4.   show ip ospf database asbr-summary Command Description

Item	Description
Link State ID	Displays the Link State ID.
Advertising Router	Identifies the advertising router's ID.
Checksum	Displays the Fletcher checksum of the an LSA's complete contents.
Length	Displays the length in bytes of the LSA.
Network Mask	Displays the network mask implemented on the area.
TOS	Displays the Type of Service (TOS) options. Option 0 is the only option.
Metric	Displays the LSA metric.

Related Commands	show ip ospf database	Displays OSPF database information.

show ip ospf database external

Display information on the AS external (type 5) LSAs.

Syntax   **show ip ospf** *process-id* **database external** [*link-state-id*] [**adv-router** *ip-address*]

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.
link-state-id	(OPTIONAL) Specify LSA ID in dotted decimal format. The LSA ID value depends on the LSA type, and it can be one of the following:
	• the network's IP address for Type 3 LSAs or Type 5 LSAs
	• the router's OSPF router ID for Type 1 LSAs or Type 4 LSAs
	• the default destination (0.0.0.0) for Type 5 LSAs
adv-router *ip-address*	(OPTIONAL) Enter the keywords **adv-router** ip-address to display only the LSA information about that router.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 21-9.   show ip ospf database external Command Example**

```
FTOS#show ip ospf 1 database external

             OSPF Router with ID (20.20.20.5) (Process ID 1)

                 Type-5 AS External

   LS age: 612
   Options: (No TOS-capability, No DC, E)
   LS type: Type-5 AS External
   Link State ID: 12.12.12.2
   Advertising Router: 20.31.3.1
   LS Seq Number: 0x80000007
   Checksum: 0x4cde
   Length: 36
   Network Mask: /32
       Metrics Type: 2
       TOS: 0
       Metrics: 25
       Forward Address: 0.0.0.0
       External Route Tag: 43

   LS age: 1868
   Options: (No TOS-capability, DC)
   LS type: Type-5 AS External
   Link State ID: 24.216.12.0
   Advertising Router: 20.20.20.8
   LS Seq Number: 0x80000005
   Checksum: 0xa00e
   Length: 36
   Network Mask: /24
       Metrics Type: 2
       TOS: 0
       Metrics: 1
       Forward Address: 0.0.0.0
       External Route Tag: 701
FTOS#
```

Table 21-5.   show ip ospf *process-id* database external Command Description

Item	Description
LS Age	Displays the LSA age.
Options	Displays the optional capabilities available on router. The following options can be found in this item: • TOS-capability or No TOS-capability is displayed depending on whether the router can support Type of Service. • DC or No DC is displayed depending on whether the originating router can support OSPF over demand circuits. • E or No E is displayed on whether the originating router can accept AS External LSAs.
LS Type	Displays the LSA's type.
Link State ID	Displays the Link State ID.
Advertising Router	Identifies the router ID of the LSA's originating router.
LS Seq Number	Identifies the link state sequence number. This number enables you to identify old or duplicate LSAs.
Checksum	Displays the Fletcher checksum of an LSA's complete contents.
Length	Displays the length in bytes of the LSA.
Network Mask	Displays the network mask implemented on the area.
Metrics Type	Displays the external type.
TOS	Displays the TOS options. Option 0 is the only option.

Table 21-5.   show ip ospf *process-id* **database external Command Description**

Item	Description
Metrics	Displays the LSA metric.
Forward Address	Identifies the address of the forwarding router. Data traffic is forwarded to this router. If the forwarding address is 0.0.0.0, data traffic is forwarded to the originating router.
External Route Tag	Displays the 32-bit field attached to each external route. This field is not used by the OSPF protocol, but can be used for external route management.

**Related
Commands**

show ip ospf database	Displays OSPF database information.

show ip ospf database network

Display the network (type 2) LSA information.

Syntax   **show ip ospf** *process-id* **database network** [*link-state-id*] [**adv-router** *ip-address*]

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.
link-state-id	(OPTIONAL) Specify LSA ID in dotted decimal format. The LSA ID value depends on the LSA type, and it can be one of the following:
	• the network's IP address for Type 3 LSAs or Type 5 LSAs
	• the router's OSPF router ID for Type 1 LSAs or Type 4 LSAs
	• the default destination (0.0.0.0) for Type 5 LSAs
adv-router *ip-address*	(OPTIONAL) Enter the keywords **adv-router** ip-address to display only the LSA information about that router.

Command Modes   EXEC

EXEC Privilege

**Command
History**

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 21-10.   show ip ospf** *process-id* **database network Command Example**

```
FTOS#show ip ospf 1 data network

              OSPF Router with ID (20.20.20.5) (Process ID 1)

                  Network (Area 0.0.0.0)

  LS age: 1372
  Options: (No TOS-capability, DC, E)
  LS type: Network
  Link State ID: 202.10.10.2
  Advertising Router: 20.20.20.8
  LS Seq Number: 0x80000006
  Checksum: 0xa35
  Length: 36
  Network Mask: /24
      Attached Router: 20.20.20.8
      Attached Router: 20.20.20.9
      Attached Router: 20.20.20.7

                  Network (Area 0.0.0.1)

  LS age: 252
  Options: (TOS-capability, No DC, E)
  LS type: Network
  Link State ID: 192.10.10.2
  Advertising Router: 192.10.10.2
  LS Seq Number: 0x80000007
  Checksum: 0x4309
  Length: 36
  Network Mask: /24
      Attached Router: 192.10.10.2
      Attached Router: 20.20.20.1
      Attached Router: 20.20.20.5
FTOS#
```

Table 21-6.   show ip ospf *process-id* **database network Command Description**

Item	Description
LS Age	Displays the LSA age.
Options	Displays the optional capabilities available on router. The following options can be found in this item: • TOS-capability or No TOS-capability is displayed depending on whether the router can support Type of Service. • DC or No DC is displayed depending on whether the originating router can support OSPF over demand circuits. • E or No E is displayed on whether the originating router can accept AS External LSAs.
LS Type	Displays the LSA's type.
Link State ID	Displays the Link State ID.
Advertising Router	Identifies the router ID of the LSA's originating router.
Checksum	Identifies the link state sequence number. This number enables you to identify old or duplicate LSAs.
Length	Displays the Fletcher checksum of an LSA's complete contents.
Network Mask	Displays the length in bytes of the LSA.
Attached Router	Identifies the IP address of routers attached to the network.

Related Commands

show ip ospf database	Displays OSPF database information.

show ip ospf database nssa-external

Display NSSA-External (type 7) LSA information.

Syntax   **show ip ospf database nssa-external** [*link-state-id*] [**adv-router** *ip-address*]

Parameters

link-state-id	(OPTIONAL) Specify LSA ID in dotted decimal format. The LSA ID value depends on the LSA type, and it can be one of the following: • the network's IP address for Type 3 LSAs or Type 5 LSAs • the router's OSPF router ID for Type 1 LSAs or Type 4 LSAs • the default destination (0.0.0.0) for Type 5 LSAs
adv-router *ip-address*	(OPTIONAL) Enter the keywords **adv-router** ip-address to display only the LSA information about that router.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show ip ospf database	Displays OSPF database information.

show ip ospf database opaque-area

Display the opaque-area (type 10) LSA information.

Syntax   **show ip ospf** *process-id* **database opaque-area** [*link-state-id*] [**adv-router** *ip-address*]

Parameters

process-id	Enter the OSPF Process ID to show a specific process. If no Process ID is entered, command applies only to the first OSPF process.
link-state-id	(OPTIONAL) Specify LSA ID in dotted decimal format. The LSA ID value depends on the LSA type, and it can be one of the following: • the network's IP address for Type 3 LSAs or Type 5 LSAs • the router's OSPF router ID for Type 1 LSAs or Type 4 LSAs • the default destination (0.0.0.0) for Type 5 LSAs
adv-router *ip-address*	(OPTIONAL) Enter the keywords **adv-router** ip-address to display only the LSA information about that router.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 21-11. **show ip ospf** *process-id* **database opaque-area Command Example (Partial)**

```
FTOS>show ip ospf 1 database opaque-area

            OSPF Router with ID (3.3.3.3) (Process ID 1)

              Type-10 Opaque Link Area (Area 0)

  LS age: 1133
  Options: (No TOS-capability, No DC, E)
  LS type: Type-10 Opaque Link Area
  Link State ID: 1.0.0.1
  Advertising Router: 10.16.1.160
  LS Seq Number: 0x80000416
  Checksum: 0x376
  Length: 28
  Opaque Type: 1
  Opaque ID: 1
  Unable to display opaque data

  LS age: 833
  Options: (No TOS-capability, No DC, E)
  LS type: Type-10 Opaque Link Area
  Link State ID: 1.0.0.2
  Advertising Router: 10.16.1.160
  LS Seq Number: 0x80000002
  Checksum: 0x19c2
--More--
```

Table 21-7. **show ip ospf** *process-id* **database opaque-area Command Description**

Item	Description
LS Age	Displays the LSA's age.
Options	Displays the optional capabilities available on router. The following options can be found in this item: • TOS-capability or No TOS-capability is displayed depending on whether the router can support Type of Service. • DC or No DC is displayed depending on whether the originating router can support OSPF over demand circuits. • E or No E is displayed on whether the originating router can accept AS External LSAs.
LS Type	Displays the LSA's type.
Link State ID	Displays the Link State ID.
Advertising Router	Identifies the advertising router's ID.
Checksum	Displays the Fletcher checksum of the an LSA's complete contents.
Length	Displays the length in bytes of the LSA.
Opaque Type	Displays the Opaque type field (the first 8 bits of the Link State ID).
Opaque ID	Displays the Opaque type-specific ID (the remaining 24 bits of the Link State ID).

Related Commands

show ip ospf database	Displays OSPF database information.

show ip ospf database opaque-as

Display the opaque-as (type 11) LSA information.

Syntax   **show ip ospf** *process-id* **database opaque-as** [*link-state-id*] [**adv-router** *ip-address*]

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.
link-state-id	(OPTIONAL) Specify LSA ID in dotted decimal format. The LSA ID value depends on the LSA type, and it can be one of the following:
	• the network's IP address for Type 3 LSAs or Type 5 LSAs
	• the router's OSPF router ID for Type 1 LSAs or Type 4 LSAs
	• the default destination (0.0.0.0) for Type 5 LSAs
adv-router *ip-address*	(OPTIONAL) Enter the keywords **adv-router** ip-address to display only the LSA information about that router.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show ip ospf database	Displays OSPF database information.

show ip ospf database opaque-link

Display the opaque-link (type 9) LSA information.

Syntax   **show ip ospf** *process-id* **database opaque-link** [*link-state-id*] [**adv-router** *ip-address*]

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.
link-state-id	(OPTIONAL) Specify LSA ID in dotted decimal format. The LSA ID value depends on the LSA type, and it can be one of the following:
	• the network's IP address for Type 3 LSAs or Type 5 LSAs
	• the router's OSPF router ID for Type 1 LSAs or Type 4 LSAs
	• the default destination (0.0.0.0) for Type 5 LSAs
adv-router *ip-address*	(OPTIONAL) Enter the keyword **adv-router** followed by the IP address of an Advertising Router to display only the LSA information about that router.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show ip ospf database	Displays OSPF database information.

show ip ospf database router

Display the router (type 1) LSA information.

Syntax   **show ip ospf** *process-id* **database router** [*link-state-id*] [**adv-router** *ip-address*]

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.
link-state-id	(OPTIONAL) Specify LSA ID in dotted decimal format. The LSA ID value depends on the LSA type, and it can be one of the following:
	• the network's IP address for Type 3 LSAs or Type 5 LSAs
	• the router's OSPF router ID for Type 1 LSAs or Type 4 LSAs
	• the default destination (0.0.0.0) for Type 5 LSAs
adv-router *ip-address*	(OPTIONAL) Enter the keywords **adv-router** ip-address to display only the LSA information about that router.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 21-12.   show ip ospf** *process-id* **database router Command Example (Partial)**

```
FTOS#show ip ospf 100 database router

            OSPF Router with ID (1.1.1.10) (Process ID 100)

               Router (Area 0)

  LS age: 967
  Options: (No TOS-capability, No DC, E)
  LS type: Router
  Link State ID: 1.1.1.10
  Advertising Router: 1.1.1.10
  LS Seq Number: 0x8000012f
  Checksum: 0x3357
  Length: 144
  AS Boundary Router
  Area Border Router
   Number of Links: 10

    Link connected to: a Transit Network
     (Link ID) Designated Router address: 192.68.129.1
     (Link Data) Router Interface address: 192.68.129.1
     Number of TOS metric: 0
      TOS 0 Metric: 1

    Link connected to: a Transit Network
     (Link ID) Designated Router address: 192.68.130.1
     (Link Data) Router Interface address: 192.68.130.1
     Number of TOS metric: 0
      TOS 0 Metric: 1

    Link connected to: a Transit Network
     (Link ID) Designated Router address: 192.68.142.2
     (Link Data) Router Interface address: 192.68.142.2
     Number of TOS metric: 0
      TOS 0 Metric: 1

    Link connected to: a Transit Network
     (Link ID) Designated Router address: 192.68.141.2
     (Link Data) Router Interface address: 192.68.141.2
     Number of TOS metric: 0
      TOS 0 Metric: 1

    Link connected to: a Transit Network
     (Link ID) Designated Router address: 192.68.140.2
     (Link Data) Router Interface address: 192.68.140.2
     Number of TOS metric: 0
      TOS 0 Metric: 1

    Link connected to: a Stub Network
     (Link ID) Network/subnet number: 11.1.5.0
--More--
```

Table 21-8.   show ip ospf *process-id* **database router Command Description**

Item	Description
LS Age	Displays the LSA age.
Options	Displays the optional capabilities available on router. The following options can be found in this item: • TOS-capability or No TOS-capability is displayed depending on whether the router can support Type of Service. • DC or No DC is displayed depending on whether the originating router can support OSPF over demand circuits. • E or No E is displayed on whether the originating router can accept AS External LSAs.
LS Type	Displays the LSA type.
Link State ID	Displays the Link State ID.
Advertising Router	Identifies the router ID of the LSA's originating router.

Table 21-8.   show ip ospf *process-id* **database router Command Description**

Item	Description
LS Seq Number	Displays the link state sequence number. This number detects duplicate or old LSAs.
Checksum	Displays the Fletcher checksum of an LSA's complete contents.
Length	Displays the length in bytes of the LSA.
Number of Links	Displays the number of active links to the type of router (Area Border Router or AS Boundary Router) listed in the previous line.
Link connected to:	Identifies the type of network to which the router is connected.
(Link ID)	Identifies the link type and address.
(Link Data)	Identifies the router interface address.
Number of TOS Metric	Lists the number of TOS metrics.
TOS 0 Metric	Lists the number of TOS 0 metrics.

Related Commands

show ip ospf database	Displays OSPF database information.

show ip ospf database summary

Display the network summary (type 3) LSA routing information.

Syntax   **show ip ospf** *process-id* **database summary** [*link-state-id*] [**adv-router** *ip-address*]

Parameters

process-id	Enter the OSPF Process ID to show a specific process. If no Process ID is entered, command applies only to the first OSPF process.
link-state-id	(OPTIONAL) Specify LSA ID in dotted decimal format. The LSA ID value depends on the LSA type, and it can be one of the following: • the network's IP address for Type 3 LSAs or Type 5 LSAs • the router's OSPF router ID for Type 1 LSAs or Type 4 LSAs • the default destination (0.0.0.0) for Type 5 LSAs
adv-router *ip-address*	(OPTIONAL) Enter the keywords **adv-router** ip-address to display only the LSA information about that router.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 21-13.   show ip ospf** *process-id* **database summary Command Example**

```
FTOS#show ip ospf 100 database summary

            OSPF Router with ID (1.1.1.10) (Process ID 100)

                Summary Network (Area 0.0.0.0)

  LS age: 1551
  Options: (No TOS-capability, DC, E)
  LS type: Summary Network
  Link State ID: 192.68.16.0
  Advertising Router: 192.168.17.1
  LS Seq Number: 0x80000054
  Checksum: 0xb5a2
  Length: 28
  Network Mask: /24
      TOS: 0 Metric: 1

  LS age: 9
  Options: (No TOS-capability, No DC, E)
  LS type: Summary Network
  Link State ID: 192.68.32.0
  Advertising Router: 1.1.1.10
  LS Seq Number: 0x80000016
  Checksum: 0x987c
  Length: 28
  Network Mask: /24
      TOS: 0 Metric: 1

  LS age: 7
  Options: (No TOS-capability, No DC, E)
  LS type: Summary Network
  Link State ID: 192.68.33.0
  Advertising Router: 1.1.1.10
  LS Seq Number: 0x80000016
  Checksum: 0x1241
  Length: 28
  Network Mask: /26
      TOS: 0 Metric: 1

FTOS#
```

Table 21-9.   show ip ospf *process-id* **database summary Command Description**

Items	Description
LS Age	Displays the LSA age.
Options	Displays the optional capabilities available on router. The following options can be found in this item: • TOS-capability or No TOS-capability is displayed depending on whether the router can support Type of Service. • DC or No DC is displayed depending on whether the originating router can support OSPF over demand circuits. • E or No E is displayed on whether the originating router can accept AS External LSAs.
LS Type	Displays the LSA's type.
Link State ID	Displays the Link State ID.
Advertising Router	Identifies the router ID of the LSA's originating router.
LS Seq Number	Identifies the link state sequence number. This number enables you to identify old or duplicate LSAs.
Checksum	Displays the Fletcher checksum of an LSA's complete contents.
Length	Displays the length in bytes of the LSA.
Network Mask	Displays the network mask implemented on the area.

Table 21-9.   show ip ospf *process-id* **database summary Command Description**

Items	Description
TOS	Displays the TOS options. Option 0 is the only option.
Metric	Displays the LSA metrics.

Related Commands

show ip ospf database   Displays OSPF database information.

show ip ospf interface

Display the OSPF interfaces configured. If OSPF is not enabled on the switch, no output is generated.

Syntax   **show ip ospf** *process-id* **interface** [*interface*]

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.
interface	(OPTIONAL) Enter the following keywords and slot/port or number information:

- For the null interface, enter the keyword **null** followed by zero (0).
- For loopback interfaces, enter the keyword **loopback** followed by a number from 0 to 16383.
- For Port Channel groups, enter the keyword **port-channel** followed by a number:
  Range: 1-128
- For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information.
- For a VLAN, enter the keyword **vlan** followed by the VLAN ID. The range is from 1 to 4094.
- For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 21-14.   show ip ospf** *process-id* **interface Command Example**

```
FTOS>show ip ospf int

TenGigabitEthernet 13/17 is up, line protocol is up
  Internet Address 192.168.1.2/30, Area 0.0.0.1
  Process ID 1, Router ID 192.168.253.2, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 192.168.253.2, Interface address 192.168.1.2
  Backup Designated Router (ID) 192.168.253.1, Interface address 192.168.1.1
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:02
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 192.168.253.1 (Backup Designated Router)

TenGigabitEthernet 13/23 is up, line protocol is up
  Internet Address 192.168.0.1/24, Area 0.0.0.1
  Process ID 1, Router ID 192.168.253.2, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DROTHER, Priority 1
  Designated Router (ID) 192.168.253.5, Interface address 192.168.0.4
  Backup Designated Router (ID) 192.168.253.3, Interface address 192.168.0.2
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:08
  Neighbor Count is 3, Adjacent neighbor count is 2
    Adjacent with neighbor 192.168.253.5 (Designated Router)
    Adjacent with neighbor 192.168.253.3 (Backup Designated Router)

Loopback 0 is up, line protocol is up
  Internet Address 192.168.253.2/32, Area 0.0.0.1
  Process ID 1, Router ID 192.168.253.2, Network Type LOOPBACK, Cost: 1
Loopback interface is treated as a stub Host.
FTOS>
```

Table 21-10.   show ip ospf *process-id* **interface Command Description**

Line beginning with	Description
TenGigabitEthernet...	This line identifies the interface type slot/port and the status of the OSPF protocol on that interface.
Internet Address...	This line displays the IP address, network mask and area assigned to this interface.
Process ID...	This line displays the OSPF Process ID, Router ID, Network type and cost metric for this interface.
Transmit Delay...	This line displays the interface's settings for Transmit Delay, State, and Priority. In the State setting, BDR is Backup Designated Router.
Designated Router...	This line displays the ID of the Designated Router and its interface address.
Backup Designated...	This line displays the ID of the Backup Designated Router and its interface address.
Timer intervals...	This line displays the interface's timer settings for Hello interval, Dead interval, Transmit Delay (Wait), and Retransmit Interval.
Hello due...	This line displays the amount time till the next Hello packet is sent out this interface.
Neighbor Count...	This line displays the number of neighbors and adjacent neighbors. Listed below this line are the details about each adjacent neighbor.

show ip ospf neighbor

Display the OSPF neighbors connected to the local router.

Syntax **show ip ospf** *process-id* **neighbor**

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 21-15.   show ip ospf** *process-id* **neighbor Command Example**

```
FTOS#show ip ospf 34 neighbor

Neighbor ID    Pri    State        Dead Time  Address          Interface Area
20.20.20.7     1      FULL/DR      00:00:32   182.10.10.3       TenGig 0/0   0.0.0.2
192.10.10.2    1      FULL/DR      00:00:37   192.10.10.2       TenGig 0/1   0.0.0.1
20.20.20.1     1      FULL/DROTHER00:00:36   192.10.10.4       TenGig 0/1   0.0.0.1
FTOS#
```

Table 21-11.   show ip ospf *process-id* **neighbor Command Description**

Row Heading	Description
Neighbor ID	Displays the neighbor router ID.
Pri	Displays the priority assigned neighbor.
State	Displays the OSPF state of the neighbor.
Dead Time	Displays the expected time until FTOS declares the neighbor dead.
Address	Displays the IP address of the neighbor.
Interface	Displays the interface type slot/port information.
Area	Displays the neighbor's area (process ID).

show ip ospf routes

Display routes as calculated by OSPF and stored in OSPF RIB.

Syntax **show ip ospf** *process-id* **routes**

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.

Defaults none

Command Modes EXEC

EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

This command is useful in isolating routing problems between OSPF and RTM. For example, if a route is missing from the RTM/FIB but is visible from the display output of this command, then likely the problem is with downloading the route to the RTM.

This command has the following limitations:

- The display output is sorted by prefixes; intra-area ECMP routes are not displayed together.
- For Type 2 external routes, type1 cost is not displayed.

Example **Figure 21-16. show ip ospf** *process-id* **routes Command Example**

```
FTOS#show ip ospf 100 route

Prefix          Cost    Nexthop         Interface     Area      Type
1.1.1.1         1       0.0.0.0           Lo 0          0      Intra-Area
3.3.3.3         2       13.0.0.3        TenGig 0/47      1      Intra-Area
13.0.0.0        1       0.0.0.0         TenGig 0/47      0      Intra-Area
150.150.150.0   2       13.0.0.3         TenGig 0/47     -       External
172.30.1.0      2       13.0.0.3        TenGig 0/47      1      Intra-Area
FTOS#
```

show ip ospf statistics

Display OSPF statistics.

Syntax **show ip ospf** *process-id* **statistics global |** [**interface** *name* {**neighbor** *router-id*}]

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.
global	Enter the keyword **global** to display the packet counts received on all running OSPF interfaces and packet counts received and transmitted by all OSPF neighbors.
interface *name*	(OPTIONAL) Enter the keyword **interface** followed by one of the following interface keywords and slot/port or number information:
	• For Port Channel groups, enter the keyword **port-channel** followed by a number:
	Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information.
	• For a VLAN, enter the keyword **vlan** followed by a number from 1 to 4094.
	• For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.
neighbor *router-id*	(OPTIONAL) Enter the keyword **neighbor** followed by the neighbor's router-id in dotted decimal format (A.B.C.D.).

Defaults none

Command Modes EXEC

EXEC Privilege

Example **Figure 21-17. show ip ospf** *process-id* **statistics global Command Example**

```
FTOS#show ip ospf 10 statistics global

 OSPF Packet Count
        Total      Error      Hello      DDiscr     LSReq      LSUpd
LSAck
RX        34          0         26          2          1          3
2
TX        34          0         25          3          1          3
2

 OSPF Global Queue Length
                TxQ-Len      RxQ-Len     Tx-Mark     Rx-Mark
    Hello-Q        0            0           1           1
    LSR-Q          0            0           1           1
    Other-Q        0            0           2           2

 Error packets (Receive statistics)
Intf-Down          0   Non-Dr              0   Self-Org            0
Wrong-Len          0   Invld-Nbr           0   Nbr-State
0
Auth-Err           0   MD5-Err             0   Chksum              0
Version            0   AreaMis             0   Conf-Issues
0
No-Buffer          0   Seq-No              0   Socket              0
Q-OverFlow         0   Unknown-Pkt         0   RtidZero
0

 Error packets (Transmit statistics)
Socket Errors          0
FTOS#
```

Table 21-12. show ip ospf statistics *process-id* **global Command Descriptions**

Row Heading	Description
Total	Displays the total number of packets received/transmitted by the OSPF process
Error	Displays the error count while receiving and transmitting packets by the OSPF process
Hello	Number of OSPF Hello packets
DDiscr	Number of database description packets
LSReq	Number of link state request packets
LSUpd	Number of link state update packets
LSAck	Number of link state acknowledgement packets
TxQ-Len	The transmission queue length
RxQ-Len	The reception queue length
Tx-Mark	The highest number mark in the transmission queue
Rx-Mark	The highest number mark in the reception queue
Hello-Q	The queue, for transmission or reception, for the hello packets
LSR-Q	The queue, for transmission or reception, for the link state request packets.
Other-Q	The queue, for transmission or reception, for the link state acknowledgement, database description, and update packets.

Table 21-13.   show ip ospf statistics *process-id* **global Error Descriptions**

Error Type	Description
Intf_Down	Received packets on an interface that is either down or OSPF is not enabled.
Non-Dr	Received packets with a destination address of ALL_DRS even though SELF is not a designated router
Self-Org	Receive the self originated packet
Wrong_Len	The received packet length is different to what was indicated in the OSPF header
Invld-Nbr	LSA, LSR, LSU, and DDB are received from a peer which is not a neighbor peer
Nbr-State	LSA, LSR, and LSU are received from a neighbor with stats less than the loading state
Auth-Error	Simple authentication error
MD5-Error	MD5 error
Cksum-Err	Checksum Error
Version	Version mismatch
AreaMismatch	Area mismatch
Conf-Issue	The received hello packet has a different hello or dead interval than the configuration
No-Buffer	Buffer allocation failure
Seq-no	A sequence no errors occurred during the database exchange process
Socket	Socket Read/Write operation error
Q-overflow	Packet(s) dropped due to queue overflow
Unknown-Pkt	Received packet is not an OSPF packet
RtidZero	Router-id received from the peer is 0.0.0.0.

The **show ip ospf** *process-id* **statistics** command displays the error packet count received on each interface as:

* The hello-timer remaining value for each interface
* The wait-timer remaining value for each interface
* The grace-timer remaining value for each interface
* The packet count received and transmitted for each neighbor
* Dead timer remaining value for each neighbor
* Transmit timer remaining value for each neighbor
* The LSU Q length and its highest mark for each neighbor
* The LSR Q length and its highest mark for each neighbor

Figure 21-18.   show ip ospf *process-id* **statistics Command Example**

```
FTOS#show ip ospf 10 statistics
Interface TenGigabitEthernet 4/45
  Error packets (Receive statistics)
        Intf-Down       0   Non-Dr            0   Self-Org        0
        Wrong-Len       0   Invld-Nbr         0   Nbr-State       0
        Auth-Error      0   MD5-Error         0   Cksum-Err       0
        Version         0   AreaMisMatch      0   Conf-Issue      0
        SeqNo-Err       0   Unknown-Pkt       0   Bad-LsReq       0
        RtidZero        0
  Neighbor ID 3.1.1.2
    Packet Statistics
              Hello     DDiscr     LSReq     LSUpd     LSAck
        RX       47         2         1         3         2
        TX       46         3         1         3         2
    Timers
        Hello    1  Wait         0  Grace     0
        Dead    37  Transmit     0
    Queue Statistics
        LSU-Q-Len          0  LSU-Q-Wmark            1
        LSR-Q-Len          0  LSR-Q-Wmark            1

FTOS#
```

Related Commands

clear ip ospf statistics	Clears the packet statistics in all interfaces and neighbors

show ip ospf timers rate-limit

Show the LSA currently in the queue waiting for timers to expire.

Syntax   **show ip ospf** *process-id* **timers rate-limit**

Parameters

process-id	Enter the OSPF Process ID to show a specific process.
	If no Process ID is entered, command applies only to the first OSPF process.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 21-19.   show ip ospf** *process-id* **timers rate-limit Command Example**

```
FTOS#show ip ospf 10 timers rate-limit

List of LSAs in rate limit Queue
LSA id: 1.1.1.0 Type: 3 Adv Rtid: 3.3.3.3 Expiry time: 00:00:09.111
LSA id: 3.3.3.3 Type: 1 Adv Rtid: 3.3.3.3 Expiry time: 00:00:23.96
FTOS#
```

show ip ospf topology

Display routers in directly connected areas.

Syntax	**show ip ospf** *process-id* **topology**

Parameters		
	process-id	Enter the OSPF Process ID to show a specific process.
		If no Process ID is entered, command applies only to the first OSPF process.

Defaults	none

Command Modes	EXEC
	EXEC Privilege

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

This command can be used to isolate problems with inter-area and external routes. In OSPF inter-area and external routes are calculated by adding LSA cost to the cost of reaching the router. If an inter-area or external route is not of correct cost, the display can determine if the path to the originating router is correct or not.

Example   **Figure 21-20.   show ip ospf** *process-id* **topology Command Example**

```
FTOS#show ip ospf 1 topology

Router ID        Flags    Cost   Nexthop        Interface     Area
3.3.3.3          E/B/-/   1      20.0.0.3       TenGig 13/1      0
1.1.1.1          E/-/-/   1      10.0.0.1       TenGig 7/1        1
FTOS#
```

summary-address

Set the OSPF ASBR to advertise one external route.

Syntax	**summary-address** *ip-address mask* [**not-advertise**] [**tag** *tag-value*]

To disable summary address, use the **no summary-address** *ip-address mask* command.

Parameters		
	ip-address	Specify the IP address in dotted decimal format of the address to be summarized.
	mask	Specify the mask in dotted decimal format of the address to be summarized.
	not-advertise	(OPTIONAL) Enter the keyword **not-advertise** to suppress that match the network prefix/mask pair.
	tag *tag-value*	(OPTIONAL) Enter the keyword **tag** followed by a value to match on routes redistributed through a route map.
		Range: 0 to 4294967295

Defaults	Not configured.

Command Modes	ROUTER OSPF

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The command area range summarizes routes for the different areas.

With "not-advertise" parameter configured, this command can be used to filter out some external routes. For example, you want to redistribute static routes to OSPF, but you don't want OSPF to advertise routes with prefix 1.1.0.0. Then you can configure `summary-address 1.1.0.0 255.255.0.0 not-advertise` to filter out all the routes fall in range 1.1.0.0/16.

Related Commands

area range	Summarizes routes within an area.

timers spf

Set the time interval between when the switch receives a topology change and starts a shortest path first (SPF) calculation.

Syntax

timers spf *delay holdtime*

To return to the default, use the **no timers spf** command.

Parameters

delay	Enter a number as the delay.
	Range: 0 to 4294967295.
	Default: 5 seconds
holdtime	Enter a number as the hold time.
	Range: 0 to 4294967295.
	Default: 10 seconds.

Defaults   *delay* = 5 seconds; *holdtime* = 10 seconds

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

Setting the *delay* and *holdtime* parameters to a low number enables the switch to switch to an alternate path quickly but requires more CPU usage.

timers throttle lsa all

Configure LSA transmit intervals.

Syntax

timers throttle lsa all {start-interval | hold-interval | max-interval}

To return to the default, use the **no timers throttle lsa** command.

Parameters	**start-interval**	Set the minimum interval between initial sending and resending the same LSA.
		Range: 0-600,000 milliseconds
	hold-interval	Set the next interval to send the same LSA. This is the time between sending the same LSA after the start-interval has been attempted.
		Range: 1-600,000 milliseconds
	max-interval	Set the maximum amount of time the system waits before sending the LSA.
		Range: 1-600,000 milliseconds

Defaults   start-interval : 0 msec
hold-interval : 5000 msec
max-interval: 5000 msec

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   LSAs are sent after the start-interval and then after hold-interval until the maximum interval is reached. In throttling, exponential backoff is used when sending same LSA, so that the interval is multiplied until the maximum time is reached. For example, if the **start-interval** *5000* and **hold-interval** *1000* and **max-interval** *100,000*, the LSA is sent at 5000 msec, then 1000 msec, then 2000 msec, them 4000 until 100,000 msec is reached.

timers throttle lsa arrival

Configure the LSA acceptance intervals.

Syntax   **timers throttle lsa arrival** *arrival-time*

To return to the default, use the **no timers throttle lsa** command.

Parameters

arrival-time	Set the interval between receiving the same LSA repeatedly, to allow sufficient time for the system to accept the LSA.
	Range: 0-600,000 milliseconds

Defaults   1000 msec

Command Modes   ROUTER OSPF

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Port Monitoring

Overview

The port monitoring feature allows you to monitor network traffic by forwarding a copy of each incoming or outgoing packet from one port to another port.

Commands

- description
- monitor session
- show config
- show monitor session
- show running-config monitor session
- source (port monitoring)

Important Points to Remember

- Port monitoring is supported on physical ports only. Logical interfaces, such as Port Channels and virtual local are networks (VLANs), are not supported.
- The Dell Force10 operating software (FTOS) supports as many monitor sessions on a system as the number of port-pipes.
- The monitoring (destination, "MG") and monitored (source, "MD") ports must be on the same switch.
- A monitoring port can monitor any physical port in the chassis.
- Only one MG and one MD may be in a single port-pipe.
- A monitoring port can monitor more than one port.
- More than one monitored port can have the same destination monitoring port.
- FTOS supports multiple source ports to be monitored by a single destination port in one monitor session.
- One monitor session can have only one MG port.

> **Note:** The monitoring port should not be a part of any other configuration.

description

Enter a description of this monitoring session.

Syntax   description {*description*}

To remove the description, use the no description {*description*} command.

Parameters

description	Enter a description regarding this session(80 characters maximum).

Defaults   none

Command Modes   MONITOR SESSION (conf-mon-sess-*session-ID*)

Command History

Version 8.3.16.1	Introduced on M I/O Aggregator

Related Commands

monitor session	Enables a monitoring session.

monitor session

Create a session for monitoring traffic with port monitoring.

Syntax   monitor session *session-ID*

To delete a session, use the no monitor session *session-ID* command.

To delete all monitor sessions, use the no monitor session all command.

Parameters

session-ID	Enter a session identification number. Range: 0 to 65535

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on M I/O Aggregator

Example   **Figure 22-1.   monitor session Command Example**

```
FTOS(conf)# monitor session 60
FTOS(conf-mon-sess-60)
```

Usage Information   The monitor command is saved in the running configuration at the Monitor Session mode level and can be restored after a chassis reload.

Related Commands

show monitor session	Displays the monitor session
show running-config monitor session	Displays the running configuration of a monitor session

show config

Display the current monitor session configuration.

Syntax   show config

Defaults   none

Command Modes   MONITOR SESSION (conf-mon-sess-*session-ID*)

Command History

Version 8.3.16.1	Introduced on M I/O Aggregator

Example   **Figure 22-2.   show config Command Example**

```
FTOS(conf-mon-sess-11)#show config
!
monitor session 11
 source TenGigabitEthernet 10/0 destination TenGigabitEthernet 10/47 direction
rx
```

show monitor session

Display the monitor information of a particular session or all sessions.

Syntax   show monitor session {*session-ID*}

To display monitoring information for all sessions, use the show monitor session command.

Parameters

session-ID	(OPTIONAL) Enter a session identification number.
	Range: 0 to 65535

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on M I/O Aggregator

Example   **Figure 22-3.   show monitor session Command Example**

```
FTOS#show monitor session 11

SessionID   Source    Destination    Direction   Mode
---------   ------    -------------  ---------   -------
   11       TenGig 10/0  TenGig 10/47        rx          interface
```

Related Commands

monitor session	Creates a session for monitoring.

show running-config monitor session

Display the running configuration of all monitor sessions or a specific session.

Syntax   show running-config monitor session {*session-ID*}

To display the running configuration for all monitor sessions, use just the show running-config monitor session command.

Parameters

session-ID	(OPTIONAL) Enter a session identification number.
	Range: 0 to 65535

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on M I/O Aggregator

Example   **Figure 22-4.   show running-config monitor session Command Example**

```
FTOS#show running-config monitor session
!
monitor session 8
 source TenGigabitEthernet 10/46 destination TenGigabitEthernet 10/1 direction rx
!
monitor session 11
 source TenGigabitEthernet 10/0 destination TenGigabitEthernet 10/47 direction rx

FTOS#show running-config monitor session 11
!
monitor session 11
 source TenGigabitEthernet 10/0 destination TenGigabitEthernet 10/47 direction rx
```

Usage Information   The monitoring command is saved in the running configuration at the Monitor Session mode level and can be restored after a chassis reload.

Related Commands

monitor session	Creates a session for monitoring.
show monitor session	Displays a monitor session.

source (port monitoring)

Configure a port monitor source.

Syntax   source *interface* destination *interface* direction {rx | tx | both}

To disable a monitor source, use the no source *interface* destination *interface* direction {rx | tx | both} command.

Parameters

interface	Enter the one of the following keywords and slot/port information:
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
destination	Enter the keyword destination to indicate the interface destination.
direction {rx	tx	both}	Enter the keyword direction followed by one of the packet directional indicators.
	rx: to monitor receiving packets only
	tx: to monitor transmitting packets only
	both: to monitor both transmitting and receiving packets

Defaults   none

Command Modes   MONITOR SESSION (conf-mon-sess-*session-ID*)

Command History

Version 8.3.16.1	Introduced on M I/O Aggregator

Example   **Figure 22-5.   Configuring a Port Monitor Source Command Example**

```
FTOS(conf-mon-sess-11)#source tengig 10/0 destination tengig 10/47 direction
rx
FTOS(conf-mon-sess-11)#
```

23

Private VLAN (PVLAN)

Commands

This chapter describes the following commands:

- ip local-proxy-arp
- private-vlan mode
- private-vlan mapping secondary-vlan
- show interfaces private-vlan
- show vlan private-vlan
- show vlan private-vlan mapping
- switchport mode private-vlan

For more information, also refer to the following commands. The command output is augmented in FTOS 7.8.1.0 to provide PVLAN data:

- show arp in Chapter 15, IPv4 Routing
- show vlan in Chapter 18, Layer 2

Private virtual local area networks (VLANs) extend the Dell Force10 operating software (FTOS) security suite by providing Layer 2 isolation between ports within the same private VLAN. A private VLAN partitions a traditional VLAN into subdomains identified by a *primary* and *secondary VLAN* pair.

The FTOS private VLAN implementation is based on RFC 3069.

Private VLAN Concepts

Primary VLAN:

The *primary VLAN* is the base VLAN and can have multiple secondary VLANs. There are two types of secondary VLAN — *community VLAN* and *isolated VLAN*:

- A primary VLAN can have any number of community VLANs and isolated VLANs.
- Private VLANs block all traffic to isolated ports except traffic from promiscuous ports. Traffic received from an isolated port is forwarded only to promiscuous ports or trunk ports.

Community VLAN:

A community VLAN is a secondary VLAN of the primary VLAN:

- Ports in a community VLAN can talk to each other. Also, all ports in a community VLAN can talk to all *promiscuous ports* in the primary VLAN and vice-versa.
- Devices on a community VLAN can communicate with each other via member ports, while devices in an isolated VLAN cannot.

Isolated VLAN:

An isolated VLAN is a secondary VLAN of the primary VLAN:

- Ports in an isolated VLAN cannot talk to each other. Servers would be mostly connected to isolated VLAN ports.
- Isolated ports can talk to promiscuous ports in the primary VLAN, and vice-versa.

Port types:

- **Community port:** A *community port* is, by definition, a port that belongs to a community VLAN and is allowed to communicate with other ports in the same community VLAN and with promiscuous ports.
- **Isolated port:** An *isolated port* is, by definition, a port that, in Layer 2, can only communicate with promiscuous ports that are in the same PVLAN.
- **Promiscuous port:** A *promiscuous port* is, by definition, a port that is allowed to communicate with any other port type.
- **Trunk port**: A *trunk port*, by definition, carries VLAN traffic across switches:
- A trunk port in a PVLAN is always tagged.
- Primary or secondary VLAN traffic is carried by the trunk port in tagged mode. The tag on the packet helps identify the VLAN to which the packet belongs.
- A trunk port can also belong to a regular VLAN (non-private VLAN).

ip local-proxy-arp

Enable/disable Layer 3 communication between secondary VLANs in a private VLAN.

Syntax   [no] ip local-proxy-arp

To disable Layer 3 communication between secondary VLANs in a private VLAN, use the no ip local-proxy-arp command in INTERFACE VLAN mode for the primary VLAN.

To disable Layer 3 communication in a particular secondary VLAN, use the no ip local-proxy-arp command in INTERFACE VLAN mode for the selected secondary VLAN.

> **Note:** Even after ip-local-proxy-arp is disabled (no ip-local-proxy-arp) in a secondary VLAN, Layer 3 communication may happen between some secondary VLAN hosts, until the ARP timeout happens on those secondary VLAN hosts.

Defaults   Layer 3 communication is disabled between secondary VLANs in a private VLAN.

Command Modes   INTERFACE VLAN

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

private-vlan mode	Sets the mode of the selected VLAN to community, isolated, or primary.
private-vlan mapping secondary-vlan	Maps the secondary VLANs to the selected primary VLAN.
show arp	Displays the ARP table.
show interfaces private-vlan	Displays the type and status of the PVLAN interfaces.
show vlan private-vlan	Displays PVLANs and/or interfaces that are part of a PVLAN.
switchport mode private-vlan	Sets PVLAN mode of the selected port.

private-vlan mode

Set PVLAN mode of the selected VLAN to community, isolated, or primary.

Syntax   **[no] private-vlan mode {community | isolated | primary}**

To remove the PVLAN configuration, use the no private-vlan mode {community | isolated | primary} command.

Parameters

community	Enter community to set the VLAN as a community VLAN, as described above.
isolated	Enter isolated to configure the VLAN as an isolated VLAN, as described above.
primary	Enter primary to configure the VLAN as a primary VLAN, as described above.

Defaults   none

Command Modes   INTERFACE VLAN

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The VLAN:

- Can be in only one mode, either community, isolated, or primary.
- Mode can be set to community or isolated even before associating it to a primary VLAN. This secondary VLAN will continue to work normally as a normal VLAN even though it is not associated to a primary VLAN. (A syslog message indicates this.)
- Must not have a port in it when the VLAN mode is being set.

Only ports (and port channels) configured as promiscuous, host, or PVLAN trunk ports (as described above) can be added to the PVLAN. No other regular ports can be added to the PVLAN.

After using this command to configure a VLAN as a primary VLAN, use the private-vlan mapping secondary-vlan command to map secondary VLANs to this VLAN.

Related Commands		
private-vlan mapping secondary-vlan	Sets the mode of the selected VLAN to primary and then associate secondary VLANs to it.	
show interfaces private-vlan	Displays the type and status of PVLAN interfaces.	
show vlan private-vlan	Displays the PVLANs and/or interfaces that are part of a PVLAN.	
show vlan private-vlan mapping	Displays the primary-secondary VLAN mapping.	
switchport mode private-vlan	Sets the PVLAN mode of the selected port.	

private-vlan mapping secondary-vlan

Map secondary VLANs to the selected primary VLAN.

Syntax   [no] private-vlan mapping secondary-vlan *vlan-list*

To remove specific secondary VLANs from the configuration, use the no private-vlan mapping secondary-vlan *vlan-list* command.

Parameters

vlan-list	Enter the list of secondary VLANs to associate with the selected primary VLAN, as described above. The list can be in comma-delimited or hyphenated-range format, following the convention for range input.

Defaults   none

Command Modes   INTERFACE VLAN

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The list of secondary VLANs can be:

- Specified in comma-delimited or hyphenated-range format.
- Specified with this command even before they have been created.
- Amended by specifying the new secondary VLAN to be added to the list.

Related Commands		
private-vlan mode	Sets the mode of the selected VLAN to community, isolated, or primary.	
show interfaces private-vlan	Displays the type and status of PVLAN interfaces.	
show vlan private-vlan	Displays the PVLANs and/or interfaces that are part of a PVLAN.	
show vlan private-vlan mapping	Displays the primary-secondary VLAN mapping.	
switchport mode private-vlan	Sets the PVLAN mode of the selected port.	

show interfaces private-vlan

Display type and status of PVLAN interfaces.

Syntax   show interfaces private-vlan [interface *interface*]

Parameters

interface *interface*	(OPTIONAL) Enter the keyword interface, followed by the ID of the specific interface for which to display PVLAN status.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   This command has two types of display — a list of all PVLAN interfaces or for a specific interface. Examples of both types of output are shown below.

Examples   **Figure 23-1.   show interfaces private-vlan Command Example**

```
FTOS# show interfaces private-vlan
Interface Vlan PVLAN-Type Interface Type Status
--------- ---- ---------- -------------- --------
TenGig 2/1   10    Primary    Promiscuous    Up
TenGig 2/2   100   Isolated   Host           Down
TenGig 2/3   10    Primary    Trunk          Up
TenGig 2/4   101   Community  Host           Up
```

Figure 23-2.   show interfaces private-vlan (Specific) Command Example

```
FTOS# show interfaces private-vlan TenGig 2/2
Interface Vlan PVLAN-Type Interface Type Status
--------- ---- ---------- -------------- --------
TenGig 2/2   100   Isolated   Host        Up
```

Table 23-1 defines the fields in the output, above.

Table 23-1.   show interfaces Command Description

Field	Description
Interface	Displays type of interface and associated slot and port number
Vlan	Displays the VLAN ID of the designated interface
PVLAN-Type	Displays the type of VLAN in which the designated interface resides
Interface Type	Displays the PVLAN port type of the designated interface.
Status	States whether the interface is operationally up or down.

Related Commands

private-vlan mode	Sets the mode of the selected VLAN to community, isolated, or primary.
show vlan private-vlan	Displays the PVLANs and/or interfaces that are part of a PVLAN.

show vlan private-vlan mapping	Displays the primary-secondary VLAN mapping.
switchport mode private-vlan	Sets the PVLAN mode of the selected port.

show vlan private-vlan

Display PVLANs and/or interfaces that are part of a PVLAN.

Syntax

show vlan private-vlan [community | *interface* | isolated | primary | *primary_vlan* | interface *interface*]

Parameters

community	(OPTIONAL) Enter the keyword community to display VLANs configured as community VLANs, along with their interfaces.
interface	(OPTIONAL) Enter the keyword community to display VLANs configured as community VLANs, along with their interfaces.
isolated	(OPTIONAL) Enter the keyword isolated to display VLANs configured as isolated VLANs, along with their interfaces.
primary	(OPTIONAL) Enter the keyword primary to display VLANs configured as primary VLANs, along with their interfaces.
primary_vlan	(OPTIONAL) Enter a private VLAN ID or secondary VLAN ID to display interface details about the designated PVLAN.
interface *interface*	(OPTIONAL) Enter the keyword interface and an interface ID to display the PVLAN configuration of the designated interface.

Defaults

Command Modes

EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

Examples of all types of command output are shown below. The first type of output is the result of not entering an optional keyword. It displays a detailed list of all PVLANs and their member VLANs and interfaces. The other types of output show details about PVLAN subsets.

Examples

Figure 23-3.   show vlan private-vlan Command Example

```
FTOS# show vlan private-vlan
Primary Secondary Type      Active Ports
------- --------- --------- ------ ------------------------
10                primary   Yes    TenGig 2/1,3
        100       isolated  Yes    TenGig 2/2
        101       community Yes    TenGig 2/10
20                primary   Yes    Po 10, 12-13
                                   TenGig 3/1
        200       isolated  Yes    TenGig 3/2,4-6
        201       community No
        202       community Yes    TenGig 3/11-12
```

Figure 23-4.   show vlan private-vlan Command Example (Primary)

```
FTOS# show vlan private-vlan primary
Primary Secondary Type      Active Ports
------- --------- --------- ------ ------------------------
10                primary   Yes    TenGig 2/1,3
20                primary   Yes    TenGig 3/1,3
```

Figure 23-5.   show vlan private-vlan Command Example (Isolated)

```
FTOS# show vlan private-vlan isolated
Primary Secondary Type      Active Ports
------- --------- --------- ------ ------------------------
10                primary   Yes    TenGig 2/1,3
        100       isolated  Yes    TenGig 2/2,4-6
        200       isolated  Yes    TenGig 3/2,4-6
```

Figure 23-6.   show vlan private-vlan Command Example (Community)

```
FTOS# show vlan private-vlan community
Primary Secondary Type      Active Ports
------- --------- --------- ------ ------------------------
10                primary   Yes    TenGig 2/1,3
        101       community Yes    TenGig 2/7-10
20                primary   Yes    Po 10, 12-13
                                   TenGig 3/1
        201       community No
        202       community Yes    TenGig 3/11-12
```

Figure 23-7.   show vlan private-vlan Command Example (Interface)

```
FTOS# show vlan private-vlan interface TenGig 2/1
Primary Secondary Type      Active Ports
------- --------- --------- ------ ------------------------
10                primary   Yes    TenGig 2/1
```

If the VLAN ID is that of a primary VLAN, then the entire private VLAN output will be displayed, as shown in Figure 23-8. If the VLAN ID is a secondary VLAN, only its primary VLAN and its particular secondary VLAN properties will be displayed, as shown in Figure 23-9.

Figure 23-8.   Output of show vlan private-vlan (primary)

```
FTOS# show vlan private-vlan 10
Primary Secondary Type      Active Ports
------- --------- --------- ------ ------------------------
10                primary   Yes    TenGig 2/1,3
        102       isolated  Yes    TenGig 0/4
        101       community Yes    TenGig 2/7-10
```

Figure 23-9.   Output of show vlan private-vlan (secondary)

```
FTOS#show vlan private-vlan 102

 Primary Secondary Type      Active Ports
 ------- --------- --------- ------ -----------------------------------------
 10                Primary   Yes    Po 1
                                    TenGig 0/2
         102       Isolated  Yes    TenGig 0/4
```

Table 23-2 defines the fields in the output.

Table 23-2.   show interfaces Command Description

Field	Description
Primary	Displays the VLAN ID of the designated or associated primary VLAN(s)
Secondary	Displays the VLAN ID of the designated or associated secondary VLAN(s
Type	Displays the type of VLAN in which the listed interfaces reside
Active	States whether the interface is operationally up or down
Ports	Displays the interface IDs in the listed VLAN.

Related Commands

private-vlan mode	Sets the mode of the selected VLAN to either community or isolated.
show interfaces private-vlan	Displays the type and status of PVLAN interfaces.
show vlan private-vlan mapping	Displays the primary-secondary VLAN mapping.
switchport mode private-vlan	Sets the PVLAN mode of the selected port.

show vlan private-vlan mapping

Display primary-secondary VLAN mapping.

Syntax   show vlan private-vlan mapping

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The output of this command (Figure 23-10), displays the community and isolated VLAN IDs that are associated with each primary VLAN.

Figure 23-10.   show vlan private-vlan mapping Command Output

```
FTOS# show vlan private-vlan mapping
Private Vlan:
 Primary   : 100
 Isolated  : 102
 Community : 101
 Unknown   : 200
```

Related Commands

private-vlan mode	Sets the mode of the selected VLAN to either community or isolated.
show interfaces private-vlan	Displays the type and status of PVLAN interfaces.
show vlan private-vlan mapping	Displays the primary-secondary VLAN mapping.
switchport mode private-vlan	Sets PVLAN mode of the selected port.

switchport mode private-vlan

Set PVLAN mode of the selected port.

Syntax
[no] switchport mode private-vlan {host | promiscuous | trunk}

To remove the PVLAN mode from the selected port, use the no switchport mode private-vlan command.

Parameters

host	Enter host to configure the selected port or port channel as an isolated interface in a PVLAN, as described above.
promiscuous	Enter promiscuous to configure the selected port or port channel as an promiscuous interface, as described above.
trunk	Enter trunk to configure the selected port or port channel as a trunk port in a PVLAN, as described above.

Defaults   disabled

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information
The assignment of the various PVLAN port types to port and port channel (LAG) interfaces is demonstrated below.

Example   **Figure 23-11.   switchport mode private-vlan Command Example**

```
FTOS#conf
FTOS(conf)#interface TenGigabitEthernet 2/1
FTOS(conf-if-te-2/1)#switchport mode private-vlan promiscuous

FTOS(conf)#interface TenGigabitEthernet 2/2
FTOS(conf-if-te-2/2)#switchport mode private-vlan host

FTOS(conf)#interface TenGigabitEthernet 2/3
FTOS(conf-if-te-2/3)#switchport mode private-vlan trunk

FTOS(conf)#interface port-channel 10
FTOS(conf-if-te-2/3)#switchport mode private-vlan promiscuous
```

Related Commands

private-vlan mode	Sets the mode of the selected VLAN to either community or isolated.
private-vlan mapping secondary-vlan	Sets the mode of the selected VLAN to primary and then associate secondary VLANs to it.
show interfaces private-vlan	Displays the type and status of PVLAN interfaces.
show vlan private-vlan mapping	Display the primary-secondary VLAN mapping.

Per-VLAN Spanning Tree Plus (PVST+)

Overview

The FTOS implementation of PVST+ (Per-VLAN Spanning Tree plus) is based on the IEEE 802.1d standard Spanning Tree Protocol, but it creates a separate spanning tree for each VLAN configured.

Commands

The FTOS PVST+ commands are:

- disable
- description
- edge-port bpdufilter default
- protocol spanning-tree pvst
- show spanning-tree pvst
- spanning-tree pvst
- spanning-tree pvst err-disable
- tc-flush-standard
- vlan bridge-priority
- vlan forward-delay
- vlan hello-time
- vlan max-age

> **Note:** For easier command line entry, the plus (+) sign is not used at the command line.

disable

Disable PVST+ globally.

Syntax	disable

To enable PVST+, enter no disable.

Defaults	PVST+ is disabled
Command Modes	CONFIGURATION (conf-pvst)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	protocol spanning-tree pvst	Enter PVST+ mode.

description

Enter a description of the PVST+

Syntax   description {*description*}

To remove the description, use the no description {*description*} command.

Parameters

description	Enter a description to identify the Spanning Tree (80 characters maximum).

Defaults   No default behavior or values

Command Modes   SPANNING TREE PVST+ (The prompt is "config-pvst")

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

protocol spanning-tree pvst	Enter SPANNING TREE mode on the switch.

edge-port bpdufilter default

Enable BPDU Filter globally to filter transmission of BPDU on port fast enabled interfaces.

Syntax   edge-port bpdufilter default

To disable global bpdu filter default, use the no edge-port bpdufilter default command.

Defaults   Disabled

Command Modes   CONFIGURATION (The prompt is "config-pvst".)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

extend system-id

Use Extend System ID to augment the Bridge ID with a VLAN ID so that PVST+ differentiate between BPDUs for each VLAN. If for some reason a VLAN receives a BPDU meant for another VLAN, PVST+ will then not detect a loop, and both ports can remain in forwarding state.

Syntax   extend system-id

Defaults   Disabled

Command Modes   PROTOCOL PVST

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 24-1.   Command Example**

```
FTOS(conf-pvst)#do show spanning-tree  pvst vlan 2 brief
VLAN 2
Executing IEEE compatible Spanning Tree Protocol
Root ID    Priority 32768, Address 001e.c9f1.00f3
Root Bridge hello time 2, max age 20, forward delay 15
Bridge ID    Priority 32768, Address 001e.c9f1.00f3
We are the root of Vlan 2
Configured hello time 2, max age 20, forward delay 15
Bpdu filter disabled globally

Interface                                          Designated
Name      PortID   Prio Cost   Sts        Cost      Bridge ID
PortID
---------- -------- ---- ------  ----------- -------
--------------------- --------
Po 23      128.24   128  1600    FWD         0        32768
001e.c9f1.00f3  128.24
Te 5/41    128.450  128  2000    DIS         0        32768
001e.c9f1.00f3  128.450
Te 5/50    128.459  128  2000    FWD         0        32768
001e.c9f1.00f3  128.459

Interface
Name      Role   PortID   Prio Cost   Sts        Cost   Link-type
Edge BpduFilter
---------- ------ -------- ---- ------- ----------- ------- ---------
---- ----------
Po 23     Desg   128.24   128  1600    FWD         0      P2P      No
No
Te 5/41   Dis    128.450  128  2000    DIS         0      P2P      No
No
Te 5/50   Desg   128.459  128  2000    FWD         0      P2P      No
No
```

Related Commands

protocol spanning-tree pvst	Enter SPANNING TREE mode on the switch.

protocol spanning-tree pvst

Enter the PVST+ mode to enable PVST+ on a device.

Syntax   protocol spanning-tree pvst

To disable PVST+, use the disable command.

Defaults   This command has no default value or behavior.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 24-2.   Configuring with protocol spanning-tree pvst Command**

```
FTOS#conf
FTOS(conf)#protocol spanning-tree pvst
FTOS(conf-pvst)#no disable
FTOS(conf-pvst)#vlan 2 bridge-priority 4096
FTOS(conf-pvst)#vlan 3 bridge-priority 16384
FTOS(conf-pvst)#
FTOS(conf-pvst)#show config
!
protocol spanning-tree pvst
 no disable
 vlan 2 bridge-priority 4096
 vlan 3 bridge-priority 16384
FTOS#
```

Usage Information   Once PVST+ is enabled, the device runs an STP instance for each VLAN it supports.

Related Commands

disable	Disable PVST+.
show spanning-tree pvst	Display the PVST+ configuration.

show spanning-tree pvst

View the Per-VLAN Spanning Tree configuration.

Syntax   show spanning-tree pvst [vlan *vlan-id*] [brief] [guard]

Parameters

vlan *vlan-id*	(OPTIONAL) Enter the keyword **vlan** followed by the VLAN ID. Range: 1 to 4094
brief	(OPTIONAL) Enter the keyword **brief** to view a synopsis of the PVST+ configuration information.

Interface	(OPTIONAL) Enter one of the interface keywords along with the slot/port information:
	• For a Port Channel interface, enter the keyword **port-channel** followed by a number:
	Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.
guard	(OPTIONAL) Enter the keyword **guard** to display the type of guard enabled on a PVST interface and the current port state.

Defaults   No default behavior or values

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1   **Figure 24-3.   show spanning-tree pvst brief Command**

```
FTOS# show spanning-tree pvst vlan 2 brief
VLAN 2
Executing IEEE compatible Spanning Tree Protocol
Root ID Priority 32768, Address 001e.c9f1.00f3
Root Bridge hello time 2, max age 20, forward delay 15
Bridge ID Priority 32768, Address 001e.c9f1.00f3
We are the root of Vlan 2
Configured hello time 2, max age 20, forward delay 15
Bpdu filter disabled globally

Interface                                   Designated
Name        PortID   Prio  Cost    Sts Cost  Bridge ID           PortID
---------- -------- ---- ------- --- ------- ------------------- --------
Po 23       128.24   128   1600    FWD  0       32768 001e.c9f1.00f3  128.24
Te 5/41     128.450  128   2000    DIS  0       32768 001e.c9f1.00f3  128.450
Te 5/50     128.459  128   2000    FWD  0       32768 001e.c9f1.00f3  128.459

Interface                                                     Bpdu
Name        Role    PortID   Prio  Cost    Sts  Cost  Link-type Edge Filter
---------- ------ -------- ---- ------- --- ------- --------- ---- ------
Po 23       Desg    128.24   128   1600    FWD  0       P2P       No   No
Te 5/41     Dis     128.450  128   2000    DIS  0       P2P       No   No
Te 5/50     Desg    128.459  128   2000    FWD  0       P2P       No   No
FTOS#
```

Example 2   **Figure 24-4.   show spanning-tree pvst vlan Command**

```
FTOS#show spanning-tree  pvst vlan 2
VLAN 2
Root Identifier has priority 32768, Address 001e.c9f1.00f3
Root Bridge hello time 2, max age 20, forward delay 15
Bridge Identifier has priority 32768, Address 001e.c9f1.00f3
Configured hello time 2, max age 20, forward delay 15
Bpdu filter disabled globally
We are the root of VLAN 2
Current root has priority 32768, Address 001e.c9f1.00f3
Number of topology changes 0, last change occurred 3d1h ago on

Port 24 (Port-channel 23) is designated Discarding
Port path cost 1600, Port priority 128, Port Identifier 128.24
Designated root has priority 32768, address 001e.c9f1.00:f3
Designated bridge has priority 32768, address 001e.c9f1.00:f3
Designated port id is 128.24   , designated path cost 0
Number of transitions to forwarding state 0
BPDU sent 8, received 0
The port is not  in the Edge port mode, bpdu filter is disabled

Port 450 (TenGigabitEthernet 5/41) is disabled Discarding
Port path cost 2000, Port priority 128, Port Identifier 128.450
Designated root has priority 32768, address 001e.c9f1.00:f3
Designated bridge has priority 32768, address 001e.c9f1.00:f3
Designated port id is 128.450 , designated path cost 0
Number of transitions to forwarding state 0
BPDU sent 0, received 0
The port is not  in the Edge port mode, bpdu filter is disabled

Port 459 (TenGigabitEthernet 5/50) is designated Forwarding
Port path cost 2000, Port priority 128, Port Identifier 128.459
Designated root has priority 32768, address 001e.c9f1.00:f3
Designated bridge has priority 32768, address 001e.c9f1.00:f3
Designated port id is 128.459  , designated path cost 0
Number of transitions to forwarding state 1
BPDU sent 16, received 0
The port is not in the Edge port mode, bpdu filter is disabled
```

Example 3   **Figure 24-5.   show spanning-tree pvst command with EDS and LBK**

```
FTOS#show spanning-tree pvst vlan 2 interface tengigabitethernet 1/0
TenGigabitEthernet 1/0 of VLAN 2 is LBK_INC discarding

Edge port:no (default) port guard :none (default)
Link type: point-to-point (auto) bpdu filter:disable (default)
Bpdu filter :disable
Bpdu guard :disable
Bpdu guard shutdown-on-violation :disable
Root Guard: disable
Bpdus sent 152, received 27562
Interface Designated
Name PortID Prio Cost Sts Cost Bridge ID PortID
-------- -------- ---- ------- --- ------- -------------------- --------
TenGig 1/0 128.1223 128 20000 EDS 0 32768 0001.e800.a12b 128.1223
```

Example 4   **Figure 24-6.   show spanning-tree pvst with EDS and PVID**

```
FTOS#show spanning-tree pvst vlan 2 interface tengigabitethernet 1/0
TenGigabitEthernet 1/0 of VLAN 2 is PVID_INC discarding
Edge port:no (default) port guard :none (default)
Link type: point-to-point (auto) bpdu filter:disable (default)
Bpdu filter :disable
Bpdu guard :disable
Bpdu guard shutdown-on-violation :disable
Root Guard: disable
Bpdus sent 1, received 0
Interface Designated
Name PortID Prio Cost Sts Cost Bridge ID PortID
--------- -------- ---- ------- --- ------- -------------------- --------
TenGig 1/0 128.1223 128 20000 EDS 0 32768 0001.e800.a12b 128.1223
```

Example 5   **Figure 24-7.   show spanning-tree pvst guard Command**

```
FTOS#show spanning-tree pvst vlan 5 guard

Interface
Name         Instance  Sts        Guard type   Bpdu Filter
---------    --------  ---------  ----------   -----------
TenGig 0/1   0         INCON(Root) Rootguard   No
TenGig 0/2   0         FWD         Loopguard    No
TenGig 0/3   0         EDS(Shut)   Bpduguard    No
```

Table 24-1.   show spanning-tree pvst guard Command Information

Field	Description
Interface Name	PVST interface
Instance	PVST instance
Sts	Port state: root-inconsistent (INCON Root), forwarding (FWD), listening (LIS), blocking (BLK), or shut down (EDS Shut)
Guard Type	Type of STP guard configured (Root, Loop, or BPDU guard)
Bpdu Filter	Yes - Bpdu filter Enabled No - Bpdu filter Disabled

Related Commands

spanning-tree pvst	Configure PVST+ on an interface.

spanning-tree pvst

Configure a PVST+ interface with one of the following settings: edge port with optional Bridge Port Data Unit (BPDU) guard, BPDU filter, port disablement if an error condition occurs, port priority or cost for a VLAN range, or root guard.

Syntax spanning-tree pvst {edge-port [bpduguard [shutdown-on-violation] | bpdufilter] | err-disable | vlan vlan-range {cost number | priority value} | rootguard}

Parameters

edge-port	Enter the keyword edge-port to configure the interface as a PVST+ edge port.
bpduguard	(OPTIONAL) Enter the keyword bpduguard to disable the port when it receives a BPDU.
shutdown-on-vi olation	(OPTIONAL) Enter the keyword shutdown-on-violation to hardware disable an interface when a BPDU is received and the port is disabled.
bpdufilter	(OPTIONAL) Enter the keyword bpdufilter to stop sending and receiving BPDUs on port fast enabled ports.
err-disable	Enter the keyword err-disable to enable the port to be put into error-disable state (EDS) if an error condition occurs.
vlan vlan-range	Enter the keyword vlan followed by the VLAN number(s). Range: 1 to 4094
cost number	Enter the keyword cost followed by the port cost value. Range: 1 to 200000 Defaults: 10-Gigabit Ethernet interface = 2000 40-Gigabit Ethernet interface = 1400 Port Channel interface with one 10-Gigabit Ethernet = 2000 Port Channel with two 10-Gigabit Ethernet = 1800 Port Channel with two 40-Gigabit Ethernet = 600
priority value	Enter the keyword priority followed the Port priority value in increments of 16. Range: 0 to 240. Default: 128
rootguard	Enter the keyword rootguard to enable root guard on a PVST+ port or port-channel interface.

Defaults Not Configured

Command Modes INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The BPDU guard option prevents the port from participating in an active STP topology in case a BPDU appears on a port unintentionally, or is misconfigured, or is subject to a DOS attack. This option places the port into an error disable state if a BPDU appears, and a message is logged so that the administrator can take corrective action. When BPDU guard and BPDU filter is enabled on the port, then BPDU filter takes the highest precedence.

By default bpdu filtering on an interface is disabled.

> Ⓘ **Note:** A port configured as an edge port, on a PVST switch, will immediately transition to the forwarding state. Only ports connected to end-hosts should be configured as an edge port. Consider an edge port similar to a port with a spanning-tree portfast enabled.

Example   **Figure 24-8.   spanning-tree pvst vlan Command Example**

```
FTOS(conf-if-te-1/1)#spanning-tree pvst vlan 3 cost 18000
FTOS(conf-if-te-1/1)#end
FTOS(conf-if-te-1/1)#show config
!
interface TenGigabitEthernet 1/1
 no ip address
 switchport
 spanning-tree pvst vlan 3 cost 18000
 no shutdown
FTOS(conf-if-te-1/1)#end

FTOS#
```

Related Commands

show spanning-tree pvst	View PVST+ configuration

spanning-tree pvst err-disable

Place ports in an err-disabled state if they receive a PVST+ BPDU when they are members an untagged VLAN.

Syntax   spanning-tree pvst err-disable cause invalid-pvst-bpdu

Defaults   Enabled; ports are placed in err-disabled state if they receive a PVST+ BPDU when they are members of an untagged VLAN.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Some non-Dell Force10 systems which have hybrid ports participating in PVST+ transmit two kinds of BPDUs: an 802.1D BPDU and an untagged PVST+ BPDU.

Dell Force10 systems do not expect PVST+ BPDU on an untagged port. If this happens, FTOS places the port in error-disable state. This behavior might result in the network not converging. To prevent FTOS from executing this action, use the command no spanning-tree pvst err-disable cause invalid-pvst-bpdu.

Related Commands

show spanning-tree pvst	View the PVST+ configuration.

tc-flush-standard

Enable the MAC address flushing upon receiving every topology change notification.

Syntax	tc-flush-standard

To disable, use the no tc-flush-standard command.

Defaults	Disabled
Command Modes	CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

By default FTOS implements an optimized flush mechanism for PVST+. This helps in flushing the MAC addresses only when necessary (and less often) allowing for faster convergence during topology changes. However, if a standards-based flush mechanism is needed, this *knob* command can be turned on to enable flushing MAC addresses upon receiving every topology change notification.

vlan bridge-priority

Set the PVST+ bridge-priority for a VLAN or a set of VLANs.

Syntax	vlan *<vlan-id>* bridge-priority *value*

To return to the default value, enter no vlan bridge-priority command.

Parameters

vlan *vlan-range*	Enter the keyword vlan followed by the VLAN number(s). Range: 1 to 4094
bridge-priority *value*	Enter the keyword bridge-priority followed by the bridge priority value in increments of 4096. Range: 0 to 61440 Default: 32768

Defaults	32768
Command Modes	CONFIGURATION (conf-pvst)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

vlan forward-delay	Change the time interval before FTOS transitions to the forwarding state
vlan hello-time	Change the time interval between BPDUs
vlan max-age	Change the time interval before PVST+ refreshes
show spanning-tree pvst	Display the PVST+ configuration

vlan forward-delay

Set the amount of time the interface waits in the Listening State and the Learning State before transitioning to the Forwarding State.

Syntax vlan *<vlan-id>* forward-delay *seconds*

To return to the default setting, enter no vlan forward-delay command.

Parameters

vlan *vlan-range*	Enter the keyword vlan followed by the VLAN number(s). Range: 1 to 4094
forward-delay *seconds*	Enter the keyword forward-delay followed by the time interval, in seconds, that FTOS waits before transitioning PVST+ to the forwarding state. Range: 4 to 30 seconds Default: 15 seconds

Defaults 15 seconds

Command Modes CONFIGURATION (conf-pvst)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

vlan bridge-priority	Set the bridge-priority value
vlan hello-time	Change the time interval between BPDUs
vlan max-age	Change the time interval before PVST+ refreshes
show spanning-tree pvst	Display the PVST+ configuration

vlan hello-time

Set the time interval between generation of PVST+ 7Bridge Protocol Data Units (BPDUs).

Syntax vlan *<vlan-id>* hello-time *seconds*

To return to the default value, enter no vlan hello-time command.

Parameters

vlan *vlan-range*	Enter the keyword vlan followed by the VLAN number(s). Range: 1 to 4094
hello-time *seconds*	Enter the keyword hello-time followed by the time interval, in seconds, between transmission of BPDUs. Range: 1 to 10 seconds Default: 2 seconds

Defaults 2 seconds

Command Modes CONFIGURATION (conf-pvst)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands		
	vlan bridge-priority	Set the bridge-priority value
	vlan forward-delay	Change the time interval before FTOS transitions to the forwarding state
	vlan max-age	Change the time interval before PVST+ refreshes
	show spanning-tree pvst	Display the PVST+ configuration

vlan max-age

Set the time interval for the PVST+ bridge to maintain configuration information before refreshing that information.

Syntax   vlan *vlan-range* max-age *seconds*

To return to the default, use the no vlan max-age command.

Parameters

vlan *vlan-range*	Enter the keyword vlan followed by the VLAN number(s).
	Range: 1 to 4094
max-age *seconds*	Enter the keyword max-age followed by the time interval, in seconds, that FTOS waits before refreshing configuration information.
	Range: 6 to 40 seconds
	Default: 20 seconds

Defaults   20 seconds

Command Modes   CONFIGURATION (conf-pvst)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

vlan bridge-priority	Set the bridge-priority value
vlan forward-delay	Change the time interval before FTOS transitions to the forwarding state
vlan hello-time	Change the time interval between BPDUs
show spanning-tree pvst	Display the PVST+ configuration

Quality of Service (QoS)

Overview

The Dell Force10 operating software (FTOS) commands for quality of service (QoS) include traffic conditioning and congestion control. This chapter contains the following sections:

- Global Configuration Commands
- Policy-Based QoS Commands

Global Configuration Commands

- qos-rate-adjust
- service-class dot1p-mapping

qos-rate-adjust

By default, for rate policing and rate shaping, FTOS does not include the Preamble, SFD, or the IFG fields. These fields are overhead; only the fields from MAC Destination Address to the CRC are used for forwarding and are included in these rate metering calculations. You can optionally include overhead fields in rate metering calculations by enabling QoS Rate Adjustment.

Syntax   qos-rate-adjustment *overhead-bytes*

Parameters

overhead-bytes	Include a specified number of bytes of packet overhead to include in rate policing, and rate shaping calculations. Range: 1-31

Defaults   QoS rate adjustment is disabled by default, and no qos-rate-adjust is listed in the running-configuration.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

service-class dot1p-mapping

This command maps an 802.1p priority to an internal traffic class.

Syntax service-class dot1p-mapping *user-priority trafficclass*

The *user-priority value* can range from 0-7 and *traffic class* can range from 0-6.

The no form of this command is not supported.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Per-Port QoS Commands

Per-port QoS ("port-based QoS") allows users to defined QoS configuration on a per-physical-port basis. The commands include:

- dot1p-priority
- rate police
- rate shape
- service-class dynamic dot1p
- strict-priority unicast

dot1p-priority

Assign a value to the IEEE 802.1p bits on the traffic received by this interface.

Syntax dot1p-priority *priority-value*

To delete the IEEE 802.1p configuration on the interface, use the no dot1p-priority command.

Parameters

priority-value	Enter a value from 0 to 7.	
	dot1p	**Queue Number**
	0	0
	1	0
	2	0
	3	1
	4	2
	5	3
	6	3
	7	3

Defaults none

Command Modes INTERFACE

Usage Information

The dot1p-priority command changes the priority of incoming traffic on the interface. The system places traffic marked with a priority in the correct queue and processes that traffic according to its queue.

When you set the priority for a Port Channel, the physical interfaces assigned to the Port Channel are configured with the same value. You cannot assign dot1p-priority command to individual interfaces in a Port Channel.

rate police

Police the incoming traffic rate on the selected interface.

Syntax

rate police [kbps] *committed-rate* [*burst-KB*] [peak [kbps] *peak-rate* [*burst-KB*]] [vlan *vlan-id*]

Parameters

kbps	Enter this keyword to specify the rate police in Kilobits per second (Kbps). On MXL Switch make the following value a multiple of 64. The default granularity is Megabits per second (Mbps).
	Range: 0 to 40000000 (Kbps)
committed-rate	Enter a number as the bandwidth in Mbps.
	Range: 0 to 10000
burst-KB	(OPTIONAL) Enter a number as the burst size in KB.
	Range: 16 to 200000
	Default: 50
peak *peak-rate*	(OPTIONAL) Enter the keyword peak followed by a number to specify the peak rate in Mbps.
	Range: 0 to 10000
vlan *vlan-id*	(OPTIONAL) Enter the keyword vlan followed by a VLAN ID to police traffic to those specific VLANs.
	Range: 1 to 4094

Defaults

Granularity for *commit ed-rate* and *peak-rate* is Mbps unless the kbps option is used.

Command Mode

INTERFACE

Usage Information

✍ **Note:** Per Port rate police is supported for Layer 2 tagged and untagged switched traffic and for Layer 3 traffic. Per VLAN rate police is supported on only tagged ports with Layer 2 switched traffic.

On *one* interface, you can configure the rate police command for a VLAN or you can configure the rate police command for an interface. For each physical interface, you can configure three rate police commands specifying different VLANS.

After configuring VLANs in the rate police command, if this error message appears:

```
%Error: Specified VLANs overlap with existing config.
```

Related Commands	rate-police	Police traffic output as part of the designated policy.

rate shape

Shape the traffic output on the selected interface.

Syntax   rate shape [kbps] *rate* [*burst-KB*]

Parameters

kbps	Enter this keyword to specify the rate shape in Kilobits per second (Kbps). On MXL Switch. make the following value a multiple of 64. The default granularity is Megabits per second (Mbps). Range: 0-40000000 (Kbps)
rate	Enter the outgoing rate in multiples of 10 Mbps. Range: 10 to 10000
burst-KB	(OPTIONAL) Enter a number as the burst size in KB. Range: 0 to 10000 Default: 50

Defaults   Granularity for *rate* is Mbps unless the kbps option is used.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	rate-shape	Shapes the traffic output as part of the designated policy.

service-class dynamic dot1p

Honor all 802.1p markings on incoming switched traffic on an interface (from INTERFACE mode) or on all interfaces (from CONFIGURATION mode). A CONFIGURATION mode entry supersedes INTERFACE mode entries.

Syntax   service-class dynamic dot1p

To return to the default setting, use the no service-class dynamic dot1p command.

Defaults   All dot1p traffic is mapped to Queue 0 unless you enable the service-class dynamic dot1p command. Then the default mapping is as follows:

Table 25-1.   Default dot1p to Queue Mapping

dot1p	Queue ID
0	0
1	0
2	0

Table 25-1. Default dot1p to Queue Mapping (continued)

dot1p	Queue ID
3	1
4	2
5	3
6	3
7	3

Command Modes INTERFACE

CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Enter this command to honor all incoming 802.1p markings, on incoming switched traffic, on the interface. By default, this facility is not enabled (that is, the 802.1p markings on incoming traffic are not honored).

This command can be applied on both physical interfaces and port channels. When you set the service-class dynamic for a port channel, the physical interfaces assigned to the port channel are automatically configured; you cannot assign the service-class dynamic command to individual interfaces in a port channel.

On the MXL Switch, all traffic is by default mapped to the same queue, Queue 0. If you honor dot1p on ingress, then you can create service classes based the queueing strategy using the command service-class dynamic dot1p from INTERFACE mode. You may apply this queuing strategy to all interfaces by entering this command from CONFIGURATION mode.

- All dot1p traffic is mapped to Queue 0 unless service-class dynamic dot1p is enabled on an interface or globally.
- Layer 2 or Layer 3 service policies supercede dot1p service classes.

service-class bandwidth-percentage

Specify a minimum bandwidth for queues

Syntax service-class bandwidth-percentage queue0 *number* queue1 *number* queue2 *number* queue3 *number*

Parameters

number	Enter the bandwidth-weight. The value must be a power of 2.
	Range 1-100.

Defaults none

Command Modes CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

Guarantee a minimum bandwidth to different queues globally using the command service-class bandwidth-percentage from CONFIGURATION mode. The DCB ETS supersedes the global and policy based QoS bandwidth configurations.

When you enable ETS, the egress QoS features in the output QoS policy-map (such as service-class bandwidth-percentage and bandwidth-percentage), the default bandwidth allocation ratio for egress queues are superseded by ETS configurations. This is to provide compatibility with DCBX. Hence, it is recommended to have ETS disabled when you wish to apply these features exclusively. Once ETS is disabled on an interface, configured parameters will be applied.

strict-priority unicast

Configure a unicast queue as a strict-priority (SP) queue.

Syntax

strict-priority unicast queue *number*

Parameters

unicast *number*	Enter the keyword unicast followed by the queue number.
	Range: 1 to 3

Defaults

Command Modes

CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

After a unicast queue is configured as strict-priority, that particular queue, on the entire chassis, is treated as strict-priority queue. Traffic for a strict priority is scheduled before any other queues are serviced. For example, if you send 100% line rate traffic over the SP queue, it will *starve* all other queues on the ports on which this traffic is flowing. To assign the strict priority schedule type to egress queues, use the scheduler strict command in QOS-POLICY-OUT mode. FTOS does not support bandwidth configuration on strict priority scheduler queues.

When you enable ETS, egress QoS features in the output QoS policy-map (such as strict priority unicast <0-3> and scheduler strict), default scheduler for egress queues are superseded by ETS configurations. This is to provide compatibility with DCBX. Hence, it is recommended to have the ETS disabled when you wish to apply these features exclusively. Once ETS disabled on an interface, configured parameters will be applied.

Policy-Based QoS Commands

Policy-based traffic classification is handled with class maps. These maps classify unicast traffic into one of four classes in the MXL Switch. FTOS enables you to match multiple class maps and specify multiple match criteria. Policy-based QoS is not supported on logical interfaces, such as port-channels, VLANS, or loopbacks. The commands are:

- bandwidth-percentage
- class-map
- clear qos statistics
- description
- match ip access-group
- match ip dscp
- match ip precedence
- match mac access-group
- match mac dot1p
- match mac vlan
- policy-aggregate
- policy-map-input
- policy-map-output
- qos-policy-input
- qos-policy-output
- rate-police
- rate-shape
- service-policy input
- service-policy output
- service-queue
- set
- show qos class-map
- show qos policy-map
- show qos policy-map-input
- show qos policy-map-output
- show qos qos-policy-input
- show qos qos-policy-output
- show qos statistics
- show qos wred-profile
- test cam-usage
- trust
- wred
- wred-profile

bandwidth-percentage

Assign a percentage of weight to class/queue.

Syntax	bandwidth-percentage *percentage*

To remove the bandwidth percentage, use the no bandwidth-percentage command.

Parameters

percentage	Enter the percentage assignment of weight to class/queue. Range: 1 to 100% (granularity 1%)

Defaults none

Command Modes CONFIGURATION (conf-qos-policy-out)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The unit of bandwidth percentage is 1%. A bandwidth percentage of 0 is allowed and will disable the scheduling of that class. If the sum of the bandwidth percentages given to all four classes exceeds 100%, the bandwidth percentage will automatically scale down to 100%.

Related Commands

qos-policy-output	Creates a QoS output policy.

class-map

Create/access a class map. Class maps differentiate traffic so that you can apply separate quality of service policies to each class.

Syntax	class-map {match-all	match-any} *class-map-name* [layer2]

Parameters

match-all	Determines how packets are evaluated when multiple match criteria exist. Enter the keyword match-all to determine that the packets must meet all the match criteria in order to be considered a member of the class.
match-any	Determines how packets are evaluated when multiple match criteria exist. Enter the keyword match-any to determine that the packets must meet at least one of the match criteria in order to be considered a member of the class.
class-map-name	Enter a name of the class for the class map in a character format (32 character maximum).
layer2	Enter the keyword layer2 to specify a Layer 2 Class Map. Default: Layer 3

Defaults Layer 3

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

| Usage Information | Packets arriving at the input interface are checked against the match criteria, configured using this command, to determine if the packet belongs to that class. This command accesses the CLASS-MAP mode, where the configuration commands include match ip and match mac options. |

Related Commands		
ip access-list extended	Configures an extended IP ACL.
ip access-list standard	Configures a standard IP ACL.
match ip access-group	Configures the match criteria based on the access control list (ACL)
match ip precedence	Identifies IP precedence values as match criteria
match ip dscp	Configures the match criteria based on the DSCP value
match mac access-group	Configures a match criterion for a class map, based on the contents of the designated MAC ACL.
match mac dot1p	Configures a match criterion for a class map, based on a dot1p value.
match mac vlan	Configures a match criterion for a class map based on VLAN ID.
service-queue	Assigns a class map and QoS policy to different queues.
show qos class-map	Views the current class map information.

clear qos statistics

Clears matched packets, matched bytes, and dropped packets.

| Syntax | clear qos statistics *interface-name*. |

Parameters		
interface-name	Enter one of the following keywords:
	• For a 40-Gigabit Ethernet interface, enter the keyword FortyGigabitEthernet followed by the slot/port information.
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.

| Defaults | none |

| Command Modes | EXEC |
| | EXEC Privilege |

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

| Usage Information | When you issue this command, statistical information stored regarding QoS is cleared and reset to 0. These statistics can be accessed using the show qos statistics command in EXEC mode. When the traffic pattern matches the QoS classification criteria flows, the corresponding counters are incremented. |

Related Commands		
show qos statistics	Displays the qos statistics.

match ip access-group

Configure match criteria for a class map, based on the access control list (ACL).

Syntax   match ip access-group *access-group-name* [set-ip-dscp *value*]

To remove ACL match criteria from a class map, use the no match ip access-group *access-group-name* [set-ip-dscp *value*] command.

Parameters

access-group-name	Enter the ACL name whose contents are used as the match criteria in determining if packets belong to the class specified by class-map.
set-ip-dscp *value*	(OPTIONAL) Enter the keyword set-ip-dscp followed by the IP DSCP value. The matched traffic will be marked with the DSCP value. Range: 0 to 63

Defaults   none

Command Modes   CLASS-MAP CONFIGURATION (config-class-map)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You must enter the class-map command in order to access this command. After the class map is identified, you can configure the match criteria. For class-map match-any, a maximum of five ACL match criteria are allowed. For class-map match-all, only one ACL match criteria is allowed.

Related Commands

class-map	Identifies the class map.

description

Add a description to the selected policy map or QOS policy.

Syntax   description {*description*}

To remove the description, use the no description {*description*} command.

Parameters

description	Enter a description to identify the policies (80 characters maximum).

Defaults   none

Command Modes   CONFIGURATION (policy-map-input and policy-map-output; conf-qos-policy-in and conf-qos-policy-out; wred)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

policy-map-input	Creates an input policy map.
policy-map-output	Creates an output policy map.
qos-policy-input	Creates an input QOS-policy on the router.

qos-policy-output	Creates an output QOS-policy on the router.
wred-profile	Creates a WRED profile.

match ip dscp

Use a differentiated services code point (DSCP) value as a match criteria.

Syntax

match ip dscp *dscp-list* [set-ip-dscp *value*]

To remove a DSCP value as a match criteria, use the no match ip dscp *dscp-list* [[multicast] set-ip-dscp *value*] command.

Parameters

dscp-list	Enter the IP DSCP value(s) that is to be the match criteria. Separate values by commas — no spaces (1,2,3) or indicate a list of values separated by a hyphen (1-3). Range: 0 to 63
set-ip-dscp *value*	(OPTIONAL) Enter the keyword set-ip-dscp followed by the IP DSCP value. The matched traffic will be marked with the DSCP value. Range: 0 to 63

Defaults

Command Modes

CLASS-MAP CONFIGURATION (config-class-map)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

You must enter the class-map command in order to access this command. After the class map is identified, you can configure the match criteria.

The match ip dscp and match ip precedence commands are mutually exclusive.

Up to 64 IP DSCP values can be matched in one match statement. For example, to indicate IP DCSP values 0, 1, 2, 3, 4, 5, 6, 7, enter either the command match ip dscp 0,1,2,3,4,5,6,7 or match ip dscp 0-7.

> **Note:** Only one of the IP DSCP values must be a successful match criterion, not all of the specified IP DSCP values need to match.

Related Commands

class-map	Identifies the class map.

match ip precedence

Use IP precedence values as a match criteria.

Syntax

match ip precedence ip-*precedence-list* [set-ip-dscp *value*]

To remove IP precedence as a match criteria, use the no match ip precedence ip-*precedence-list* [set-ip-dscp *value*] command.

Parameters

ip-precedence-list	Enter the IP precedence value(s) as the match criteria. Separate values by commas — no spaces (1,2,3) or indicate a list of values separated by a hyphen (1-3). Range: 0 to 7
set-ip-dscp *value*	(OPTIONAL) Enter the keyword set-ip-dscp followed by the IP DSCP value. The matched traffic will be marked with the DSCP value. Range: 0 to 63

Defaults   none

Command Modes   CLASS-MAP CONFIGURATION (conf-class-map)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You must enter the class-map command in order to access this command. After the class map is identified, you can configure the match criteria.

The match ip precedence command and the match ip dscp command are mutually exclusive.

Up to eight precedence values can be matched in one match statement. For example, to indicate the IP precedence values 0 1 2 3 enter either the command match ip precedence 0-3 or match ip precedence 0,1,2,3.

> **Note:** Only one of the IP precedence values must be a successful match criterion, not all of the specified IP precedence values need to match.

Related Commands

class-map	Identifies the class map.

match mac access-group

Configure a match criterion for a class map, based on the contents of the designated MAC ACL.

Syntax   match mac access-group { *mac-acl-name* }

Parameters

mac-acl-name	Enter a MAC ACL name. Its contents will be used as the match criteria in the class map.

Defaults   none

Command Modes   CLASS-MAP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You must enter the class-map command in order to access this command. After the class map is identified, you can configure the match criteria.

Related Commands

class-map	Identifies the class map.

match mac dot1p

Configure a match criterion for a class map, based on a dot1p value.

Syntax	match mac dot1p { *dot1p-list* }

Parameters		
dot1p-list	Enter a dot1p value.	
	Range: 0 to 7	

Defaults none

Command Modes CLASS-MAP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information You must enter the class-map command in order to access this command. After the class map is identified, you can configure the match criteria.

Related Commands	class-map	Identifies the class map.

match mac vlan

Configure a match criterion for a class map based on VLAN ID.

Syntax	match mac vlan *number*

Parameters		
number	Enter the VLAN ID.	
	Range: 1 to 4094	

Defaults none

Command Modes CLASS-MAP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information You must first enter the class-map command in order to access this command. You can match against only one VLAN ID.

Related Commands	class-map	Creates/accesses a class map.

policy-aggregate

Allow an aggregate method of configuring per-port QoS via policy maps. An aggregate QoS policy is part of the policy map (input/output) applied on an interface.

Syntax policy-aggregate *qos-policy-name*

To remove a policy aggregate configuration, use the no policy-aggregate *qos-policy-name* command.

Parameters	*qos-policy-name*	Enter the name of the policy map in character format (32 characters maximum)

Defaults   none

Command Modes   CONFIGURATION (policy-map-input and policy-map-output)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

Aggregate input/output QoS policy applies to all the port ingoing/outgoing traffic. Aggregate input/output QoS policy can co-exist with per queue input/output QoS policies.

1. If only aggregate input QoS policy exists, input traffic conditioning configurations (rate-police) will apply. Any marking configurations in aggregate input QoS policy will be ignored.
2. If aggregate input QoS policy and per class input QoS policy co-exist, then aggregate input QoS policy will preempt per class input QoS policy on input traffic conditioning (rate-police). In other words, if rate police configuration exists in aggregate QoS policy, the configurations in per class QoS are ignored. Marking configurations in per class input QoS policy still apply to each queue.

Related Commands	policy-map-input	Creates an input policy map
	policy-map-output	Creates an output policy map

policy-map-input

Create an input policy map.

Syntax   policy-map-input *policy-map-name* [layer2]

To remove an input policy map, use the no policy-map-input *policy-map-name* [layer2] command.

Parameters	*policy-map-name*	Enter the name for the policy map in character format (32 characters maximum).
	layer2	(OPTIONAL) Enter the keyword layer2 to specify a Layer 2 Class Map.
		Default: Layer 3

Defaults   Layer 3

Command Modes   CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

Input policy map is used to classify incoming traffic to different flows using class-map, QoS policy, or simply using incoming packets DSCP. This command enables policy-map-input configuration mode (conf-policy-map-in).

Related Commands	service-queue	Assigns a class map and QoS policy to different queues.
	policy-aggregate	Allows an aggregate method of configuring per-port QoS via policy maps.
	service-policy input	Applies an input policy map to the selected interface.

policy-map-output

Create an output policy map.

Syntax   policy-map-output *policy-map-name*

To remove a policy map, use the no policy-map-output *policy-map-name* command.

Parameters

policy-map-name	Enter the name for the policy map in character format (16 characters maximum).

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Output policy map is used to assign traffic to different flows using QoS policy. This command enables the policy-map-output configuration mode (conf-policy-map-out).

Related Commands

service-queue	Assigns a class map and QoS policy to different queues.
policy-aggregate	Allows an aggregate method of configuring per-port QoS via policy maps.
service-policy output	Applies an output policy map to the selected interface.

qos-policy-input

Create a QoS input policy on the router.

Syntax   qos-policy-input *qos-policy-name* [layer2]

To remove an existing input QoS policy from the router, use the no qos-policy-input *qos-policy-name* [layer2] command.

Parameters

qos-policy-name	Enter your input QoS policy name in character format (32 character maximum).
layer2	(OPTIONAL) Enter the keyword layer2 to specify a Layer 2 Class Map. Default: Layer 3

Defaults   Layer 3

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Use this command to specify the name of the input QoS policy. After input policy is specified, rate-police can be defined. This command enables the qos-policy-input configuration mode— (conf-qos-policy-in).

When changing a *service-queue* configuration in a QoS policy map, all QoS rules are deleted and re-added automatically to ensure that the order of the rules is maintained. As a result, the Matched Packets value shown in the "show qos statistics" command is reset.

Related Commands		
rate-police	Incoming traffic policing function

qos-policy-output

Create a QoS output policy.

Syntax   qos-policy-output *qos-policy-name*

To remove an existing output QoS policy, use the no qos-policy-output *qos-policy-name* command.

Parameters

qos-policy-name	Enter your output QoS policy name in character format (32 character maximum).

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Use this command to specify the name of the output QoS policy. After output policy is specified, rate-limit, bandwidth-percentage, and WRED can be defined. This command enables the qos-policy-output configuration mode—(conf-qos-policy-out).

When changing a *service-queue* configuration in a QoS policy map, all QoS rules are deleted and re-added automatically to ensure that the order of the rules is maintained. As a result, the Matched Packets value shown in the show qos statistics command is reset.

Related Commands		
bandwidth-percentage	Assigns weight to class/queue percentage.
wred	Assigns yellow or green drop precedence.

rate-police

Specify the policing functionality on incoming traffic.

Syntax   rate-police [kbps] *committed-rate* [*burst-KB*] [peak [kbps] *peak-rate* [*burst-KB*]]

Parameters

kbps	Enter this keyword to specify the rate limit in Kilobits per second (Kbps). On MXL Switch, make the following value a multiple of 64. The default granularity is Megabits per second (Mbps).
	Range: 0-40000000 (Kbps)
committed-rate	Enter the committed rate in Mbps.
	Range: 0 to 10000 Mbps

burst-KB	(OPTIONAL) Enter the burst size in KB.
	Range: 16 to 200000 KB
	Default: 100 KB
peak *peak-rate*	(OPTIONAL) Enter the keyword peak followed by the peak rate in Mbps.
	Range: 0 to 10000 Mbps
	Default: Same as designated for *committed-rate*

Defaults Burst size is 100 KB. *peak-rate* is by default the same as *committed-rate*. Granularity for *committed-rate* and *peak-rate* is Mbps unless the kbps option is used.

Command Modes QOS-POLICY-IN

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

rate police	Specifies traffic policing on the selected interface.
qos-policy-input	Creates a QoS output policy.

rate-shape

Shape traffic output as part of the designated policy.

Syntax rate-shape [kbps] *rate* [*burst-KB*]

Parameters

kbps	Enter this keyword to specify the rate limit in Kilobits per second (Kbps). On MXL Switch, make the following value a multiple of 64. The default granularity is Megabits per second (Mbps).
	Range: 0-40000000 (Kbps)
rate	Enter the outgoing rate in multiples of 10 Mbps.
	Range: 10 to 10000
burst-KB	(OPTIONAL) Enter a number as the burst size in KB.
	Range: 0 to 10000
	Default: 50

Defaults Burst size is 50 KB. Granularity for *rate* is Mbps unless the kbps option is used.

Command Modes QOS-POLICY-OUT

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information When rate-shape in QoS policy is applied both on queue level and aggregate mode, the queue-based shaping occurs first followed by the aggregate rate shaping.

Related Commands

rate shape	Shapes the traffic output of the selected interface.
qos-policy-output	Creates a QoS output policy.

service-policy input

Apply an input policy map to the selected interface.

Syntax   service-policy input *policy-map-name* [layer2]

To remove the input policy map from the interface, use the no service-policy input *policy-map-name* [layer2] command.

Parameters

policy-map-name	Enter the name for the policy map in character format (16 characters maximum). You can identify an existing policy map or name one that does not yet exist.
layer2	(OPTIONAL) Enter the keyword layer2 to specify a Layer 2 Class Map. Default: Layer 3

Defaults   Layer 3

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   A single policy-map can be attached to one or more interfaces to specify the service-policy for those interfaces. A policy map attached to an interface can be modified.

> **Note:** The service-policy commands are not allowed on a port channel.
> The service-policy input *policy-map-name* command and the service-class dynamic dot1p command are not allowed simultaneously on an interface.

Related Commands

policy-map-input	Creates an input policy map.

service-policy output

Apply an output policy map to the selected interface.

Syntax   service-policy output *policy-map-name*

To remove the output policy map from the interface, use the no service-policy output *policy-map-name* command.

Parameters

policy-map-name	Enter the name for the policy map in character format (16 characters maximum). You can identify an existing policy map or name one that does not yet exist.

Defaults   none

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	A single policy-map can be attached to one or more interfaces to specify the service-policy for those interfaces. A policy map attached to an interface can be modified.

Related Commands	policy-map-output	Creates an output policy map.

service-queue

Assign a class map and QoS policy to different queues.

Syntax	service-queue *queue-id* [class-map *class-map-name*] [qos-policy *qos-policy-name*]

To remove the queue assignment, use the no service-queue *queue-id* [class-map *class-map-name*] [qos-policy *qos-policy-name*] command.

Parameters	*queue-id*	Enter the value used to identify a queue.
		Range:0-3 (four queues per interface; four queues are reserved for control traffic.)
	class-map *class-map-name*	(OPTIONAL) Enter the keyword class-map followed by the class map name assigned to the queue in character format (16 character maximum). **Note:** This option is available under policy-map-input only.
	qos-policy *qos-policy-name*	(OPTIONAL) Enter the keyword qos-policy followed by the QoS policy name assigned to the queue in text format (16 characters maximum). This specifies the input QoS policy assigned to the queue under policy-map-input and output QoS policy under policy-map-output context.

Defaults	none
Command Modes	CONFIGURATION (conf-policy-map-in and conf-policy-map-out)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	There are four (4) queues per interface on the MXL Switch. This command assigns a class map or QoS policy to different queues.

Related Commands	class-map	Identifies the class map.
	service-policy input	Applies an input policy map to the selected interface.
	service-policy output	Applies an output policy map to the selected interface.

set

Mark outgoing traffic with a Differentiated Service Code Point (DSCP) or dot1p value.

Syntax set {ip-dscp *value* | mac-dot1p *value*}

Parameters

ip-dscp *value*	(OPTIONAL) Enter the keyword ip-dscp followed by the IP DSCP value. Range: 0 to 63
mac-dot1p *value*	Enter the keyword mac-dot1p followed by the dot1p value. Range: 0 to 7 On the MXL Switch, allowed values are:0,2,4,6

Defaults none

Command Modes CONFIGURATION (conf-qos-policy-in)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information After the IP DSCP bit is set, other QoS services can then operate on the bit settings.

show qos class-map

View the current class map information.

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

Parameters

class-name	(OPTIONAL) Enter the name of a configured class map.

Defaults none

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 25-1.   show qos class-map Command Example**

```
FTOS#show qos class-map

Class-map match-any CM
  Match ip access-group ACL
```

Related Commands

class-map	Identifies the class map.

show qos policy-map

View the QoS policy map information.

Syntax show qos policy-map {summary [*interface*] | detail [*interface*]}

Parameters

summary *interface*	To view a policy map interface summary, enter the keyword summary and optionally one of the following keywords and slot/port or number information: • For a Forty Gigabit Ethernet interface, enter the keyword FortyGigabitEthernet followed by the slot/port information. • For a Ten Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
detail *interface*	To view a policy map interface in detail, enter the keyword detail and optionally one of the following keywords and slot/port or number information: • For a FortyGigabit Ethernet interface, enter the keyword FortyGigabitEthernet followed by the slot/port information. • For a Ten Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.

Defaults none

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1 **Figure 25-2. show qos policy-map detail (IPv4) Command Example**

```
FTOS#show qos policy-map detail tengigabitethernet 0/0

Interface TenGigabitEthernet 4/1

Policy-map-input policy
Trust diffserv
Queue#    Class-map-name           Qos-policy-name
  0             -                   q0
  1            CM1                   q1
  2            CM2                   q2
  3            CM3                   q3
FTOS#
```

Example 2 **Figure 25-3. show qos policy-map summary (IPv4) Command Example**

```
FTOS#show qos policy-map summary

Interface        policy-map-input        policy-map-output
TenGig 4/1            PM1                       -
TenGig 4/2            PM2                     PMOut
FTOS#
```

show qos policy-map-input

View the input QoS policy map details.

Syntax   show qos policy-map-input [*policy-map-name*] [class *class-map-name*] [qos-policy-input *qos-policy-name*]

Parameters

policy-map-name	Enter the policy map name.
class *class-map-name*	Enter the keyword class followed by the class map name.
qos-policy-input *qos-policy-name*	Enter the keyword qos-policy-input followed by the QoS policy name.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1   **Figure 25-4.   show qos policy-map-input (IPv4) Command Example**

```
FTOS#show qos policy-map-input

Policy-map-input PolicyMapInput
Aggregate Qos-policy-name AggPolicyIn
Queue#   Class-map-name            Qos-policy-name
  0      ClassMap1                 qosPolicyInput
FTOS#
```

show qos policy-map-output

View the output QoS policy map details.

Syntax   show qos policy-map-output [*policy-map-name*] [qos-policy-output *qos-policy-name*]

Parameters

policy-map-name	Enter the policy map name.
qos-policy-output *qos-policy-name*	Enter the keyword qos-policy-output followed by the QoS policy name.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 25-5.   show qos policy-map-output Command Example**

```
FTOS#show qos policy-map-output

Policy-map-output PolicyMapOutput
Aggregate Qos-policy-name AggPolicyOut
Queue#          Qos-policy-name
  0             qosPolicyOutput
FTOS#
```

show qos qos-policy-input

View the input QoS policy details.

Syntax   show qos qos-policy-input [*qos-policy-name*]

Parameters

qos-policy-name	Enter the QoS policy name.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 25-6.   show qos qos-policy-input Command Example**

```
FTOS#show qos qos-policy-input

Qos-policy-input QosInput
      Rate-police 100 50 peak 100 50
      Dscp 32
FTOS#
```

show qos qos-policy-output

View the output QoS policy details.

Syntax   show qos qos-policy-output [*qos-policy-name*]

Parameters

qos-policy-name	Enter the QoS policy name.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 25-7.   show qos qos-policy-output Command Example**

```
FTOS#show qos qos-policy-output

FTOS#show qos qos-policy-output

Qos-policy-output qmap_out
        Bandwidth-percentage 10

Qos-policy-output qmap_wg
        Rate-shape 100 50
        Wred yellow wy
        Wred green wg
FTOS#
```

show qos statistics

View QoS statistics.

Syntax   show qos statistics {wred-profile [*interface*]} | [*interface*]

Parameters

wred-profile *interface*	Enter the keyword wred-profile and optionally one of the following keywords and slot/port or number information:
	• For a Forty Gigabit Ethernet interface, enter the keyword FortyGigabitEthernet followed by the slot/port information.
	• For a Ten Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
interface	Enter one of the following keywords and slot/port or number information
	• For a Forty Gigabit Ethernet interface, enter the keyword FortyGigabitEthernet followed by the slot/port information.
	• For a Ten Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1   **Figure 25-8.   show qos statistics Command Example**

```
FTOS#show qos statistics
Interface Te 0/20
Queue#  Matched Pkts
  0       0
  1       0
  2       0
  3       0
FTOS#
```

Table 25-2.   show qos statistics Command Description (ED and EE Series)

Field	Description
Queue #	Queue Number
Matched Pkts	The number of packets that matched the class-map criteria. **Note:** When trust is configured, matched packet counters are not incremented in this field.

Example 2   **Figure 25-9.   show qos statistics wred-profile Command Example**

```
FTOS#show qos statistics wred-profile
Interface Te 0/20
Drop-statistic   Dropped Pkts
Green            0
Yellow           0
Out of Profile   0
FTOS#
```

Table 25-3.   show qos statistics wred-profile Command Description (ED, EE, and EF Series)

Field	Description
Queue #	Queue Number
Drop-statistic	Drop statistics for green, yellow and out-of-profile packets
Dropped Pkts	The number of packets dropped for green, yellow and out-of-profile

Related Commands

clear qos statistics	Clears counters as shown in show qos statistics

show qos wred-profile

View the WRED profile details.

Syntax   show qos wred-profile *wred-profile-name*

Parameters

wred-profile-name	Enter the WRED profile name to view the profile details.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 25-10.   show qos wred-profile Command Example**

```
FTOS#show qos wred-profile

Wred-profile-name      min-threshold    max-threshold
wred_drop              0                0
wred_ge_y              1024             2048
wred_ge_g              2048             4096
wred_teng_y            4096             8192
wred_teng_g            8192             16384
WRED1                  2000             7000
```

test cam-usage

Check the Input Policy Map configuration for the CAM usage.

Syntax   test cam-usage service-policy input *policy-map* stack-unit {[*number*] | [all]}

Parameters

policy-map	Enter the policy map name.
stack-unit *number*	(OPTIONAL) Enter the keyword stack-unit followed by the stack-unit number.
stack-unit all	(OPTIONAL) Enter the keywords stack-unit all to indicate all stack units.

Defaults   none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 25-11.   test cam-usage service-policy input policy-map stack-unit all Command Example**

```
FTOS# test cam-usage service-policy input pmap_l2 stack-unit all

For a L2 Input Policy Map pmap_l2, the output must be as follows,

Stack-unit Status|  Portpipe | CAM Partition | Available CAM | Estimated CAM| Status
         |          |               |               | per Port     | (Allowed ports)

0          0          L2ACL           500          200          Allowed (2)
0          1          L2ACL           100          200          Exception
1          0          L2ACL           1000         200          Allowed (5)
1          1          L2ACL           0            200          Exception
                      …
                      …
                      …
13         1          L2ACL           400          200          Allowed (2)
FTOS#
```

> Ø **Note:** In a Layer 2 Policy Map, IPv4 rules are not allowed and hence the output contains only L2ACL CAM partition entries.

Table 25-4. test cam-usage Command Description

Field	Description
stack-unit	Indicates the stack-unit number.
Portpipe	Indicates the portpipe number.
CAM Partition	The CAM space where the rules are added.
Available CAM	Indicates the free CAM space, in the partition, for the classification rules. **Note:** The CAM entries reserved for the default rules are not included in the Available CAM column; free entries, from the default rules space, can not be used as a policy map for the classification rules.
Estimated CAM per Port	Indicates the number of free CAM entries required (for the classification rules) to apply the input policy map on a single interface. **Note:** The CAM entries for the default rule are not included in this column; a CAM entry for the default rule is always dedicated to a port and is always available for that interface.
Status (Allowed ports)	Indicates if the input policy map configuration on an interface belonging to a stack-unit/port-pipe is successful—Allowed (*n*)—or not successful—Exception. The allowed number (*n*) indicates the number of ports in that port-pipe on which the Policy Map can be applied successfully.

Usage Information

This features allows you to determine if the CAM has enough space available before applying the configuration on an interface.

An input policy map with both Trust and Class-map configuration, the Class-map rules are ignored and only the Trust rule is programmed in the CAM. In such an instance, the Estimated CAM output column will contain the size of the CAM space required for the Trust rule and *not* the Class-map rule.

trust

Specify dynamic classification (DSCP) or dot1p to trust.

Syntax

trust {diffserv [fallback]| dot1p [fallback]|}

Parameters

diffserv	Enter the keyword **diffserv** to specify trust of DSCP markings.
dot1p	Enter the keyword **dot1p** to specify trust dot1p configuration.
fallback	Enter this keyword to classify packets according to their DSCP value as a secondary option in case no match occurs against the configured class maps.

Defaults

Command Modes

CONFIGURATION (conf-policy-map-in)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	When trust is configured, matched bytes/packets counters are not incremented in the show qos statistics command.

Dynamic mapping honors packets marked according to the standard definitions of DSCP. The default mapping table is detailed in the following table.

Table 25-5. Standard Default DSCP Mapping Table

DSCP/CP hex range (XXX)	DSCP Definition	Traditional IP Precedence	MXL Switch Internal Queue ID	DSCP/CP decimal
111XXX		Network Control	3	48–63
110XXX		Internetwork Control	3	
101XXX	EF (Expedited Forwarding)	CRITIC/ECP	2	32–47
100XXX	AF4 (Assured Forwarding)	Flash Override	2	
011XXX	AF3	Flash	1	16–31
010XXX	AF2	Immediate	1	
001XXX	AF1	Priority	0	0–15
000XXX	BE (Best Effort)	Best Effort	0	

wred

Designate the WRED profile to yellow or green traffic.

Syntax	wred [[(yellow | green) *profile-name*] ecn]

To remove the WRED drop precedence, use the no wred {yellow | green} [*profile-name]* command.

Parameters	yellow	green	Enter the keyword yellow for yellow traffic. DSCP value of xxx110 and xxx100 maps to yellow.
		Enter the keyword green for green traffic. DSCP value of xxx010 maps to green.
	profile-name	Enter your WRED profile name in character format (16 character maximum). Or use one of the 5 pre-defined WRED profile names.
		Pre-defined Profiles:
		wred_drop, wred_teng_y, wred_teng_
	ecn	When wred ecn <cr> command is configured, instead of dropping the packets exponentially, Explicit Congestion Notification (ECN) marking is made on the packets.

Defaults	none
Command Modes	CONFIGURATION (conf-qos-policy-out)
Command History	Version 8.3.16.1 Introduced on MXL 10/40GbE Switch IO Module

| **Usage Information** | Use this command to assign drop precedence to green or yellow traffic. If there is no honoring enabled on the input, all the traffic defaults to green drop precedence. |

| **Related Commands** | wred-profile | Creates a WRED profile and name that profile |
| | trust | Defines the dynamic classification to trust DSCP |

wred-profile

Create a WRED profile and name that profile.

| **Syntax** | wred-profile *wred-profile-name* |

To remove an existing WRED profile, use the no wred-profile command.

Parameters	*wred-profile-name*	Enter your WRED profile name in character format (16 character maximum). Or use one of the pre-defined WRED profile names. You can configure up to 26 WRED profiles plus the 5 pre-defined profiles, for a total of 31 WRED profiles.
		Pre-defined Profiles:
		wred_drop, wred-ge_y, wred_ge_g, wred_teng_y, wred_teng_g

| **Defaults** | The five pre-defined WRED profiles. When a new profile is configured, the minimum and maximum threshold defaults to predefined wred_ge_g values |

| **Command Modes** | CONFIGURATION |

| **Command History** | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

| **Usage Information** | Use the default pre-defined profiles or configure your own profile. You can not delete the pre-defined profiles or their default values. This command enables the WRED configuration mode—(conf-wred). |

26

Routing Information Protocol (RIP)

Overview

Routing information protocol (RIP) is a distance vector routing protocol. The Dell Force10 operating software (FTOS) supports both RIP version 1 (RIPv1) and RIP version 2 (RIPv2).

The FTOS implementation of RIP is based on IETF RFCs 2453 and RFC 1058. For more information about configuring RIP, refer to the *FTOS Configuration Guide*.

Commands

The following commands allow you to configure RIP:

- auto-summary
- clear ip rip
- debug ip rip
- default-information originate
- default-metric
- description
- distance
- distribute-list in
- distribute-list out
- ip poison-reverse
- ip rip receive version
- ip rip send version
- ip split-horizon
- maximum-paths
- neighbor
- network
- offset-list
- output-delay
- passive-interface
- redistribute
- redistribute ospf
- router rip
- show config
- show ip rip database

- show running-config rip
- timers basic
- version

auto-summary

Restore the default behavior of automatic summarization of subnet routes into network routes. This command applies only to RIP version 2.

Syntax   auto-summary

To send sub-prefix routing information, use the no auto-summary command.

Default   Enabled.

Command Modes   ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

clear ip rip

Update all the RIP routes in the FTOS routing table.

Syntax   clear ip rip

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   This command triggers updates of the main RIP routing tables.

debug ip rip

Examine RIP routing information for troubleshooting.

Syntax   debug ip rip [*interface* | database | events [*interface*] | packet [*interface*] | trigger]

To turn off debugging output, use the no debug ip rip command.

Parameters	*interface*	(OPTIONAL) Enter the interface type and ID as one of the following:
		• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128
		• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
		• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
		• For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.
	database	(OPTIONAL) Enter the keyword database to display messages when there is a change to the RIP database.
	events	(OPTIONAL) Enter the keyword events to debug only RIP protocol changes.
	trigger	(OPTIONAL) Enter the keyword trigger to debug only RIP trigger extensions.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

default-information originate

Generate a default route for the RIP traffic.

Syntax   default-information originate [always] [metric *metric-value*] [route-map *map-name*]

To return to the default values, use the no default-information originate command.

Parameters

always	(OPTIONAL) Enter the keyword always to enable the switch software to always advertise the default route.
metric *metric-value*	(OPTIONAL) Enter the keyword metric followed by a number as the metric value. Range: 1 to 16 Default: 1
route-map *map-name*	(OPTIONAL) Enter the keyword route-map followed by the name of a configured route-map.

Defaults   Disabled

metric: 1

Command Modes   ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The default route must be present in the switch routing table for the default-information originate command to take effect.

default-metric

Change the default metric for routes. Use this command with the redistribute command to ensure that all redistributed routes use the same metric value.

Syntax

default-metric *number*

To return the default metric to the original values, use the no default-metric command.

Parameters

number	Specify a number. Range: 1 to 16. The default is 1.

Default

1

Command Modes

ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

This command ensures that route information being redistributed is converted to the same metric value.

Related Commands

redistribute	Allows you to redistribute routes learned by other methods.

description

Enter a description of the RIP routing protocol

Syntax

description {*description*}

To remove the description, use the no description {*description*} command.

Parameters

description	Enter a description to identify the RIP protocol (80 characters maximum).

Defaults

Command Modes

ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

router rip	Enters ROUTER mode on the switch.

distance

Assign a weight (for prioritization) to all routes in the RIP routing table or to a specific route. Lower weights ("administrative distance") are preferred.

Syntax	distance *weight* [*ip-address mask* [*prefix-name*]]

To return to the default values, use the no distance *weight* [*ip-address mask*] command.

Parameters

weight	Enter a number from 1 to 255 for the weight (for prioritization). The default is 120.
ip-address	(OPTIONAL) Enter the IP address, in dotted decimal format (A.B.C.D), of the host or network to receive the new distance metric.
mask	If you enter an IP address, you must also enter a mask for that IP address, in either dotted decimal format or /prefix format (/x)
prefix-name	(OPTIONAL) Enter a configured prefix list name.

Defaults   *weight* = 120

Command Modes   ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

default-metric	Assigns one distance metric to all routes learned using the redistribute command.

distribute-list in

Configure a filter for incoming routing updates.

Syntax	distribute-list *prefix-list-name* in [*interface*]

To delete the filter, use the no distribute-list *prefix-list-name* in command.

Parameters

prefix-list-name	Enter the name of a configured prefix list.
interface	(OPTIONAL) Identifies the interface type slot/port as one of the following:
	• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.

Defaults   Not configured.

Command Modes   ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	ip prefix-list	Enters PREFIX-LIST mode and configures a prefix list.

distribute-list out

Configure a filter for outgoing routing updates.

Syntax

distribute-list *prefix-list-name* out [*interface* | bgp | connected | ospf | static]

To delete the filter, use the no distribute-list *prefix-list-name* out command.

Parameters

prefix-list-name	Enter the name of a configured prefix list.
interface	(OPTIONAL) Identifies the interface type slot/port as one of the following: • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information. • For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.
connected	(OPTIONAL) Enter the keyword connected to filter only directly connected routes.
ospf	(OPTIONAL) Enter the keyword ospf to filter all OSPF routes.
static	(OPTIONAL) Enter the keyword static to filter manually configured routes.

Defaults

Not configured.

Command Modes

ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	ip prefix-list	Enters PREFIX-LIST mode and configures a prefix list.

ip poison-reverse

Set the prefix of the RIP routing updates to the RIP infinity value.

Syntax

ip poison-reverse

To disable poison reverse, use the no ip poison-reverse command.

Defaults

Disabled.

Command Modes

INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	ip split-horizon	Sets the RIP routing updates to exclude routing prefixes.

ip rip receive version

Set the interface to receive specific versions of RIP. The RIP version you set on the interface overrides the version command in ROUTER RIP mode.

Syntax

ip rip receive version [1] [2]

To return to the default, use the no ip rip receive version command.

Parameters

1	(OPTIONAL) Enter the number 1 for RIP version 1.
2	(OPTIONAL) Enter the number 2 for RIP version 2.

Defaults

RIPv1 and RIPv2

Command Modes

INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

If you want the interface to receive both versions of RIP, use ip rip receive version 1 2.

Related Commands

ip rip send version	Sets the RIP version to be used for sending RIP traffic on an interface.
version	Sets the RIP version to be used for the switch software.

ip rip send version

Set the interface to send a specific version of RIP. The version you set on the interface overrides the version command in ROUTER RIP mode.

Syntax

ip rip send version [1] [2]

To return to the default value, use the no ip rip send version command.

Parameters

1	(OPTIONAL) Enter the number 1 for RIP version 1. The default is RIPv1.
2	(OPTIONAL) Enter the number 2 for RIP version 2.

Defaults

RIPv1

Command Modes

INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

To enable the interface to send both version of RIP packets, use ip rip send version 1 2.

Related Commands	ip rip receive version	Sets the RIP version for the interface to receive traffic.
	version	Sets the RIP version to be used for the switch software.

ip split-horizon

Enable split-horizon for RIP data on the interface. As described in RFC 2453, the split-horizon scheme prevents any routes learned over a specific interface to be sent back out that interface.

Syntax	ip split-horizon

To disable split-horizon, enter no ip split-horizon.

Defaults	Enabled

Command Modes	INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	ip poison-reverse	Sets the prefix for RIP routing updates.

maximum-paths

Set RIP to forward packets over multiple paths.

Syntax	maximum-paths *number*

To return to the default values, use the no maximum-paths command.

Parameters

number	Enter the number of paths. Range: 1 to 16. The default is 4 paths.

Defaults	4

Command Modes	ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	RIP supports a maximum of 16 ECMP paths.

neighbor

Define a neighbor router with which to exchange RIP information.

Syntax	neighbor *ip-address*

To delete a neighbor setting, use the no neighbor *ip-address* command.

Parameters		
ip-address	Enter the IP address, in dotted decimal format, of a router with which to exchange information.	

Defaults   Not configured.

Command Modes   ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   When a neighbor router is identified, unicast data exchanges occur. Multiple neighbor routers are possible.

Use the passive-interface command in conjunction with the neighbor command to ensure that only specific interfaces are receiving and sending data.

Related Commands

passive-interface	Sets the interface to only listen to RIP broadcasts.

network

Enable RIP for a specified network. Use this command to enable RIP on all networks connected to the switch.

Syntax   network *ip-address*

To disable RIP for a network, use the no network *ip-address* command.

Parameter

ip-address	Specify an IP network address in dotted decimal format. You cannot specify a subnet.

Defaults   No RIP network is configured.

Command Modes   ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You can enable an unlimited number of RIP networks.

RIP operates over interfaces configured with any address specified by the network command.

offset-list

Specify a number to add to the incoming or outgoing route metrics learned via RIP.

Syntax   offset-list *prefix-list-name* {in | out} *offset* [*interface*]

To delete an offset list, use the no offset-list *prefix-list-name* {in | out} *offset* [*interface*] command.

Parameters		
	prefix-list-name	Enter the name of an established Prefix list to determine which incoming routes will be modified.
	offset	Enter a number from zero (0) to 16 to be applied to the incoming route metric matching the access list specified.
		If you set an offset value to zero (0), no action is taken.
	interface	(OPTIONAL) Enter the following keywords and slot/port or number information:

- For a Port Channel interface, enter the keyword **port-channel** followed by a number:
  Range: 1-128
- For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information.
- For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE** followed by the slot/port information.
- For a VLAN, enter the keyword **vlan** followed by a number from 1 to 4094.

Defaults	Not configured.
Command Modes	ROUTER RIP

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information — When the offset metric is applied to an interface, that value takes precedence over an offset value that is not extended to an interface.

Related Commands		
	ip prefix-list	Enters PREFIX-LIST mode and configures a prefix list.

output-delay

Set the interpacket delay of successive packets to the same neighbor.

Syntax — output-delay *delay*

To return to the switch software defaults for interpacket delay, use the no **output-delay** command.

Parameters		
	delay	Specify a number of milliseconds as the delay interval.
		Range: 8 to 50

Default	Not configured.
Command Modes	ROUTER RIP

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information — This command is intended for low-speed interfaces.

passive-interface

Suppress routing updates on a specified interface.

Syntax	passive-interface *interface*

To delete a passive interface, use the no passive-interface *interface* command.

Parameters

interface	Enter the following information:
	• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For a VLAN, enter the keyword vlan followed by a number from 1 to 4094.

Defaults	Not configured.

Command Modes   ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Although the passive interface neither sends nor receives routing updates, the network on that interface is still included in RIP updates sent via other interfaces.

Related Commands

neighbor	Enables RIP for a specified network.
network	Defines a neighbor.

redistribute

Redistribute information from other routing instances.

Syntax	redistribute {connected	static}

To disable redistribution, use the no redistribute {connected | static} command.

Parameters

connected	Enter the keyword connected to specify that information from active routes on interfaces is redistributed.
static	Enter the keyword static to specify that information from static routes is redistributed.

Defaults	Not configured.

Command Modes   ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   To redistribute the default route (0.0.0.0/0), configure the default-information originate command.

Related Commands

| default-information originate | Generates a default route for RIP traffic. |

redistribute ospf

Redistribute routing information from an OSPF process.

Syntax

redistribute ospf *process-id* [match external {1 | 2} | match internal | metric *metric-value*] [route-map *map-name*]

To disable redistribution, use the no redistribute ospf *process-id* [match external {1 | 2} | match internal | metric *metric-value*] [route-map *map-name*] command.

Parameters

process-id	Enter a number that corresponds to the OSPF process ID to be redistributed. Range: 1 to 65355.
match external {1 | 2}	(OPTIONAL) Enter the keywords match external followed by the numbers 1 or 2 to indicated that external 1 routes or external 2 routes should be redistributed.
match internal	(OPTIONAL) Enter the keywords match internal to indicate that internal routes should be redistributed.
metric *metric-value*	(OPTIONAL) Enter the keyword metric followed by a number as the metric value. Range: 0 to 16
route-map *map-name*	(OPTIONAL) Enter the keyword route-map followed by the name of a configured route map.

Defaults

Not configured.

Command Modes

ROUTER RIP

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

router rip

Enter ROUTER RIP mode to configure and enable RIP.

Syntax

router rip

To disable RIP, use the no router rip command.

Defaults

Disabled.

Command Modes

CONFIGURATION

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information

To enable RIP, you must assign a network address using the network command.

Figure 26-1.   router rip Command Example

```
FTOS(conf)#router rip
FTOS(conf-router_rip)#
```

Related   network   Enable RIP.
Commands
                 exit   Return to the CONFIGURATION mode.

show config

Display the changes you made to the RIP configuration. Default values are not shown.

Syntax   show config

Command Modes   ROUTER RIP

Command   Version 8.3.16.1   Introduced on MXL 10/40GbE Switch IO Module
History

Example   Figure 26-2.   show config Command Example in ROUTER RIP Mode

```
FTOS(conf-router_rip)#show config
!
router rip
 network 172.31.0.0
 passive-interface  TenGigabitEthernet 0/1
FTOS(conf-router_rip)#
```

show ip rip database

Display the routes learned by RIP. If the switch learned no RIP routes, no output is generated.

Syntax   show ip rip database [*ip-address mask*]

Parameters   *ip-address*   (OPTIONAL) Specify an IP address in dotted decimal format to view RIP information on
                                  that network only.

                                  If you enter an IP address, you must also enter a mask for that IP address.

                mask   (OPTIONAL) Specify a mask, in /network format, for the IP address.

Command Modes   EXEC Privilege

Command   Version 8.3.16.1   Introduced on MXL 10/40GbE Switch IO Module
History

Example   Figure 26-3.   show ip rip database Command Example (Partial)

```
FTOS#show ip rip database
Total number of routes in RIP database: 1624
204.250.54.0/24
        [50/1] via 192.14.1.3, 00:00:12, TenGigabitEthernet 9/15
204.250.54.0/24        auto-summary
203.250.49.0/24
        [50/1] via 192.13.1.3, 00:00:12, TenGigabitEthernet 9/14
203.250.49.0/24        auto-summary
210.250.40.0/24
        [50/2] via 1.1.18.2, 00:00:14, Vlan 18
        [50/2] via 1.1.130.2, 00:00:12, Port-channel 30
210.250.40.0/24        auto-summary
207.250.53.0/24
        [50/2] via 1.1.120.2, 00:00:55, Port-channel 20
        [50/2] via 1.1.130.2, 00:00:12, Port-channel 30
        [50/2] via 1.1.10.2, 00:00:18, Vlan 10
207.250.53.0/24        auto-summary
208.250.42.0/24
        [50/2] via 1.1.120.2, 00:00:55, Port-channel 20
        [50/2] via 1.1.130.2, 00:00:12, Port-channel 30
        [50/2] via 1.1.10.2, 00:00:18, Vlan 10
208.250.42.0/24        auto-summary
```

Table 26-1.   show ip rip database Command Description

Field	Description
Total number of routes in RIP database	Displays the number of RIP routes stored in the RIP database.
100.10.10.0/24 directly connected	Lists the route(s) directly connected.
150.100.0.0 redistributed	Lists the routes learned through redistribution.
209.9.16.0/24...	Lists the routes and the sources advertising those routes.

show running-config rip

Use this feature to display the current RIP configuration.

Syntax   show running-config rip

Defaults   none

Command Modes   EXEC Privilege

Example   Figure 26-4.   show running-config rip Command Example

```
show running-config rip
!
router rip
 distribute-list Test1 in
 distribute-list Test21 out
 network 10.0.0.0
 passive-interface TenGigabitEthernet 2/0
 neighbor 20.20.20.20
 redistribute ospf 999
 version 2
```

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

timers basic

Manipulate the RIP timers for routing updates, invalid, holddown times and flush time.

Syntax
timers basic *update invalid holddown flush*

To return to the default settings, use the no timers basic command.

Parameters

update	Enter the number of seconds to specify the rate at which RIP routing updates are sent. Range: zero (0) to 4294967295. Default: 30 seconds.
invalid	Enter the number of seconds to specify the time interval before routing updates are declared invalid or expired. The *invalid* value should be at least three times the *update* timer value. Range: zero (0) to 4294967295. Default: 180 seconds.
holddown	Enter the number of seconds to specify a time interval during which the route is marked as unreachable but still sending RIP packets. The *holddown* value should be at least three times the *update* timer value. Range: zero (0) to 4294967295. Default: 180 seconds.
flush	Enter the number of seconds to specify the time interval during which the route is advertised as unreachable. When this interval expires, the route is flushed from the routing table. The *flush* value should be greater than the *update* value. Range: zero (0) to 4294967295. Default is 240 seconds.

Defaults
- *update* = 30 seconds
- *invalid* = 180 seconds
- *holddown* = 180 seconds
- *flush* = 240 seconds.

Command Modes
ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information
If you change the timers on one router, the timers on all routers in the RIP domain must also be synchronized.

version

Specify either RIP version 1 or RIP version 2.

Syntax
version {1 | 2}

To return to the default version setting, use the no version command.

Parameters

1	Enter the keyword 1 to specify RIP version 1.
2	Enter the keyword 2 to specify RIP version 2.

Default   The FTOS sends RIPv1 and receives RIPv1 and RIPv2.

Command Modes   ROUTER RIP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related
Commands

ip rip receive version	Sets the RIP version to be received on the interface.
ip rip send version	Sets the RIP version to be sent out the interface.

Remote Monitoring (RMON)

Overview

Dell Force10 operating software (FTOS) remote monitoring (RMON) is based on IEEE standards, providing both 32-bit and 64-bit monitoring and long-term statistics collection. FTOS RMON supports the following RMON groups, as defined in RFC-2819, RFC-3273, and RFC-3434:

•	Ethernet Statistics Table	RFC-2819
•	Ethernet Statistics High-Capacity Table	RFC-3273, 64bits
•	Ethernet History Control Table	RFC-2819
•	Ethernet History Table	RFC-2819
•	Ethernet History High-Capacity Table	RFC-3273, 64bits
•	Alarm Table	RFC-2819
•	High-Capacity Alarm Table (64bits)	RFC-3434, 64bits
•	Event Table	RFC-2819
•	Log Table	RFC-2819

FTOS RMON does not support the following statistics:

- etherStatsCollisions
- etherHistoryCollisions
- etherHistoryUtilization

> Note: Only the simple network management protocol (SNMP) GET/GETNEXT access is supported. Configure RMON using the RMON commands. Collected data is lost during a chassis reboot.

Commands

The FTOS RMON commands are:

- rmon alarm
- rmon collection history
- rmon collection statistics
- rmon event
- rmon hc-alarm
- show rmon
- show rmon alarms
- show rmon events
- show rmon hc-alarm

- show rmon history
- show rmon log
- show rmon statistics

rmon alarm

Set an alarm on any MIB object.

Syntax

rmon alarm *number variable interval* {delta | absolute} rising-threshold *value event-number* falling-threshold *value event-number* [owner *string*]

To disable the alarm, use the no rmon alarm *number* command.

Parameters

number	Enter the alarm integer number from 1 to 65535. The value must be unique in the RMON Alarm Table.
variable	The MIB object to monitor. The variable must be in the SNMP OID format, for example, 1.3.6.1.2.1.1.3 The object type must be a 32 bit integer.
interval	Time, in seconds, the alarm monitors the MIB variables; this is the alarmSampleType in the RMON Alarm table. Range: 5 to 3600 seconds
delta	Enter the keyword delta to test the change between MIB variables. This is the alarmSampleType in the RMON Alarm table.
absolute	Enter the keyword absolute to test each MIB variable directly. This is the alarmSampleType in the RMON Alarm table.
rising-threshold *value event-number*	Enter the keyword rising-threshold followed by the value (32bit) the rising-threshold alarm is either triggered or reset. Then enter the event-number to trigger when the rising threshold exceeds its limit. This value is the same as the alarmRisingEventIndex or alarmTable of the RMON MIB. If there is no corresponding rising-threshold event, the value is zero.
falling-threshold *value event-number*	Enter the keyword falling-threshold followed by the value (32bit) the falling-threshold alarm is either triggered or reset. Then enter the event-number to trigger when the falling threshold exceeds its limit. This value is the same as the alarmFallingEventIndex or the alarmTable of the RMON MIB. If there is no corresponding falling-threshold event, the value is zero.
owner *string*	(OPTIONAL) Enter the keyword owner followed by the owner name to specify an owner for the alarm. This is the alarmOwner object in the alarmTable of the RMON MIB.

Default

owner

Command Modes

CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

rmon collection history

Enable the RMON MIB history group of statistics collection on an interface.

Syntax
rmon collection history {controlEntry *integer*} [owner *name*] [buckets *number*] [interval *seconds*]

To remove a specified RMON history group of statistics collection, use the no rmon collection history {controlEntry *integer*} command.

Parameters

controlEntry *integer*	Enter the keyword controlEntry to specify the RMON group of statistics using a value. Then enter an integer value from 1 to 65535 that identifies the RMON group of statistics. The integer value must be a unique index in the RMON History Table.
owner *name*	(OPTIONAL) Enter the keyword owner followed by the owner name to record the owner of the RMON group of statistics.
buckets *number*	(OPTIONAL) Enter the keyword buckets followed the number of buckets for the RMON collection history group of statistics. Bucket Range: 1 to 1000 Default: 50
interval *seconds*	(OPTIONAL) Enter the keyword interval followed the number of seconds in each polling cycle. Range: 5 to 3600 seconds Default: 1800 seconds

Defaults
No default behavior

Command Modes
CONFIGURATION INTERFACE (config-if)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

rmon collection statistics

Enable RMON MIB statistics collection on an interface.

Syntax
rmon collection statistics {controlEntry *integer*} [owner *name*]

To remove RMON MIB statistics collection on an interface, use the no rmon collection statistics {controlEntry *integer*} command.

Parameters

controlEntry *integer*	Enter the keyword controlEntry to specify the RMON group of statistics using a value. Then enter an integer value from 1 to 65535 that identifies the RMON Statistic Table. The integer value must be a unique in the RMON Statistic Table.
owner *name*	(OPTIONAL) Enter the keyword owner followed by the owner name to record the owner of the RMON group of statistics.

Defaults
none

Command Modes
CONFIGURATION INTERFACE (config-if)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

rmon event

Add an event in the RMON event table.

Syntax
rmon event *number* [log] [trap *community*] [description *string*] [owner *name*]

To disable RMON on an interface, use the no rmon event *number* [log] [trap *community*] [description *string*] command.

Parameters

number	Assign an event number in integer format from 1 to 65535. The number value must be unique in the RMON Event Table.
log	(OPTIONAL) Enter the keyword log to generate an RMON log entry. The log entry is triggered and sets the eventType in the RMON MIB to log or log-and-trap. Default: No log
trap *community*	(OPTIONAL) Enter the keyword trap followed by an SNMP community string to configure the eventType setting in the RMON MIB. This sets either snmp-trap or log-and-trap. Default: public
description *string*	(OPTIONAL) Enter the keyword description followed by a string describing the event.
owner *name*	(OPTIONAL) Enter the keyword owner followed by the name of the owner of this event.

Defaults
as described above

Command Modes
CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

rmon hc-alarm

Set an alarm on any MIB object.

Syntax
rmon hc-alarm *number variable interval* {delta | absolute} rising-threshold *value event-number* falling-threshold *value event-number* [owner *string*]

To disable the alarm, use the no rmon hc-alarm *number* command.

Parameters

number	Enter the alarm integer number from 1 to 65535. The value must be unique in the RMON Alarm Table.
variable	The MIB object to monitor. The variable must be in the SNMP OID format, for example, 1.3.6.1.2.1.1.3 The object type must be a 64 bit integer.
interval	Time, in seconds, the alarm monitors the MIB variables; this is the alarmSampleType in the RMON Alarm table. Range: 5 to 3600 seconds
delta	Enter the keyword delta to test the change between MIB variables. This is the alarmSampleType in the RMON Alarm table.
absolute	Enter the keyword absolute to test each MIB variable directly. This is the alarmSampleType in the RMON Alarm table.

rising-threshold *value* *event-number*	Enter the keyword rising-threshold followed by the value (64 bit) the rising-threshold alarm is either triggered or reset. Then enter the event-number to trigger when the rising threshold exceeds its limit. This value is the same as the alarmRisingEventIndex or alarmTable of the RMON MIB. If there is no corresponding rising-threshold event, the value is zero.
falling-threshold *value* *event-number*	Enter the keyword falling-threshold followed by the value (64 bit) the falling-threshold alarm is either triggered or reset. Then enter the event-number to trigger when the falling threshold exceeds its limit. This value is the same as the alarmFallingEventIndex or the alarmTable of the RMON MIB. If there is no corresponding falling-threshold event, the value is zero.
owner *string*	(OPTIONAL) Enter the keyword owner followed the owner name to specify an owner for the alarm. This is the alarmOwner object in the alarmTable of the RMON MIB.

Defaults	owner
Command Modes	CONFIGURATION
Command History	

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show rmon

Display the RMON running status including the memory usage.

Syntax	show rmon
Defaults	none
Command Modes	EXEC
Command History	

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   Figure 27-1.   show rmon Command Example

```
FTOS# show rmon
RMON status
    total memory used 218840 bytes.
    ether statistics table: 8 entries, 4608 bytes
    ether history table: 8 entries, 6000 bytes
    alarm table: 390 entries, 102960 bytes
    high-capacity alarm table: 5 entries, 1680 bytes
    event table: 500 entries, 206000 bytes
    log table: 2 entries, 552 bytes
FTOS#
```

show rmon alarms

Display the contents of the RMON alarm table.

Syntax   show rmon alarms [*index*] [brief]

Parameters

index	(OPTIONAL) Enter the table index number to display just that entry.
brief	(OPTIONAL) Enter the keyword brief to display the RMON Alarm Table in an easy-to-read format.

Defaults   none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1   Figure 27-2.   show rmon alarms *index* Command Example

```
FTOS#show rmon alarm  1
RMON alarm entry 1
    sample Interval: 5
    object: 1.3.6.1.2.1.1.3
    sample type: absolute value.
    value: 255161
    alarm type: rising or falling alarm.
    rising threshold: 1, RMON event index: 1
    falling threshold: 501, RMON event index: 501
    alarm owner: 1
    alarm status: OK
FTOS#
```

Example 2   Figure 27-3.   show rmon alarms brief Command Example

```
FTOS#show rmon alarm br
index           SNMP OID
----------------------------------------------------------------
-
1               1.3.6.1.2.1.1.3
2               1.3.6.1.2.1.1.3
3               1.3.6.1.2.1.1.3
4               1.3.6.1.2.1.1.3
5               1.3.6.1.2.1.1.3
6               1.3.6.1.2.1.1.3
7               1.3.6.1.2.1.1.3
8               1.3.6.1.2.1.1.3
9               1.3.6.1.2.1.1.3
10              1.3.6.1.2.1.1.3
11              1.3.6.1.2.1.1.3
12              1.3.6.1.2.1.1.3
13              1.3.6.1.2.1.1.3
14              1.3.6.1.2.1.1.3
15              1.3.6.1.2.1.1.3
16              1.3.6.1.2.1.1.3
17              1.3.6.1.2.1.1.3
18              1.3.6.1.2.1.1.3
19              1.3.6.1.2.1.1.3
20              1.3.6.1.2.1.1.3
21              1.3.6.1.2.1.1.3
22              1.3.6.1.2.1.1.3
FTOS#
```

show rmon events

Display the contents of RMON event table.

Syntax show rmon events [*index*] [brief]

Parameters

index	(OPTIONAL) Enter the table index number to display just that entry.
brief	(OPTIONAL) Enter the keyword brief to display the RMON Event Table in an easy-to-read format.

Defaults none

Command Modes EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1 Figure 27-4.   show rmon event *index* Command Example

```
FTOS#show rmon event 1
RMON event entry 1
    description: 1
    event type: LOG and SNMP TRAP.
    event community: public
    event last time sent: none
    event owner: 1
    event status: OK
FTOS#
```

Example 2 Figure 27-5.   show rmon event brief Command Example

```
FTOS#show rmon event br
index           description
---------------------------------------------------------------------
1               1
2               2
3               3
4               4
5               5
6               6
7               7
8               8
9               9
10              10
11              11
12              12
13              13
14              14
15              15
16              16
17              17
18              18
19              19
20              20
21              21
22              22
FTOS#
```

show rmon hc-alarm

Display the contents of RMON High-Capacity Alarm Table.

Syntax   show rmon hc-alarm [*index*] [brief]

Parameters

index	(OPTIONAL) Enter the table index number to display just that entry.
brief	(OPTIONAL) Enter the keyword brief to display the RMON High-Capacity Alarm Table in an easy-to-read format.

Defaults   none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1   Figure 27-6.   show rmon hc-alarm brief Command Example

```
FTOS#show rmon hc-alarm brief
index          SNMP OID
--------------------------------------------------------------------
1              1.3.6.1.2.1.1.3
2              1.3.6.1.2.1.1.3
3              1.3.6.1.2.1.1.3
4              1.3.6.1.2.1.1.3
5              1.3.6.1.2.1.1.3
FTOS#
```

Example 2   Figure 27-7.   show rmon hc-alarm *index* Command Example

```
FTOS#show rmon hc-alarm 1
RMON high-capacity alarm entry 1
    object: 1.3.6.1.2.1.1.3
    sample interval: 5
    sample type: absolute value.
    value: 185638
    alarm type: rising or falling alarm.
    alarm rising threshold value: positive.
    rising threshold: 1001, RMON event index: 1
    alarm falling threshold value: positive.
    falling threshold: 999, RMON event index: 6
    alarm sampling failed 0 times.
    alarm owner: 1
    alarm storage type: non-volatile.
    alarm status: OK
FTOS#
```

show rmon history

Display the contents of the RMON Ethernet History table.

Syntax   show rmon history [*index*] [brief]

Parameters

index	(OPTIONAL) Enter the table index number to display just that entry.
brief	(OPTIONAL) Enter the keyword brief to display the RMON Ethernet History table in an easy-to-read format.

Defaults   none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1   Figure 27-8.   show rmon history *index* Command Example

```
FTOS#show rmon history 6001
RMON history control entry 6001
    interface: ifIndex.100974631 TenGigabitEthernet 2/1
    bucket requested: 1
    bucket granted: 1
    sampling interval: 5 sec
    owner: 1
    status: OK
FTOS#
```

Example 2   Figure 27-9.   show rmon history brief Command Example

```
FTOS#show rmon history brief
index          ifIndex          interface
-------------------------------------------------------------------
-
6001           100974631        TenGigabitEthernet 2/1
6002           100974631        TenGigabitEthernet 2/1
6003           101236775        TenGigabitEthernet 2/1
6004           101236775        TenGigabitEthernet 2/1
9001           134529054        TenGigabitEthernet 3/1
9002           134529054        TenGigabitEthernet 3/1
9003           134791198        TenGigabitEthernet 3/1
9004           134791198        TenGigabitEthernet 3/1
FTOS#
```

show rmon log

Display the contents of RMON log table.

Syntax   show rmon log [*index*] [brief]

Parameters

index	(OPTIONAL) Enter the log index number to display just that entry.
brief	(OPTIONAL) Enter the keyword brief to display the RMON Log Table in an easy-to-read format.

Defaults   none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1   Figure 27-10.   show rmon log *index* Command Example

```
FTOS#show rmon log 2
RMON log entry, alarm table index 2, log index 1
    log time: 14638 (THU AUG 12 22:10:40 2004)
    description: 2
FTOS#
```

Example 2   Figure 27-11.   show rmon log brief Command Example

```
FTOS#show rmon log br
eventIndex      description
-----------------------------------------------------------------
-
2               2
4               4
FTOS#
```

Usage Information   The log table has a maximum of 500 entries. If the log exceeds that maximum, the oldest log entry is purged to allow room for the new entry.

show rmon statistics

Display the contents of RMON ethernet statistics table.

Syntax   show rmon statistics [*index*] [brief]

Parameters

index	(OPTIONAL) Enter the index number to display just that entry.
brief	(OPTIONAL) Enter the keyword brief to display the RMON Ethernet Statistics table in an easy-to-read format.

Defaults   none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1   Figure 27-12.   show rmon statistics *index* Command Example

```
FTOS#show rmon statistics 6001
RMON statistics entry 6001
    interface: ifIndex.100974631 TenGigabitEthernet 2/1
    packets dropped: 0
    bytes received: 0
    packets received: 0
    broadcast packets: 0
    multicast packets: 0
    CRC error: 0
    under-size packets: 0
    over-size packets: 0
    fragment errors: 0
    jabber errors: 0
    collision: 0
    64bytes packets: 0
    65-127 bytes packets: 0
    128-255 bytes packets: 0
    256-511 bytes packets: 0
    512-1023 bytes packets: 0
    1024-1518 bytes packets: 0
    owner: 1
    status: OK
    <high-capacity data>
    HC packets received overflow: 0
    HC packets received: 0
    HC bytes received overflow: 0
    HC bytes received: 0
    HC 64bytes packets overflow: 0
    HC 64bytes packets: 0
    HC 65-127 bytes packets overflow: 0
    HC 65-127 bytes packets: 0
    HC 128-255 bytes packets overflow: 0
    HC 128-255 bytes packets: 0
    HC 256-511 bytes packets overflow: 0
    HC 256-511 bytes packets: 0
    HC 512-1023 bytes packets overflow: 0
    HC 512-1023 bytes packets: 0
    HC 1024-1518 bytes packets overflow: 0
    HC 1024-1518 bytes packets: 0
FTOS#
```

Example 2   Figure 27-13.   show rmon statistics brief Command Example

```
FTOS#show rmon statistics br
index           ifIndex            interface
--------------------------------------------------------------------
6001            100974631          TenGigabitEthernet 2/1
6002            100974631          TenGigabitEthernet 2/1
6003            101236775          TenGigabitEthernet 2/1
6004            101236775          TenGigabitEthernet 2/1
9001            134529054          TenGigabitEthernet 3/1
9002            134529054          TenGigabitEthernet 3/1
9003            134791198          TenGigabitEthernet 3/1
9004            134791198          TenGigabitEthernet 3/1
FTOS#
```

Rapid Spanning Tree Protocol (RSTP)

Overview

The Dell Force10 operating software (FTOS) implementation of the rapid spanning tree protocol (RSTP) is based on the IEEE 802.1w standard spanning-tree protocol. The RSTP algorithm configures connectivity throughout a bridged local area network (LAN) that is comprised of LANs interconnected by bridges.

Commands

The FTOS RSTP commands are:

- bridge-priority
- debug spanning-tree rstp
- description
- forward-delay
- hello-time
- max-age
- edge-port bpdufilter default
- protocol spanning-tree rstp
- show config
- show spanning-tree rstp
- spanning-tree rstp
- tc-flush-standard

bridge-priority

Set the bridge priority for RSTP.

Syntax   bridge-priority *priority-value*

To return to the default value, use the no bridge-priority command.

Parameters

priority-value	Enter a number as the bridge priority value in increments of 4096.
	Range: 0 to 61440
	Default: 32768

Defaults   32768

| **Command Modes** | CONFIGURATION RSTP (conf-rstp) |
| | |

| **Command History** | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

| **Related Commands** | protocol spanning-tree rstp | Enters rapid spanning tree mode |

debug spanning-tree rstp

Enable debugging of RSTP and view information on the protocol.

Syntax   debug spanning-tree rstp [all | bpdu *interface* {in | out} | events]

To disable debugging, use the no debug spanning-tree rstp command.

Parameters

all	(OPTIONAL) Enter the keyword all to debug all spanning tree operations.
bpdu *interface* {in | out}	(OPTIONAL) Enter the keyword bpdu to debug Bridge Protocol Data Units.
	(OPTIONAL) Enter the interface keyword along with the type slot/port of the interface you want displayed. Type slot/port options are the following:
	• For a Port Channel interface, enter the keyword port-channel followed by a number:
	Range: 1 to 128
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	Optionally, enter an in or out parameter in conjunction with the optional interface:
	• For Receive, enter in
	• For Transmit, enter out
events	(OPTIONAL) Enter the keyword events to debug RSTP events.

Command Modes   EXEC Privilege

| **Command History** | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Example   **Figure 28-1.   debug spanning-tree rstp bpdu Command Example**

```
FTOS#debug spanning-tree rstp bpdu tengigabitethernet 2/0 ?
in Receive (in)
out Transmit (out)
```

description

Enter a description of the rapid spanning tree

Syntax   description {*description*}

To remove the description, use the no description {*description*} command.

Parameters		
	description	Enter a description to identify the Rapid Spanning Tree (80 characters maximum).

Defaults	none

Command Modes	SPANNING TREE (The prompt is "config-rstp".)

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands		
	protocol spanning-tree rstp	Enters SPANNING TREE mode on the switch.

disable

Disable RSTP globally on the system.

Syntax	disable

To enable rapid spanning tree protocol, use the no disable command.

Defaults	RSTP is disabled

Command Modes	CONFIGURATION RSTP (conf-rstp)

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands		
	protocol spanning-tree rstp	Enters Rapid Spanning Tree mode

forward-delay

Configure the amount of time the interface waits in the Listening State and the Learning State before transitioning to the Forwarding State.

Syntax	forward-delay *seconds*

To return to the default setting, use the no forward-delay command.

Parameters		
	seconds	Enter the number of seconds that FTOS waits before transitioning RSTP to the forwarding state.
		Range: 4 to 30
		Default: 15 seconds

Defaults	15 seconds

Command Modes	CONFIGURATION RSTP (conf-rstp)

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

| **Related Commands** | hello-time | Changes the time interval between BPDUs. |
| | max-age | Changes the wait time before RSTP refreshes protocol configuration information. |

hello-time

Set the time interval between generation of RSTP bridge protocol data units (BPDUs).

Syntax   hello-time [milli-second] *seconds*

To return to the default value, use the no hello-time command.

Parameters

seconds	Enter a number as the time interval between transmission of BPDUs.
	Range: 1 to 10 seconds
	Default: 2 seconds.
milli-second	Enter this keyword to configure a hello time on the order of milliseconds.
	Range: 50 - 950 milliseconds

Defaults   2 seconds

Command Modes   CONFIGURATION RSTP (conf-rstp)

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information

The hello time is encoded in BPDUs in increments of 1/256ths of a second. The standard minimum hello time in seconds is 1 second, which is encoded as 256. Millisecond hello times are encoded using values less than 256; the millisecond hello time equals (x/1000)*256.

When millisecond hellos are configured, the default hello interval of 2 seconds is still used for edge ports; the millisecond hello interval is not used.

Related Commands

| forward-delay | Changes the wait time before RSTP transitions to the Forwarding state. |
| max-age | Changes the wait time before RSTP refreshes protocol configuration information. |

max-age

Set the time interval for the RSTP bridge to maintain configuration information before refreshing that information.

Syntax   max-age *seconds*

To return to the default values, use the no max-age command.

Parameters

max-age	Enter a number of seconds the FTOS waits before refreshing configuration information.
	Range: 6 to 40 seconds
	Default: 20 seconds

Defaults   20 seconds

Command Modes	CONFIGURATION RSTP (conf-rstp)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	max-age	Changes the wait time before RSTP transitions to the Forwarding state.
	hello-time	Changes the time interval between BPDUs.

edge-port bpdufilter default

Enable BPDU Filter globally to filter transmission of BPDU on port fast enabled interfaces.

Syntax   edge-port bpdufilter default

To disable global bpdu filter default, use the no edge-port bpdufilter default command.

Defaults   Disabled

Command Modes   CONFIGURATION (conf-rstp)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

protocol spanning-tree rstp

Enter the RSTP mode to configure RSTP.

Syntax   protocol spanning-tree rstp

To exit the RSTP mode, use the exit command.

Defaults   Not configured

Command Modes   CONFIGURATION RSTP (conf-rstp)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 28-2.   protocol spanning-tree rstp Command Example**

```
FTOS(conf)#protocol spanning-tree rstp
FTOS(conf-rstp)##no disable
```

Usage Information   RSTP is not enabled when you enter RSTP mode. To enable RSTP globally on the system, use the no description command from RSTP mode.

Related Commands	description	Disable RSTP globally on the system.

show config

View the current configuration for the mode. Only non-default values are displayed.

Syntax	show config
Command Modes	CONFIGURATION RSTP (conf-rstp)
Command History	Version 8.3.16.1 Introduced on MXL 10/40GbE Switch IO Module
Example	**Figure 28-3. show config Command Example for RSTP Mode**

```
FTOS(conf-rstp)#show config
!
protocol spanning-tree rstp
 no disable
 bridge-priority 16384
```

show spanning-tree rstp

Display the RSTP configuration.

Syntax	show spanning-tree rstp [brief] [guard]

Parameters		
	brief	(OPTIONAL) Enter the keyword brief to view a synopsis of the RSTP configuration information.
	guard	(OPTIONAL) Enter the keyword guard to display the type of guard enabled on an RSTP interface and the current port state.

Command Modes	EXEC
	EXEC Privilege

Example 1   **Figure 28-4.   show spanning-tree rstp brief Command Example**

```
FTOS#show spanning-tree rstp brief
Executing IEEE compatible Spanning Tree Protocol
Root ID Priority 8192, Address 0001.e805.e306
Root Bridge hello time 4, max age 20, forward delay 15
Bridge ID Priority 16384, Address 0001.e801.6aa8
Configured hello time 2, max age 20, forward delay 15
Bpdu filter disabled globally

Interface                               Designated
Name       PortID Prio  Cost    Sts Cost    Bridge ID            PortID
---------- ------- ---- ------- --- ------- -------------------- -------
TenGig 4/0 128.418 128   20000   FWD 20000   16384 0001.e801.6aa8 128.418
TenGig 4/1 128.419 128   20000   FWD 20000   16384 0001.e801.6aa8 128.419
TenGig 4/8 128.426 128   20000   FWD 20000   8192 0001.e805.e306  128.130
TenGig 4/9 128.427 128   20000   BLK 20000   8192 0001.e805.e306  128.131

Interface                                                    Bpdu
Name       Role    PortID   Prio  Cost    Sts Cost    Link-type Edge  Filter
---------- ------ -------- ---- ------- --- ------- --------- ---- ------
TenGig 4/0 Desg    128.418 128   20000   FWD 20000   P2P       Yes   No
TenGig 4/1 Desg    128.419 128   20000   FWD 20000   P2P       Yes   No
TenGig 4/8 Root    128.426 128   20000   FWD 20000   P2P       No    No
TenGig 4/9 Altr    128.427 128   20000   BLK 20000   P2P       No    No
FTOS#
```

Example 2   **Figure 28-5.   show spanning-tree rstp with EDS and LBK**

```
FTOS#show spanning-tree rstp br
Executing IEEE compatible Spanning Tree Protocol
Root ID Priority 32768, Address 0001.e801.6aa8
Root Bridge hello time 2, max age 20, forward delay 15
Bridge ID Priority 32768, Address 0001.e801.6aa8
We are the root
Configured hello time 2, max age 20, forward delay 15
Interface                                 Designated
Name       PortID   Prio  Cost   Sts Cost    Bridge ID           PortID
---------- -------- ---- ------- --- ------- ------------------- --------
TenGig 0/0 128.257  128  20000   EDS  0      32768 0001.e801.6aa8 128.257

Interface                                                      Bpdu
Name       Role   PortID   Prio Cost   Sts Cost  Link-type Edge Filter
---------- ------ -------- ---- ------- --- ------- --------- ---- ------
TenGig 0/0 ErrDis 128.257  128  20000   EDS  0       P2P       No   No

FTOS#show spanning-tree rstp
Root Identifier has priority 32768, Address 0001.e801.6aa8
Root Bridge hello time 2, max age 20, forward delay 15, max hops 0
Bridge Identifier has priority 32768, Address 0001.e801.6aa8
Configured hello time 2, max age 20, forward delay 15, max hops 0
We are the root
Current root has priority 32768, Address 0001.e801.6aa8
Number of topology changes 1, last change occurred 00:00:31 ago on TenGig 0/0
Port 257 (TenGigabitEthernet 0/0) is LBK_INC Discarding
Port path cost 20000, Port priority 128, Port Identifier 128.257
Designated root has priority 32768, address 0001.e801.6aa8
Designated bridge has priority 32768, address 0001.e801.6aa8
Designated port id is 128.257, designated path cost 0
Number of transitions to forwarding state 1
BPDU : sent 27, received 9
The port is not in the Edge port mode, bpdu filter is disabled


FTOS#
```

Example 3   **Figure 28-6.   show spanning-tree rstp guard Command Example**

```
FTOS#show spanning-tree rstp guard

Interface
Name       Instance  Sts        Guard type   Bpdu Filter
---------  --------  ---------  ----------   -----------
TenGig 0/1  0        INCON(Root) Rootguard    No
TenGig 0/2  0        FWD         Loopguard     No
TenGig 0/3  0        BLK         Bpduguard     No
FTOS#
```

Table 28-1.   show spanning-tree rstp guard Command Description

Field	Description
Interface Name	RSTP interface
Instance	RSTP instance
Sts	Port state: root-inconsistent (INCON Root), forwarding (FWD), listening (LIS), blocking (BLK), disabled (DIS), or shut down (EDS Shut)
Guard Type	Type of STP guard configured (Root, Loop, or BPDU guard)
BPDU Filter	Yes - BPDU Filter enabled No - BPDU Filter disabled

Note: Loop guard is not supported in the show spanning-tree rstp guard command.

spanning-tree rstp

Configure an RSTP interface with one of these settings: port cost, edge port with optional Bridge Port Data Unit (BPDU) guard, port priority, loop guard, or root guard.

Syntax   spanning-tree rstp {cost *port-cost* | edge-port [bpduguard [shutdown-on-violation] | bpdufilter] | priority *priority* | {rootguard}}

Parameters

cost *port-cost*	Enter the keyword cost followed by the port cost value. Range: 1 to 200000 Defaults: 10-Gigabit Ethernet interface = 2000 40-Gigabit Ethernet interface = 1400 Port Channel interface with one 10-Gigabit Ethernet = 2000 Port Channel interface with one 40-Gigabit Ethernet = 1400 Port Channel with two 10-Gigabit Ethernet = 1800 Port Channel with two 40-Gigabit Ethernet = 600
edge-port	Enter the keyword edge-port to configure the interface as a Rapid Spanning Tree edge port.
bpduguard	(OPTIONAL) Enter the keyword portfast to enable Portfast to move the interface into forwarding mode immediately after the root fails. Enter the keyword bpduguard to disable the port when it receives a BPDU.
shutdown-on-violation	(OPTIONAL) Enter the keyword shutdown-on-violation to hardware disable an interface when a BPDU is received and the port is disabled.
bpdufilter	(OPTIONAL) Enter the keyword bpdufilter to enable BPDU Filter to stop sending and receiving BPDUs on port enabled interfaces.
priority *priority*	Enter keyword priority followed by a value in increments of 16 as the priority. Range: 0 to 240 Default: 128
rootguard	Enter the keyword rootguard to enable root guard on an RSTP port or port-channel interface.

Defaults   Not configured

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The BPDU guard option prevents the port from participating in an active STP topology in case a BPDU appears on a port unintentionally, or is mis-configured, or is subject to a DOS attack. This option places the port into an error disable state if a BPDU appears, and a message is logged so that the administrator can take corrective action.

> **Note:** A port configured as an edge port on an RSTP switch, immediately transitions to the Forwarding state. Only ports connected to end-hosts should be configured as edge ports. Consider an edge port similar to a port with a spanning-tree portfast enabled.

If you do not enable the shutdown-on-violation command, BPDUs are still sent to the CPU.

You cannot enable STP root guard and loop guard at the same time on a port. For example, if you configure loop guard on a port on which root guard is already configured, the following error message is displayed:

```
% Error: RootGuard is configured. Cannot configure LoopGuard.
```

Enabling Portfast BPDU guard and loop guard at the same time on a port results in a port that remains in a blocking state and prevents traffic from flowing through it. For example, when Portfast BPDU guard and loop guard are both configured:

- If a BPDU is received from a remote device, BPDU guard places the port in an Err-Disabled blocking state and no traffic is forwarded on the port.
- If no BPDU is received from a remote device, loop guard places the port in a Loop-Inconsistent blocking state and no traffic is forwarded on the port.

Example   **Figure 28-7.   spanning-tree rstp edge-port Command Example**

```
FTOS(conf)#interface tengigabitethernet 4/0
FTOS(conf-if-tengig-4/0)#spanning-tree rstp edge-port
FTOS(conf-if-tengig-4/0)#show config
!
interface TenGigabitEthernet 4/0
 no ip address
 switchport
 spanning-tree rstp edge-port
 no shutdown
FTOS#
```

tc-flush-standard

Enable the MAC address flushing after receiving every topology change notification.

Syntax   tc-flush-standard

To disable, use the no tc-flush-standard command.

Defaults   Disabled

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information By default FTOS implements an optimized flush mechanism for RSTP. This helps in flushing MAC addresses only when necessary (and less often), allowing for faster convergence during topology changes. However, if a standards-based flush mechanism is needed, you can turn on this knob command to enable flushing MAC addresses after receiving every topology change notification.

29

Security

Commands

This chapter describes various types of security commands in the Dell Force10 operating software (FTOS), in the following sections:

- AAA Accounting Commands
- Authorization and Privilege Commands
- Authentication and Password Commands
- RADIUS Commands
- TACACS+ Commands
- SSH Server and SCP Commands
- Secure DHCP Commands

For configuration details, refer to the Security chapter in the *FTOS Configuration Guide*.

> **Note:** Starting with FTOS version 7.2.1.0, LEAP with MSCHAP v2 supplicant is implemented.

AAA Accounting Commands

AAA accounting enables tracking of services that users are accessing and the amount of network resources being consumed by those services.When you enable AAA accounting, the network server reports user activity to the terminal access controller access control system (TACACS+) security server in the form of accounting records. Each accounting record is comprised of accounting Attribute/Value (AV) pairs and is stored on the access control server.

As with authentication and authorization, you must configure AAA accounting by defining named list of accounting methods, and then applying that list to various interfaces. The commands in this section are:

- aaa accounting
- aaa accounting suppress
- accounting
- show accounting

aaa accounting

Enable AAA accounting and create a record for monitoring the accounting function.

Syntax aaa accounting {system | exec | commands *level*} {*name* | default} {start-stop | wait-start | stop-only} {tacacs+}

To disable AAA Accounting, use the no aaa accounting {system | exec | command *level*} {*name* | *default*} {start-stop | wait-start | stop-only} {tacacs+} command.

Parameters

system	Enter the keyword system to send accounting information of any other AAA configuration.
exec	Enter the keyword exec to send accounting information when a user has logged in to the EXEC mode.
commands *level*	Enter the keyword command followed by a privilege level for accounting of commands executed at that privilege level.
name	default	Enter one of the following: • For *name*, a user-defined name of a list of accounting methods • default for the default accounting methods
start-stop	Enter the keyword start-stop to send a "start accounting" notice at the beginning of the requested event and a "stop accounting" notice at the end of the event.
wait-start	Enter the keyword wait-start to ensure that the TACACS+ security server acknowledges the start notice before granting the user's process request.
stop-only	Enter the keyword stop-only to instruct the TACACS+ security server to send a "stop record accounting" notice at the end of the requested user process.
tacacs+	Enter the keyword tacacs+ to use TACACS+ data for accounting. FTOS currently only supports TACACS+ accounting.

Defaults none

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 29-1.   aaa accounting Command Examples**

```
FTOS(conf)# aaa accounting exec default start-stop tacacs+
FTOS(conf)# aaa accounting command 15 default start-stop tacacs+
FTOS (config)#
```

Usage Information In Figure 29-1, TACACS+ accounting is used to track all usage of EXEC command and commands on privilege level 15.

Privilege level 15 is the default. If you want to track usage at privilege level 1, for example, use aaa accounting command 1.

Related Commands

enable password	Changes the password for the enable command.
login authentication	Enables AAA login authentication on terminal lines.
password	Creates a password.
tacacs-server host	Specifies a TACACS+ server host.

aaa accounting suppress

Prevent the generation of accounting records of users with user name value of NULL.

Syntax aaa accounting suppress null-username

To permit accounting records to users with user name value of NULL, use the no aaa accounting suppress null-username command

Defaults Accounting records are recorded for all users.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information FTOS issues accounting records for all users on the system, including users whose username string, due to protocol translation, is NULL. For example, a user who comes on line with the aaa authentication login *method-list* none command is applied. Use aaa accounting suppress command to prevent accounting records from being generated for sessions that do not have user names associated to them.

accounting

Apply an accounting method list to terminal lines.

Syntax accounting {*exec* | commands *level*} *method-list*

Parameters

exec	Enter this keyword to apply an EXEC level accounting method list.
commands *level*	Enter this keyword to apply an EXEC and CONFIGURATION level accounting method list.
method-list	Enter a method list that you defined using the command aaa accounting exec or aaa accounting commands.

Defaults none

Command Modes LINE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

aaa accounting	Enables AAA Accounting and create a record for monitoring the accounting function.

show accounting

Display the active accounting sessions for each online user.

Syntax show accounting

Defaults none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 29-2.   show accounting Command Example**

```
FTOS#show accounting
Active accounted actions on tty2, User admin Priv 1
   Task ID 1, EXEC Accounting record, 00:00:39 Elapsed, service=shell
Active accounted actions on tty3, User admin Priv 1
   Task ID 2, EXEC Accounting record, 00:00:26 Elapsed, service=shell
FTOS#
```

Usage Information   This command steps through all active sessions and then displays the accounting records for the active account functions.

Authorization and Privilege Commands

Set command line authorization and privilege levels with the following commands:

- authorization
- aaa authorization commands
- aaa authorization config-commands
- aaa authorization exec
- privilege level (CONFIGURATION mode)
- privilege level (LINE mode)

authorization

Apply an authorization method list to terminal lines.

Syntax   authorization { *exec* | commands *level*} *method-list*

Parameters

exec	Enter this keyword to apply an EXEC level authorization method list.
commands *level*	Enter this keyword to apply an EXEC and CONFIGURATION level authorization method list.
method-list	Enter a method list that you defined using the command aaa authorization exec or aaa authorization commands.

Defaults   none

Command Modes   LINE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

aaa authorization commands

Set parameters that restrict (or permit) a user's access to EXEC and CONFIGURATION level commands

Syntax aaa authorization commands *level* {*name* | default} {local || tacacs+ || none}

To undo a configuration, use the no aaa authorization commands level {name | default} {local || tacacs+ || none} command.

Parameters

commands *level*	Enter the keyword commands followed by the command privilege level for command level authorization.
name	Define a name for the list of authorization methods.
default	Define the default list of authorization methods.
local	Use the authorization parameters on the system to perform authorization.
tacacs+	Use the TACACS+ protocol to perform authorization.
none	Enter this keyword to apply no authorization.

Defaults none

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

aaa authorization config-commands

Set parameters that restrict (or permit) a user's access to EXEC level commands.

Syntax aaa authorization config-commands

To disable authorization checking for CONFIGURATION level commands, use the no aaa authorization config-commands command.

Defaults Enabled when you configure aaa authorization commands

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information By default, the aaa authorization commands command configures the system to check both EXEC level and CONFIGURATION level commands. To enable only EXEC-level command checking, use the no aaa authorization config-commands command.

aaa authorization exec

Set parameters that restrict (or permit) a user's access to EXEC-level commands.

Syntax   aaa authorization exec { *name* | default} {local || tacacs+ || if-authenticated || none}

To disable authorization checking for EXEC level commands, use the no aaa authorization exec command.

Parameters

name	Define a name for the list of authorization methods.
default	Define the default list of authorization methods.
local	Use the authorization parameters on the system to perform authorization.
tacacs+	Use the TACACS+ protocol to perform authorization.
none	Enter this keyword to apply no authorization.

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

privilege level (CONFIGURATION mode)

Change the access or privilege level of one or more commands.

Syntax   privilege *mode* {level *level command* | reset *command*}

To delete access to a level and command, use the no privilege *mode* level *level command* command.

Parameters

mode	Enter one of the following keywords as the mode for which you are controlling access: • configure for the CONFIGURATION mode • exec for the EXEC mode • interface for the INTERFACE modes • line for the LINE mode • route-map for the ROUTE-MAP • router for the ROUTER OSPF, ROUTER RIP, and ROUTER BGP modes.
level *level*	Enter the keyword level followed by a number for the access level. Range: 0 to 15. Level 1 is the EXEC mode and Level 15 allows access to all CLI modes and commands.
reset	Enter the keyword reset to return the security level to the default setting.
command	Enter the command's keywords to assign the command to a certain access level. You can enter one or all of the keywords

Defaults   Not configured.

Command Modes   CONFIGURATION

Usage Information   To define a password for the level to which you are assigning privilege or access, use the enable password command.

privilege level (LINE mode)

Change the access level for users on the terminal lines.

Syntax   privilege level *level*

To delete access to a terminal line, use the no privilege level *level* command.

Parameters

level *level*	Enter the keyword level followed by a number for the access level. Range: 0 to 15. Level 1 is the EXEC mode and Level 15 allows access to all CLI modes.

Defaults   *level* = 15

Command Modes   LINE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Authentication and Password Commands

This section contains the following commands controlling management access to the system:

- aaa authentication enable
- aaa authentication login
- access-class
- enable password
- enable restricted
- enable secret
- login authentication
- password
- password-attributes
- privilege level (CONFIGURATION mode)
- privilege level (LINE mode)
- service password-encryption
- show privilege
- show users
- timeout login response
- username

aaa authentication enable

Configure AAA Authentication method lists for user access to the EXEC privilege mode (the "Enable" access).

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

To return to the default setting, use the no aaa authentication enable {default | *method-list-name*} *method* [... *method2*] command.

Parameters

default	Enter the keyword default followed by the authentication methods to use as the default sequence of methods to be used for the Enable log-in. Default: default enable
method-list-name	Enter a text string (up to 16 characters long) to name the list of enabled authentication methods activated at log in.
method	Enter one of the following methods: • enable - use the password defined by the enable password command in the CONFIGURATION mode. • line - use the password defined by the password command in the LINE mode. • none - no authentication. • radius - use the RADIUS server(s) configured with the radius-server host command. • tacacs+ - use the TACACS+ server(s) configured with the tacacs-server host command.
... method2	(OPTIONAL) In the event of a "no response" from the first method, FTOS applies the next configured method.

Defaults Use the enable password.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information By default, the Enable password is used. If you configure aaa authentication enable default, FTOS uses the methods defined for Enable access instead.

Methods configured with the aaa authentication enable command are evaluated in the order they are configured. If authentication fails using the primary method, FTOS employs the second method (or third method, if necessary) automatically. For example, if the TACACS+ server is reachable, but the server key is invalid, FTOS proceeds to the next authentication method. The TACACS+ is incorrect, but the user is still authenticated by the secondary method.

Related Commands

enable password	Changes the password for the enable command.
login authentication	Enables AAA login authentication on terminal lines.
password	Creates a password.
radius-server host	Specifies a RADIUS server host.
tacacs-server host	Specifies a TACACS+ server host.

aaa authentication login

Configure AAA Authentication method lists for user access to the EXEC mode (Enable log-in).

Syntax   aaa authentication login {*method-list-name* | default} *method* [*... method4*]

To return to the default setting, use the no aaa authentication login {*method-list-name* | default} command.

Parameters

method-list-name	Enter a text string (up to 16 characters long) as the name of a user-configured method list that can be applied to different lines.
default	Enter the keyword default to specify that the method list specified is the default method for all terminal lines.
method	Enter one of the following methods: • enable - use the password defined by the enable password command in the CONFIGURATION mode. • line - use the password defined by the password command in the LINE mode. • local - use the user name/password defined by the in the local configuration. • none - no authentication. • radius - use the RADIUS server(s) configured with the radius-server host command. • tacacs+ - use the TACACS+ server(s) configured with the tacacs-server host command.
... method4	(OPTIONAL) Enter up to four additional methods. In the event of a "no response" from the first method, FTOS applies the next configured method (up to four configured methods).

Default   Not configured (that is, no authentication is performed)

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

By default, the locally configured username password is used. If you configure aaa authentication login default, FTOS uses the methods defined by this command for login instead.

Methods configured with the aaa authentication login command are evaluated in the order they are configured. If users encounter an error with the first method listed, FTOS applies the next method configured. If users fail the first method listed, no other methods are applied. The only exception is the local method. If the user's name is not listed in the local database, the next method is applied. If the correct user name/password combination are not entered, the user is not allowed access to the switch.

> ✎ **Note:** If authentication fails using the primary method, FTOS employs the second method (or third method, if necessary) automatically. For example, if the TACACS+ server is reachable, but the server key is invalid, FTOS proceeds to the next authentication method. The TACACS+ is incorrect, but the user is still authenticated by the secondary method.

After configuring the aaa authentication login command, to enable the authentication scheme on terminal lines, configure the login authentication command.

Connections to the SSH server works with the following login mechanisms: local, radius, and tacacs.

Related Commands	login authentication	Applies an authentication method list to designated terminal lines.
	password	Creates a password.
	radius-server host	Specifies a RADIUS server host.
	tacacs-server host	Specifies a TACACS+ server host.

access-class

Restrict incoming connections to a particular IP address in a defined IP access control list (ACL).

Syntax

access-class *access-list-name*

To delete a setting, use the no access-class command.

Parameters

access-list-name	Enter the name of an established IP Standard ACL.

Defaults Not configured.

Command Modes LINE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

line	Applies an authentication method list to designated terminal lines.
ip access-list standard	Names (or selects) a standard access list to filter based on IP address.
ip access-list extended	Names (or selects) an extended access list based on IP addresses or protocols.

enable password

Change the password for the enable command.

Syntax enable password [level *level*] [*encryption-type*] *password*

To delete a password, use the no enable password [*encryption-type*] *password* [level *level*] command.

Parameters

level *level*	(OPTIONAL) Enter the keyword level followed by a number as the level of access.
	Range: 1 to 15
encryption-type	(OPTIONAL) Enter the number 7 or 0 as the encryption type.
	Enter a 7 followed by a text string as the hidden password. The text string must be a password that was already encrypted by a Dell Force10 router.
	Use this parameter only with a password that you copied from the show running-config file of another Dell Force10 router.
password	Enter a text string, up to 32 characters long, as the clear text password.

| **Defaults** | No password is configured. *level* = 15 |

| **Command Modes** | CONFIGURATION |

**Command
History**

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

**Usage
Information**

Use this command to define a password for a level. Use the privilege level (CONFIGURATION mode) command to control access to command modes.

Passwords must meet the following criteria:

- Start with a letter, not a number.
- Passwords can have a regular expression as the password. To create a password with a regular expression in it, you must use CNTL + v prior to entering regular expression. For example, to create the password abcd]e, you type "abcd CNTL v]e". When the password is created, you do not use the CNTL + v key combination and enter "abcd]e".

> **Note:** The question mark (?) and the tilde (~) are not supported characters.

**Related
Commands**

| show running-config | Views the current configuration. |
| privilege level (CONFIGURATION mode) | Controls access to command modes within the switch. |

enable restricted

Allows Dell Force10 technical support to access restricted commands.

| **Syntax** | enable restricted [*encryption-type*] *password* |

To disallow access to restricted commands, use the no enable restricted command.

Parameters

encryption-type	(OPTIONAL) Enter the number 7 as the encryption type.
	Enter 7 followed a text string as the hidden password. The text string must be a password that was already encrypted by a Dell Force10 router.
	Use this parameter only with a password that you copied from the show running-config file of another Dell Force10 router.
password	Enter a text string, up to 32 characters long, as the clear text password.

| **Command Modes** | Not configured. |

**Command
History**

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

**Usage
Information**

Only Dell Force10 Technical Support staff use this command.

enable secret

Change the password for the enable command.

Syntax   enable secret [level *level*] [*encryption-type*] *password*

To delete a password, use the no enable secret [*encryption-type*] *password* [level *level*] command.

Parameters

level *level*	(OPTIONAL) Enter the keyword level followed by a number as the level of access.
	Range: 1 to 15
encryption-type	(OPTIONAL) Enter the number 5 or 0 as the encryption type.
	Enter a 5 followed by a text string as the hidden password. The text string must be a password that was already encrypted by a Dell Force10 router.
	Use this parameter only with a password that you copied from the show running-config file of another Dell Force10 router.
password	Enter a text string, up to 32 characters long, as the clear text password.

Defaults   No password is configured. *level* = 15

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Use this command to define a password for a level. Use the privilege level (CONFIGURATION mode) command to control access to command modes.

Passwords must meet the following criteria:

*   Start with a letter, not a number.
*   Passwords can have a regular expression as the password. To create a password with a regular expression in it, you must use CNTL + v prior to entering regular expression. For example, to create the password abcd]e, you type abcd CNTL v] e and when the password is created, you do not use the CNTL + v key combination and enter abcd]e.

    Note: The question mark (?) and the tilde (~) are not supported characters.

Related Commands

show running-config	Views the current configuration.
privilege level (CONFIGURATION mode)	Controls access to command modes.

login authentication

Apply an authentication method list to designated terminal lines.

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

To use the local user/password database for login authentication, use the no login authentication command.

Parameters		
method-list-name	Enter the *method-list-name* to specify that method list, created in the aaa authentication login command, to be applied to the designated terminal line.	
default	Enter the keyword default to specify that the default method list, created in the aaa authentication login command, is applied to the terminal line.	

Defaults   No authentication is performed on the console lines, and local authentication is performed on the virtual terminal and auxiliary lines.

Command Modes   LINE

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module	

Usage Information   If you configure the aaa authentication login default command, the login authentication default command automatically is applied to all terminal lines.

Related Commands		
aaa authentication login	Selects login authentication methods.	

password

Specify a password for users on terminal lines.

Syntax   password [*encryption-type*] *password*

To delete a password, use the no password *password* command.

Parameters		
encryption-type	(OPTIONAL) Enter either zero (0) or 7 as the encryption type for the *password* entered. The options are:	
	• 0 is the default and means the password is not encrypted and stored as clear text.	
	• 7 means that the password is encrypted and hidden.	
password	Enter a string up to 32 characters long. The first character of the *password* must be a letter.	
	You cannot use spaces in the password.	

Defaults   No password is configured.

Command Modes   LINE

Command History		
Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module	

Usage Information   FTOS prompts users for these passwords when the method for authentication or authorization used is "line".

Related Commands		
enable password	Sets the password for the enable command.	
login authentication	Configures an authentication method to log in to the switch.	
service password-encryption	Encrypts all passwords configured in FTOS.	

radius-server key	Configures a key for all RADIUS communications between the switch and the RADIUS host server.
tacacs-server key	Configures a key for communication between a TACACS+ server and client.
username	Establishes an authentication system based on user names.

password-attributes

Configure the password attributes (strong password).

Syntax

password-attributes [min-length *number*] [max-retry *number*] [character-restriction [upper *number*] [lower *number*] [numeric *number*] [special-char *number*]]

To return to the default, use the no password-attributes [min-length *number*] [max-retry *number*] [character-restriction [upper *number*] [lower *number*] [numeric *number*] [special-char *number*]] command.

Parameters

min-length *number*	(OPTIONAL) Enter the keyword min-length followed by the number of characters.
	Range: 0 - 32 characters
max-retry *number*	(OPTIONAL) Enter the keyword max-retry followed by the number of maximum password retries.
	Range: 0 - 16
character-restriction	(OPTIONAL) Enter the keyword character-restriction to indicate a character restriction for the password.
upper *number*	(OPTIONAL) Enter the keyword upper followed the upper number.
	Range: 0 - 31
lower *number*	(OPTIONAL) Enter the keyword lower followed the lower number.
	Range: 0 - 31
numeric *number*	(OPTIONAL) Enter the keyword numeric followed the numeric number.
	Range: 0 - 31
special-char *number*	(OPTIONAL) Enter the keyword special-char followed the number of special characters permitted.
	Range: 0 - 31

Defaults

Command Modes

CONFIGURATION

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Related Commands

| password | Specifies a password for users on terminal lines. |

service password-encryption

Encrypt all passwords configured in FTOS.

Syntax   service password-encryption

To store new passwords as clear text, use the no service password-encryption command.

Defaults   Enabled.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

△ **Caution:** Encrypting passwords with this command does not provide a high level of security. When the passwords are encrypted, you cannot return them to plain text unless you re-configure them. To remove an encrypted password, use the no password *password* command.

Usage Information   To keep unauthorized people from viewing passwords in the switch configuration file, use the service password-encryption command. This command encrypts the clear-text passwords created for user name passwords, authentication key passwords, the privileged command password, and console and virtual terminal line access passwords.

To view passwords, use the show running-config command.

show privilege

View your access level.

Syntax   show privilege

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 29-3.   show privilege Command Example**

```
FTOS#show privilege
Current privilege level is 15
FTOS#
```

Related Commands

privilege level (CONFIGURATION mode)	Assigns access control to different command modes.

show users

View information on all users logged into the switch.

Syntax

show users [all]

Parameters

all	(OPTIONAL) Enter the keyword all to view all terminal lines in the switch.

Command Modes

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example

Figure 29-4.   show users Command Example

```
FTOS#show user
    Line            User                    Host(s)     Location
    0 console 0     admin                   idle
*   3 vty 1         admin                   idle        172.31.1.4
FTOS#
```

Table 1 describes the information in the show users command example.

Table 1 show users Command Description

Field	Description
(untitled)	Indicates with am asterisk (*) which terminal line you are using.
Line	Displays the terminal lines currently in use.
User	Displays the user name of all users logged in.
Host(s)	Displays the terminal line status.
Location	Displays the IP address of the user.

Related Commands

username	Enables a user.

timeout login response

Specify how long the software will wait for login input (for example, user name and password) before timing out.

Syntax

timeout login response *seconds*

To return to the default values, use the no timeout login response command.

Parameters

seconds	Enter a number of seconds the software will wait before logging you out.
	Range:
	VTY: 1 to 30 seconds, default: 30 seconds.
	Console: 1 to 300 seconds, default: 0 seconds (no timeout).
	AUX: 1 to 300 seconds, default: 0 seconds (no timeout).

Defaults

see above

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The software measures the period of inactivity defined in this command as the period between consecutive keystrokes. For example, if your password is "password" you can enter "p" and wait 29 seconds to enter the next letter.

username

Establish an authentication system based on user names.

Syntax

username *name* [access-class *access-list-name*] [nopassword | {password | secret} [*encryption-type*] *password*] [privilege *level*]

If you do not want a specific user to enter a password, use the nopassword option.

To delete authentication for a user, use the no username *name* command.

Parameters

name	Enter a text string for the name of the user up to 63 characters.
access-class *access-list-name*	Enter the keyword access-class followed by the name of a configured access control list (either an IP access control list or MAC access control list).
nopassword	Enter the keyword nopassword to specify that the user should not enter a password.
password	Enter the keyword password followed by the *encryption-type* or the password.
secret	Enter the keyword secret followed by the *encryption-type* or the password.
encryption-type	Enter an encryption type for the *password* that you will enter. • 0 directs FTOS to store the password as clear text. It is the default encryption type when using the password option. • 7 to indicate that a password encrypted using a DES hashing algorithm will follow. This encryption type is available with the password option only. • 5 to indicate that a password encrypted using an MD5 hashing algorithm will follow. This encryption type is available with the secret option only, and is the default encryption type for this option.
password	Enter a string up to 32 characters long.
privilege *level*	Enter the keyword privilege followed by a number from zero (0) to 15.
secret	Enter the keyword secret followed by the encryption type.

Defaults

The default encryption type for the password option is 0. The default encryption type for the secret option is 0.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

To view the defined user names, use the show running-config user command.

Related Commands	password	Specifies a password for users on terminal lines.
	show running-config	Views the current configuration.

RADIUS Commands

The RADIUS commands supported by FTOS are:

- debug radius
- ip radius source-interface
- radius-server deadtime
- radius-server host
- radius-server key
- radius-server retransmit
- radius-server timeout

debug radius

View RADIUS transactions to assist with troubleshooting.

Syntax   debug radius

To disable debugging of RADIUS, use the no debug radius command.

Defaults   Disabled.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip radius source-interface

Specify an interface's IP address as the source IP address for RADIUS connections.

Syntax   ip radius source-interface *interface*

To delete a source interface, use the no ip radius source-interface command.

Parameters	*interface*	Enter the following keywords and slot/port or number information:
		• For Loopback interfaces, enter the keyword loopback followed by a number from zero (0) to 16838.
		• For the Null interface, enter the keywords null 0.
		• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128
		• For a Ten Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
		• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
		• For VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.

Defaults   Not configured.

Command Mode   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

radius-server deadtime

Configure a time interval during which non-responsive RADIUS servers to authentication requests are skipped.

Syntax   radius-server deadtime *seconds*

To disable this function or return to the default value, use the no radius-server deadtime command.

Parameters

seconds	Enter a number of seconds during which non-responsive RADIUS servers are skipped.
	Range: 0 to 2147483647 seconds.
	Default: 0 seconds.

Defaults   0 seconds

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

radius-server host

Configure a RADIUS server host.

Syntax   radius-server host {*hostname* | *ipv4-address*} [auth-port *port-number*] [retransmit *retries*] [timeout *seconds*] [key [*encryption-type*] *key*]

Parameters

hostname	Enter the name of the RADIUS server host.
ipv4-address	Enter the IPv4 address (A.B.C.D) of the RADIUS server host.

auth-port *port-number*	(OPTIONAL) Enter the keyword **auth-port** followed by a number as the port number. Range: zero (0) to 65535 The default *port-number* is 1812.
retransmit *retries*	(OPTIONAL) Enter the keyword **retransmit** followed by a number as the number of attempts. This parameter overwrites the radius-server retransmit command. Range: zero (0) to 100 Default: 3 attempts
timeout *seconds*	(OPTIONAL) Enter the keyword **timeout** followed by the seconds the time interval the switch waits for a reply from the RADIUS server. This parameter overwrites the radius-server timeout command. Range: 0 to 1000 Default: 5 seconds
key [*encryption-type*] *key*	(OPTIONAL) Enter the keyword **key** followed by an optional encryption-type and a string up to 42 characters long as the authentication key. This authentication key is used by the RADIUS host server and the RADIUS daemon operating on this switch. For the encryption-type, enter either zero (0) or 7 as the encryption type for the *key* entered. The options are: • 0 is the default and means the password is not encrypted and stored as clear text. • 7 means that the password is encrypted and hidden. Configure this parameter last because leading spaces are ignored.

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Use this command to configure any number of RADIUS server hosts for each server host that is configured. FTOS searches for the RADIUS hosts in the order they are configured in the software.

The global default values for timeout, retransmit, and key optional parameters are applied, unless those values are specified in the radius-server host or other commands. If you configure timeout, retransmit, or key values, you must include those keywords when entering the no radius-server host command syntax to return to the global default values.

Related Commands

login authentication	Sets the database to be checked when a user logs in.
radius-server key	Sets a authentication key for RADIUS communications.
radius-server retransmit	Sets the number of times the RADIUS server will attempt to send information.
radius-server timeout	Sets the time interval before the RADIUS server times out.

radius-server key

Configure a key for all RADIUS communications between the switch and the RADIUS host server.

Syntax   radius-server key [*encryption-type*] *key*

To delete a password, use the no radius-server key command.

Parameters

encryption-type	(OPTIONAL) Enter either zero (0) or 7 as the encryption type for the *key* entered. The options are:
	• 0 is the default and means the key is not encrypted and stored as clear text.
	• 7 means that the key is encrypted and hidden.
key	Enter a string that is the key to be exchanged between the switch and RADIUS servers. It can be up to 42 characters long.

Defaults   Not configured.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The key configured on the switch must match the key configured on the RADIUS server daemon.

If the key parameter in the radius-server host command is configured, the key configured with the radius-server key command is the default key for all RADIUS communications.

Related Commands

radius-server host	Configures a RADIUS host.

radius-server retransmit

Configure the number of times the switch attempts to connect with the configured RADIUS host server before declaring the RADIUS host server unreachable.

Syntax   radius-server retransmit *retries*

To configure zero retransmit attempts, use the no radius-server retransmit command. To return to the default setting, use the radius-server retransmit 3 command.

Parameters

retries	Enter a number of attempts that FTOS tries to locate a RADIUS server.
	Range: zero (0) to 100.
	Default: 3 retries.

Defaults   3 retries

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	radius-server host	Configures a RADIUS host.

radius-server timeout

Configure the amount of time the RADIUS client (the switch) waits for a RADIUS host server to reply to a request.

Syntax

radius-server timeout *seconds*

To return to the default value, use the no radius-server timeout command.

Parameters

seconds	Enter the number of seconds between an unsuccessful attempt and the FTOS times out.
	Range: zero (0) to 1000 seconds.
	Default: 5 seconds.

Defaults   5 seconds

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	radius-server host	Configures a RADIUS host.

TACACS+ Commands

FTOS supports TACACS+ as an alternate method for login authentication. The following are TACACS+ commands:

- debug tacacs+
- ip tacacs source-interface
- tacacs-server host
- tacacs-server key

debug tacacs+

View TACACS+ transactions to assist with troubleshooting.

Syntax

debug tacacs+

To disable debugging of TACACS+, use the no debug tacacs+ command.

Defaults   Disabled.

Command Modes   EXEC Privilege

ip tacacs source-interface

Specify an interface's IP address as the source IP address for TACACS+ connections.

Syntax	ip tacacs source-interface *interface*

To delete a source interface, use the no ip tacacs source-interface command.

Parameters	*interface*	Enter the following keywords and slot/port or number information:
		• For Loopback interfaces, enter the keyword loopback followed by a number from zero (0) to 16838.
		• For the Null interface, enter the keywords null 0.
		• For a Port Channel interface, enter the keyword port-channel followed by a number:
		Range: 1 to 128
		• For a Ten Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
		• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
		• For VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.

Defaults	Not configured.

Command Mode	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

tacacs-server host

Specify a TACACS+ host.

Syntax	tacacs-server host { *hostname*	*ipv4-address* } [port *number*] [timeout *seconds*] [key *key*]

Parameters	*hostname*	Enter the name of the TACACS+ server host.
	ipv4-address	Enter the IPv4 address (A.B.C.D) of the TACACS+ server host.
	port *number*	(OPTIONAL) Enter the keyword port followed by a number as the port to be used by the TACACS+ server.
		Range: zero (0) to 65535
		Default: 49

timeout *seconds*	(OPTIONAL) Enter the keyword timeout followed by the number of seconds the switch waits for a reply from the TACACS+ server. Range: 0 to 1000 Default: 10 seconds
key *key*	(OPTIONAL) Enter the keyword key followed by a string up to 42 characters long as the authentication key. This authentication key must match the key specified in the tacacs-server key for the TACACS+ daemon. Configure this parameter last because leading spaces are ignored.

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information To list multiple TACACS+ servers to be used by the aaa authentication login command, configure this command multiple times.

If you are not configuring the switch as a TACACS+ server, you do not need to configure the port, timeout and key optional parameters. If you do not configure a key, the key assigned in the tacacs-server key command is used.

Related Commands

aaa authentication login	Specifies the login authentication method.
tacacs-server key	Configures a TACACS+ key for the TACACS server.

tacacs-server key

Configure a key for communication between a TACACS+ server and client.

Syntax tacacs-server key [*encryption-type*] *key*

To delete a key, use the no tacacs-server key *key* command.

Parameters

encryption-type	(OPTIONAL) Enter either zero (0) or 7 as the encryption type for the *key* entered. The options are: • 0 is the default and means the key is not encrypted and stored as clear text. • 7 means that the key is encrypted and hidden.
key	Enter a text string, up to 42 characters long, as the clear text password. Leading spaces are ignored.

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The key configured with this command must match the key configured on the TACACS+ daemon.

SSH Server and SCP Commands

FTOS supports secure shell (SSH) protocol versions 1.5 and 2.0. SSH is a protocol for secure remote login over an insecure network. SSH sessions are encrypted and use authentication. The SSH and SCP commands are:

- crypto key generate
- debug ip ssh
- ip scp topdir
- ip ssh authentication-retries
- ip ssh connection-rate-limit
- ip ssh hostbased-authentication
- ip ssh key-size
- ip ssh password-authentication
- ip ssh pub-key-file
- ip ssh rhostsfile
- ip ssh rsa-authentication (Config)
- ip ssh rsa-authentication (EXEC)
- ip ssh server
- show crypto
- show ip ssh
- show ip ssh client-pub-keys
- show ip ssh rsa-authentication
- ssh

crypto key generate

Generate keys for the SSH server.

Syntax	crypto key generate {rsa | rsa1}

Parameters

rsa	Enter the keyword rsa followed by the key size to generate a SSHv2 RSA host keys. Range: 1024 to 2048 Default: 1024
rsa1	Enter the keyword rsa1 followed by the key size to generate a SSHv1 RSA host keys. Range: 1024 to 2048 Default: 1024

Defaults   Key size 1024

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 29-5.   crypto key generate rsa1 Command Example**

```
FTOS#conf
FTOS(conf)#crypto key generate rsa1
Enter key size <1024-2048>. Default<1024>: 1024

Host key already exists. Do you want to replace. [y/n]  :y
FTOS(conf)#
```

Usage Information   The host keys are required for key-exchange by the SSH server. If the keys are not found when the server is enabled (ip ssh server enable), the keys are automatically generated.

This command requires user interaction and generates a prompt prior to overwriting any existing host keys.

> **Note:** Only a user with superuser permissions should generate host-keys.

Related Commands

ip ssh server	Enables the SSH server.
show crypto	Displays the SSH host public keys

debug ip ssh

Enables collecting SSH debug information.

Syntax   debug ip ssh {client | server}

To disable debugging, use the no debug ip ssh {client | server} command.

Parameters

client	Enter the keyword client to enable collecting debug information on the client.
server	Enter the keyword server to enable collecting debug information on the server.

Defaults   Disabled on both client and server.

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Debug information includes details for key-exchange, authentication, and established session for each connection.

ip scp topdir

Identify a location for files used in secure copy transfer.

Syntax   ip scp topdir *directory*

To return to the default setting, use the no ip scp topdir command.

Parameters	*directory*	Enter a directory name.

Defaults	The internal flash (flash:) is the default directory.

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	To configure the switch as a SCP server, use the ip ssh server command.

Related Commands	ip ssh server	Enables the SSH and SCP server on the switch.

ip ssh authentication-retries

Configure the maximum number of attempts that should be used to authenticate a user.

Syntax	ip ssh authentication-retries *1-10*

Parameters	*1-10*	Enter the number of maximum retries to authenticate a user. Range: 1 to 10 Default: 3

Defaults	3

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	This command specifies the maximum number of attempts to authenticate a user on a SSH connection with the remote host for password authentication. SSH disconnects when the number of password failures exceeds authentication-retries.

ip ssh connection-rate-limit

Configure the maximum number of incoming SSH connections per minute.

Syntax	ip ssh connection-rate-limit *1-10*

Parameters	*1-10*	Enter the number of maximum number of incoming SSH connections allowed per minute. Range: 1 to 10 per minute Default: 10 per minute

Defaults	10 per minute

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip ssh hostbased-authentication

Enable hostbased-authentication for the SSHv2 server.

Syntax   ip ssh hostbased-authentication enable

To disable hostbased-authentication for SSHv2 server, use the no ip ssh hostbased-authentication enable command.

Parameters

enable	Enter the keyword enable to enable hostbased-authentication for SSHv2 server.

Defaults   Disable by default

Command Modes   CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   If you enable this command, clients can login without a password prompt. This provides two levels of authentication:

- rhost-authentication is done with the file specified in the ip ssh rhostfile command
- checking client host-keys is done with the file specified in the ip ssh pub-key-file command

If you execute no ip ssh rsa-authentication enable, host-based authentication is disabled.

> **Note:** Administrators must specify the two files (rhosts and pub-key-file) to configure host-based authentication.

Related Commands

ip ssh pub-key-file	Public keys of trusted hosts from a file.
ip ssh rhostsfile	Trusted hosts and users for rhost authentication.

ip ssh key-size

Configure the size of the server-generated RSA SSHv1 key.

Syntax   ip ssh key-size *512-869*

Parameters

512-869	Enter the key-size number for the server-generated RSA SSHv1 key. Range: 512 to 869 Default: 768

Defaults   Key size 768

Command Modes   CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The server-generated key is used for SSHv1 key-exchange.

ip ssh password-authentication

Enable password authentication for the SSH server.

Syntax ip ssh password-authentication enable

To disable password-authentication, use the no ip ssh password-authentication enable command.

Parameters

enable	Enter the keyword enable to enable password-authentication for the SSH server.

Defaults Enabled

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information With password authentication enabled, you can authenticate using local, RADIUS, or TACACS+ password fallback order as configured.

ip ssh pub-key-file

Specify the file to be used for host-based authentication.

Syntax ip ssh pub-key-file { *WORD* }

Parameters

WORD	Enter the file name for the host-based authentication.

Defaults none

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 29-6.   ip ssh pub-key-file Command Example**

```
FTOS#conf
FTOS(conf)# ip ssh pub-key-file flash://knownhosts
FTOS(conf)#
```

Usage Information	This command specifies the file to be used for the host-based authentication. The file creates/overwrites the file flash://ADMIN_DIR/ssh/knownhosts and deletes the user specified file. Even though this is a global configuration command, it does not appear in the running configuration because this command needs to be run just once.

The file contains the OpenSSH compatible public keys of the host for which host-based authentication is allowed. An example known host file format:

poclab4,123.12.1.123 ssh-rsa AAAAB3NzaC1yc2EAAAABIwAAAIEAox/
QQp8xYhzOxn07yh4VGPAoUfgKoieTHO9G4sNV+ui+DWEc3cgYAcU5Lai1MU2ODrzhCwyDNp05tKBU3t
ReG1o8AxLi6+S4hyEMqHzkzBFNVqHzpQc+Rs4p2urzV0F4pRKnaXdHf3Lk4D460HZRhhVrxqeNxPDpEn
WIMPJi0ds= ashwani@poclab4

✎ **Note:** For rhostfile and pub-key-file, the administrator must FTP the file to the chassis.

Related Commands	show ip ssh client-pub-keys	Displays the client-public keys used for the host-based authentication.

ip ssh rhostsfile

Specify the rhost file to be used for host-based authorization.

Syntax	ip ssh rhostsfile { *WORD* }

Parameters	*WORD*	Enter the rhost file name for the host-based authentication.

Defaults	none

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 29-7. ip ssh rhostsfile Command Example**

```
FTOS#conf
FTOS(conf)# ip ssh rhostsfile flash://shosts
FTOS(conf)#
```

Usage Information	This command specifies the rhost file to be used for host-based authentication. This file creates/overwrites the file flash:/ADMIN_DIR/ssh/shosts and deletes the user specified file. Even though this is a global configuration command, it does not appear in the running configuration because this command needs to be run just once.

This file contains hostnames and usernames, for which hosts and users, rhost-authentication can be allowed.

✎ **Note:** For rhostfile and pub-key-file, the administrator must FTP the file to the switch.

ip ssh rsa-authentication (Config)

Enable RSA authentication for the SSHv2 server.

Syntax   ip ssh rsa-authentication enable

To disable RSA authentication, use the no ip ssh rsa-authentication enable command.

Parameters

enable	Enter the keyword enable to enable RSA authentication for the SSHv2 server.

Defaults   RSA authentication is disabled by default.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Enabling RSA authentication allows you to login without being prompted for a password. In addition, the OpenSSH compatible SSHv2 RSA public key must be added to the list of authorized keys (ip ssh rsa-authentication my-authorized-keys *device://filename* command).

Related Commands

ip ssh rsa-authentication (EXEC)	Adds keys for RSA authentication.

ip ssh rsa-authentication (EXEC)

Add keys for the RSA authentication.

Syntax   ip ssh rsa-authentication {my-authorized-keys *WORD*}

To delete the authorized keys, use the no ip ssh rsa-authentication {my-authorized-keys} command.

Parameters

my-authorized-keys *WORD*	Enter the keyword my-authorized-keys followed by the file name of the RSA authorized-keys.

Defaults   none

Command Modes   EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   If you want to log in without being prompted for a password, log in through RSA authentication. To do that, you must first add the SSHv2 RSA public keys to the list of authorized keys. This command adds the specified RSA keys to the following file:
flash://ADMIN_DIR/ssh/authorized-keys-*username* (where *username* is the user associated with this terminal).

> **Note:** The no form of this command deletes the file flash://ADMIN_DIR/ssh/authorized-keys-*username*

| **Related Commands** | show ip ssh rsa-authentication | Displays RSA authorized keys. |
| | ip ssh rsa-authentication (Config) | Enables RSA authentication. |

ip ssh server

Configure an SSH server.

Syntax ip ssh server {enable | port *port-number*} [version {1 | 2}]

To disable SSH server functions, use the no ip ssh server enable command.

Parameters

enable	Enter the key word enable to start the SSH server.
port *port-number*	(OPTIONAL) Enter the keyword port followed by the port number of the listening port of the SSH server. Range: 1 to 65535 Default: 22
[version {1	2}]	(OPTIONAL) Enter the keyword version followed by the SSH version 1 or 2 to specify only SSHv1 or SSHv2.

Defaults Default listening port is 22.

Command Modes CONFIGURATION

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information This command enables the SSH server and begins listening on a port. If a port is not specified, listening is on SSH default port 22.

Example **Figure 29-8.   ip ssh server port Command Example**

```
FTOS# conf
FTOS(conf)# ip ssh server port 45
FTOS(conf)# ip ssh server enable
FTOS#
```

| **Related Commands** | show ip ssh | Displays the ssh information |

show crypto

Display the public part of the SSH host-keys.

Syntax show crypto key mypubkey {rsa | rsa1}

Parameters

| Key | Enter the keyword key to display the host public key. |
| mypubkey | Enter the keyword mypubkey to display the host public key. |

rsa	Enter the keyword **rsa** to display the host SSHv2 RSA public key.
rsa1	Enter the keyword **rsa1** to display the host SSHv1 RSA public key.

Defaults none

Command Modes EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 29-9.   show crypto Command Examples**

```
FTOS#show crypto key mypubkey rsa
ssh-rsa AAAAB3NzaC1yc2EAAAABIwAAAIEAtzkZME/
e8V8smnXR22EJGQhCMkEOkuisa+OILVoMYU1ZKGfj0W5BPCSvF/
x5ifqYFFwUzJNOcsJK7vjSsnmMhChF2YSvXlvTJ6h971FJAQlOsgd0ycpocsF+DNLKfJnx7SAjhakFQMwG
g/g78ZkDT3Ydr8KKjfSI4Bg/WS8B740=

FTOS#show crypto key mypubkey rsa1
1024 35
131060015480873398953257515397249657850072206444294963674080935683088961020317226 6
798895675496676526500637962218977992760927852363883922305508181916600992813261640 8
664345774602219229518903992966334579117374224743155375050167692966027379060149443 4
05000001517986442562961338577491923608177134105953376006391 3083
FTOS#
```

Usage Information This command is useful if the remote SSH client implements Strict Host Key Checking. You can copy the host key to your list of known hosts.

Related Commands

crypto key generate	Generates SSH keys.

show ip ssh

Display information about established SSH sessions.

Syntax show ip ssh

Command Modes EXEC

EXEC Privilege

Example **Figure 29-10.   show ip ssh Command Example**

```
FTOS#show ip ssh
2#show ip ssh
SSH server               : disabled.
SSH server version       : v1 and v2.
Password Authentication  : enabled.
Hostbased Authentication : disabled.
RSA        Authentication : disabled.
FTOS#
```

Related Commands

ip ssh server	Configures an SSH server.
show ip ssh client-pub-keys	Displays the client-public keys.

show ip ssh client-pub-keys

Display the client public keys used in host-based authentication.

Syntax show ip ssh client-pub-keys

Defaults none

Command Modes EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 29-11.   show ip ssh client-pub-keys Command Example**

```
FTOS#show ip ssh client-pub-keys

poclab4,123.12.1.123 ssh-rsa AAAAB3NzaC1yc2EAAAABIwAAAIEAox/
QQp8xYhzOxn07yh4VGPAoUfgKoieTHO9G4sNV+ui+DWEc3cgYAcU5Lai1MU2ODrzhCwyDNp05tKBU3tReG1
o8AxLi6+S4hyEMqHzkzBFNVqHzpQc+Rs4p2urzV0F4pRKnaXdHf3Lk4D460HZRhhVrxqeNxPDpEnWIMPJi0
ds= ashwani@poclab4

FTOS#
```

Usage Information This command displays the contents of the file flash://ADMIN_DIRssh/knownhosts

Related Commands

ip ssh pub-key-file	Configures the file name for the host-based authentication

show ip ssh rsa-authentication

Display the authorized-keys for the RSA authentication.

Syntax show ip ssh rsa-authentication {my-authorized-keys}

Parameters

my-authorized-keys	Display the RSA authorized keys.

Defaults none

Command Modes EXEC

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 29-12.   show ip ssh rsa-authentication Command Example**

```
FTOS#show ip ssh rsa-authentication my-authorized-keys
ssh-rsa
AAAAB3NzaC1yc2EAAAABIwAAAIEAyB17l4gFp4r2DRHIvMc1VZd0Sg5GQxRV1y1X1JOMeO6Nd0WuYyzrQMM
4qJAoBwtneOXfLBcHF3V2hcMIqaZN+CRCnw/
zCMlnCf0+qVTd1oofsea5r09kS0xTp0CNfHXZ3NuGCq9Ov33m9+U9tMwhS8vy8AVxdH4x4km3c3t5Jvc=
freedom@poclab4

FTOS#
```

Related Commands

ip ssh rsa-authentication (Config)	Configures the RSA authorized keys.

ssh

Open an SSH connection specifying the hostname, username, port number and version of the SSH client.

FTOS supports both inbound and outbound SSH sessions using IPv4 addressing. Inbound SSH supports accessing the system through the management interface as well as through a physical Layer 3 interface.

Syntax ssh {*hostname* | *ipv4 address*} [-l *username* | -p *port-number* | -v {1 | 2}]

Parameters

hostname	(OPTIONAL) Enter the IP address or the hostname of the remote device.
ipv4 address	(OPTIONAL) Enter the IP address in dotted decimal format A.B.C.D.
-l *username*	(OPTIONAL) Enter the keyword -l followed by the user name used in this SSH session.
	Default: The user name of the user associated with the terminal.
-p *port-number*	(OPTIONAL) Enter the keyword -p followed by the port number.
	Range: 1 to 65536
	Default: 22
-v {1	2}	(OPTIONAL) Enter the keyword -v followed by the SSH version 1 or 2.
	Default: The version from the protocol negotiation

Defaults As above.

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 29-13. ssh Command Example**

```
FTOS#ssh 123.12.1.123 –l ashwani –p 5005 –v 2
```

Secure DHCP Commands

The dynamic host configuration protocol (DHCP) as defined by RFC 2131 provides no authentication or security mechanisms. Secure DHCP is a suite of features that protects networks that use dynamic address allocation from spoofing and attacks. The DHCP commands are:

- clear ip dhcp snooping
- ip dhcp relay
- ip dhcp snooping
- ip dhcp snooping database
- ip dhcp snooping binding
- ip dhcp snooping database renew
- ip dhcp snooping trust
- ip dhcp source-address-validation
- ip dhcp snooping vlan
- show ip dhcp snooping

clear ip dhcp snooping

Clear the DHCP binding table.

Syntax	clear ip dhcp snooping binding
Command Modes	EXEC Privilege
Default	none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show ip dhcp snooping	Displays the contents of the DHCP binding table.

ip dhcp relay

Enable Option 82.

Syntax	ip dhcp relay information-option [trust-downstream]

Parameters

trust-downstream	Configure the system to trust Option 82 when it is received from the previous-hop router.

Command Modes	CONFIGURATION
Default	Disabled

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip dhcp snooping

Enable DHCP Snooping globally.

Syntax	[no] ip dhcp snooping
Command Modes	CONFIGURATION
Default	Disabled
Command History	Version 8.3.16.1 Introduced on MXL 10/40GbE Switch IO Module
Usage Information	When enabled, no learning takes place until snooping is enabled on a VLAN. After disabling DHCP Snooping, the binding table is deleted, and Option 82, IP Source Guard, and Dynamic ARP Inspection are disabled.
Related Commands	ip dhcp snooping vlan Enables DHCP Snooping on one or more VLANs.

ip dhcp snooping database

Delay writing the binding table for a specified time.

Syntax	ip dhcp snooping database write-delay *minutes*
Parameters	*minutes* Range: 5 to 21600
Command Modes	CONFIGURATION
Default	none
Command History	Version 8.3.16.1 Introduced on MXL 10/40GbE Switch IO Module

ip dhcp snooping binding

Create a static entry in the DHCP binding table.

Syntax   [no] ip dhcp snooping binding mac *address* vlan-id *vlan-id* ip *ip-address* interface *type slot/port* lease *number*

Parameters

mac *address*	Enter the keyword mac followed by the MAC address of the host to which the server is leasing the IP address.
vlan-id *vlan-id*	Enter the keyword vlan-id followed by the VLAN to which the host belongs. Range: 2 to 4094
ip *ip-address*	Enter the keyword ip followed by the IP address that the server is leasing.

interface *type*	Enter the keyword **interface** followed by the type of interface to which the host is connected.
	• For a Ten Gigabit Ethernet interface, enter the keyword **tengigabitethernet**.
	• For a 40-Gigabit Ethernet interface, enter the keyword **fortyGigE**.
slot/port	Enter the slot and port number of the interface.
lease *time*	Enter the keyword **lease** followed by the amount of time the IP address will be leased.
	Range: 1-4294967295

Command Modes   EXEC

EXEC Privilege

Default   none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show ip dhcp snooping	Displays the contents of the DHCP binding table.

ip dhcp snooping database renew

Renew the binding table.

Syntax   ip dhcp snooping database renew

Command Modes   EXEC

EXEC Privilege

Default   none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip dhcp snooping trust

Configure an interface as trusted.

Syntax   [no] ip dhcp snooping trust

Command Modes   INTERFACE

Default   Untrusted

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip dhcp source-address-validation

Enable IP Source Guard.

Syntax	[no] ip dhcp source-address-validation
Command Modes	INTERFACE
Default	Disabled

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ip dhcp snooping vlan

Enable DHCP Snooping on one or more VLANs.

Syntax	[no] ip dhcp snooping vlan *name*

Parameters

name	Enter the name of a VLAN on which to enable DHCP Snooping.

Command Modes	CONFIGURATION
Default	Disabled

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

When enabled, the system begins creating entries in the binding table for the specified VLAN(s). Note that learning only happens if there is a trusted port in the VLAN.

Related Commands

ip dhcp snooping trust	Configures an interface as trusted.

show ip dhcp snooping

Display the contents of the DHCP binding table.

Syntax	show ip dhcp snooping binding
Command Modes	EXEC
	EXEC Privilege
Default	none

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

clear ip dhcp snooping	Clears the contents of the DHCP binding table.

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sFlow

Overview

The Dell Force10 operating software (FTOS) sFlow monitoring system includes an sFlow agent and an sFlow collector.

- The sFlow agent combines the flow samples and interface counters into sFlow datagrams and forwards them to the sFlow collector.
- The sFlow collector analyses the sFlow datagrams received from the different devices and produces a network-wide view of traffic flows.

Important Points to Remember

- FTOS exports all sFlow packets to the sFlow collector. A small sampling rate can equate to a large number of exported packets. A backoff mechanism is automatically applied to reduce this amount. Some sampled packets may be dropped when the exported packet rate is high and the backoff mechanism is about to or is starting to take effect. The dropEvent counter, in the sFlow packet, is always zero.
- sFlow sampling is done on a per-port basis.
- Community list and local preference fields are not filled up in the extended gateway element in the sFlow datagram.
- The 802.1P source priority field is not filled up in the extended switch element in the sFlow datagram.
- Only Destination and Destination Peer AS numbers are packed in the dst-as-path field in the extended gateway element.
- If the packet being sampled is redirected using policy-based routing (PBR), the sFlow datagram may contain incorrect extended gateway/router information.
- The source virtual local area network (VLAN) field in the extended switch element is not packed in case of a routed packet.
- The destination VLAN field in the extended switch element is not packed in case of a multicast packet.
- The maximum number of packets that can be sampled and processed per second is:
  - 7500 packets when no extended information packing is enabled
  - 7500 packets when only extended-switch information packing is enabled (refer to sflow extended-switch enable)
  - 1600 packets when extended-router and/or extended-gateway information packing is enabled

Commands

The sFlow commands are:

* sflow collector
* sflow enable (Global)
* sflow enable (Interface)
* sflow extended-switch enable
* sflow polling-interval (Global)
* sflow polling-interval (Interface)
* sflow sample-rate (Global)
* sflow sample-rate (Interface)
* show sflow
* show sflow stack-unit

sflow collector

Configure a collector device to which sFlow datagrams are forwarded.

Syntax sflow collector {*ipv4-address*} agent-addr {*ipv4-address*} [*number* [max-datagram-size *number*]] | [max-datagram-size *number*]

To delete a configured collector, use the no sflow collector {*ipv4-address*} agent-addr {*ipv4-address*} [*number* [max-datagram-size *number*]] | [max-datagram-size *number*] command.

Parameters

sflow collector *ipv4-address*	Enter the IPv4 (A.B.C.D) of the sFlow collector device.
agent-addr *ipv4-address*	Enter the IPv4 (A.B.C.D) of the sFlow agent in the router.
number	(OPTIONAL) Enter the UDP port number (User Datagram Protocol). Range: 0 to 65535 Default: 6343
max-datagram-size *number*	(OPTIONAL) Enter the keyword max-datagram-size followed by the size number in bytes. Range: 400 to 1500 Default: 1400

Defaults Not configured

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information You can configure up to two sFlow collectors (IPv4). If two collectors are configured, traffic samples are sent to both.

The sFlow agent address is carried in a field in SFlow packets and is used by the collector to identify the sFlow agent.

As part of the sFlow-MIB, if the simple network management protocol (SNMP) request originates from a configured collector, FTOS returns the corresponding configured agent IP in management information base (MIB) requests. FTOS checks to ensure that two entries are not configured for the same collector IP with a different agent IP. Should that happen, FTOS generates the following error:
`%Error: Different agent-addr attempted for an existing collector`

sflow enable (Global)

Enable sFlow globally.

Syntax	sflow enable
	To disable sFlow, use the no sflow enable command.
Defaults	sFlow is disabled by default
Command Modes	CONFIGURATION
Command History	Version 8.3.16.1 Introduced on MXL 10/40GbE Switch IO Module
Usage Information	In addition to this command, sFlow needs to be enabled on individual interfaces where you want sFlow sampling.
Related Commands	sflow enable (Interface) Enables sFlow on interfaces.

sflow enable (Interface)

Enable sFlow on Interfaces.

Syntax	sflow enable
	To disable sFlow, use the no sflow enable command.
Defaults	sFlow is disabled by default on all interfaces
Command Modes	INTERFACE
Command History	Version 8.3.16.1 Introduced on MXL 10/40GbE Switch IO Module
Usage Information	When you enable sFlow on an interface, flow sampling is done on any traffic going out of the interface.

> **Note:** After a physical port is a member of a LAG, it inherits the sFlow configuration from the LAG port.

Related Commands	sflow enable (Global) Turns sFlow on globally

sflow extended-switch enable

Enable packing information on a switch only.

Syntax sflow extended-switch enable

To disable packing information, use the no sflow extended-switch [enable] command.

Parameters

enable	Enter the keyword enable to enable global extended information.

Defaults Disabled

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information FTOS version 7.8.1.0 and later enhances the sflow implementation for real time traffic analysis to provide extended gateway information in cases where the destination IP addresses are learned by different routing protocols and for cases where the destination is reachable over ECMP.

Related Commands

show sflow	Displays the sFlow configuration

sflow polling-interval (Global)

Set the sFlow polling interval at a global level.

Syntax sflow polling-interval *interval value*

To return to the default, use the no sflow polling-interval *interval* command.

Parameters

interval value	Enter the interval value in seconds.
	Range: 15 to 86400 seconds
	Default: 20 seconds

Defaults 20 seconds

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The polling interval for an interface is the maximum number of seconds between successive samples of counters to be sent to the collector. This command changes the global default counter polling (20 seconds) interval. You can configure an interface to use a different polling interval.

Related Commands

sflow polling-interval (Interface)	Sets the polling interval for an interface

sflow polling-interval (Interface)

Set the sFlow polling interval at an interface (overrides the global-level setting.)

Syntax   sflow polling-interval *interval value*

To return to the default, use the no sflow polling-interval *interval* command.

Parameters

interval value	Enter the interval value in seconds.
	Range: 15 to 86400 seconds
	Default: The global counter polling interval

Defaults   The same value as the current global default counter polling interval.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   This command sets the counter polling interval for an interface.

Related Commands

sflow polling-interval (Global)	Globally set the polling interval

sflow sample-rate (Global)

Change the global default sampling rate.

Syntax   sflow sample-rate *value*

To return to the default sampling rate, use the no sflow sample-rate command.

Parameters

value	Enter the sampling rate value.
	Range: 256 to 8388608 packets
	Enter values in powers of 2 only, for example 4096, 8192, 16384 etc.
	Default: 32768 packets

Defaults   32768

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Sample-rate is the average number of packets skipped before the sample is taken. This command changes the global default sampling rate. You can configure an interface to use a different sampling rate than the global sampling rate. If the value entered is not a correct power of 2, the command generates an error message with the previous and next power of 2 value. Select one of these two packet numbers and re-enter the command.

Related Commands	sflow sample-rate (Interface) Changes the Interface sampling rate.

sflow sample-rate (Interface)

Change the Interface default sampling rate.

Syntax	sflow sample-rate *value*
	To return to the default sampling rate, use the no sflow sample-rate command.

Parameters	*value*	Enter the sampling rate value.
		Range:256 to 8388608 packets
		Enter values in powers of 2 only, for example 4096, 8192, 16384 etc.
		Default: 32768 packets

Defaults	The global default sampling
Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	This command changes the sampling rate for an interface. By default, the sampling rate of an interface is set to the same value as the current global default sampling rate. If the value entered is not a correct power of 2, the command generates an error message with the previous and next power-of-2 value. Select one of these two number and re-enter the command.

Related Commands	sflow sample-rate (Global) Changes the sampling rate globally.

show sflow

Display the current sFlow configuration

Syntax	show sflow [*interface*]

Parameters	*interface*	(OPTIONAL) Enter the following keywords and slot/port or number information:
		• For a 40-Gigabit Ethernet interface, enter the keyword FortyGigabitEthernet followed by the slot/port information.
		• For a Loopback interface, enter the keyword loopback followed by a number from 0 to 16383.
		• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.

Command Modes	EXEC
	EXEC Privilege

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 30-1.   show sflow Command Example**

```
FTOS##show sflow
sFlow services are disabled
Global default sampling rate: 32768
Global default counter polling interval: 20
Global extended information enabled: none
0 collectors configured
0 UDP packets exported
0 UDP packets dropped
0 sFlow samples collected

FTOS#
```

Usage
Information   The dropEvent counter (*sFlow samples dropped due to sub-sampling*) shown in Figure 30-1 always
displays a value of zero.

show sflow stack-unit

Display the sFlow information on a stack unit.

Syntax   show sflow stack-unit { *unit number* }

Parameters

unit number	(OPTIONAL) Enter a unit number to view information on the stack unit in that slot.
	Range: 0 to 5.

Command Modes   EXEC

EXEC Privilege

Command
History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 30-2.   show sflow stack unit Command Example**

```
FTOS#show sflow stack-unit 1
Stack-Unit 1
  Samples rcvd from h/w           :0
  Total UDP packets exported      :0
UDP packets dropped           :0
FTOS#
```

Simple Network Management Protocol (SNMP) and Syslog

Overview

This chapter contains commands to configure and monitor the simple network management protocol (SNMP) v1/v2/v3 and Syslog. The chapter contains the following sections:

- SNMP Commands
- Syslog Commands

SNMP Commands

The SNMP commands available in the Dell Force10 operating software (FTOS) are:

- show snmp
- show snmp engineID
- show snmp group
- show snmp user
- snmp ifmib ifalias long
- snmp-server community
- snmp-server contact
- snmp-server enable traps
- snmp-server engineID
- snmp-server group
- snmp-server host
- snmp-server location
- snmp-server packetsize
- snmp-server trap-source
- snmp-server user
- snmp-server view
- snmp trap link-status

The SNMP is used to communicate management information between the network management stations and the agents in the network elements. FTOS supports SNMP versions 1, 2c, and 3, supporting both read-only and read-write modes. FTOS sends SNMP traps, which are messages informing an SNMP management system about the network. FTOS supports up to 16 SNMP trap receivers.

Important Points to Remember

- Typically, 5-second timeout and 3-second retry values on an SNMP server are sufficient for both local area network (LAN) and wide area network (WAN) applications. If you experience a timeout with these values, the recommended best practice on Dell Force10 switches (to accommodate their high port density) is to increase the timeout and retry values on your SNMP server to the following:
  — SNMP Timeout—greater than 3 seconds
  — SNMP Retry count—greater than 2 seconds
- If you are using access control lists (ACLs) in SNMP v3 configuration, group ACL overrides user ACL if the user is part of that group.
- SNMP operations are not supported on a virtual LAN (VLAN).

show snmp

Display the status of SNMP network elements.

Syntax   show snmp

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 31-1.   show snmp Command Example**

```
FTOS#show snmp
     32685 SNMP packets input
         0 Bad SNMP version errors
         0 Unknown community name
         0 Illegal operation for community name supplied
         0 Encoding errors
     96988 Number of requested variables
         0 Number of altered variables
     31681 Get-request PDUs
       968 Get-next PDUs
         0 Set-request PDUs
     61727 SNMP packets output
         0 Too big errors (Maximum packet size 1500)
         9 No such name errors
         0 Bad values errors
         0 General errors
     32649 Response PDUs
     29078 Trap PDUs
FTOS#
```

Related Commands

snmp-server community	Enables SNMP and set community string.

show snmp engineID

Display the identification of the local SNMP engine and all remote engines that are configured on the router.

Syntax   show snmp engineID

Command Modes	EXEC
	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 31-2.   show snmp engineID Command Example**

```
FTOS#show snmp engineID
Local SNMP engineID: 0000178B02000001E80214A8
Remote Engine ID                IP-addr         Port
80001F88043132333435            172.31.1.3      5009
80001F88043938373635            172.31.1.3      5008

FTOS#
```

Related Commands

snmp-server engineID	Configures local and remote SNMP engines on the router.

show snmp group

Display the group name, security model, status, and storage type of each group.

Syntax   show snmp group

Command Modes	EXEC
	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Figure 31-3 displays a group named ngroup. The ngroup has a security model of version 3 (v3), with authentication (auth), the read and notify name is nview with no write view name specified, and the row status is active.

Example   **Figure 31-3.   show snmp group Command Example**

```
FTOS#show snmp group

  groupname: ngroup                          security model: v3 auth
  readview : nview                           writeview: no write view specified
  notifyview: nview
  row status: active

FTOS#
```

Related Commands

snmp-server group	Configures an SNMP server group

show snmp user

Display the information configured on each SNMP user name.

Syntax   show snmp user

Command Modes   EXEC

EXEC Privilege

Example   **Figure 31-4.   show snmp user Command Example**

```
FTOS#show snmp user
  User name: v1v2creadu
  Engine ID: 0000178B02000001E80214A8
  storage-type: nonvolatile        active
  Authentication Protocol: None
  Privacy Protocol: None

FTOS#
```

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

snmp ifmib ifalias long

Display the entire description string through the Interface MIB, which would be truncated otherwise to 63 characters.

Syntax   snmp ifmib ifalias long

Defaults   Interface description truncated beyond 63 characters

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 31-5.   snmp ifmib ifalias long Command Example**

```
!------command run on host connected to switch: --------------!
> snmpwalk -c public 10.10.10.130 .1.3.6.1.2.1.31 | grep -i alias | more
IF-MIB::ifAlias.134530304 = STRING: This is a port connected to Router2. This is a
port connected to
IF-MIB::ifAlias.134792448 = STRING:

!------command run on Dell Force10 switch: --------------!
FTOS#snmp ifmib ifalias long

!------command run on server connected to switch: --------------!
> snmpwalk -c public 10.10.10.130 .1.3.6.1.2.1.31 | grep -i alias | more
IF-MIB::ifAlias.134530304 = STRING: This is a port connected to Router2. This is a
port connected to Router2. This is a port connected to Router2. This is a port
connected to Router2. This is a port connected to Router2.
IF-MIB::ifAlias.134792448 = STRING:
```

snmp-server community

Configure a new community string access for SNMPv1, v2, and v3.

Syntax   snmp-server community *community-name* {ro | rw} [security-name *name*] [*access-list-name*]

To remove access to a community, use the no snmp-server community *community-string* {ro | rw} [security-name *name*] [*access-list-name*] command.

Usage Information   Figure 31-6 configures a community named guest that is mapped to the security named guestuser with Read Only (ro) permissions.

Example   **Figure 31-6.   snmp-server community Command Example**

```
FTOS#config
FTOS(conf)# snmp-server community guest ro
FTOS(conf)# snmp-server community guest ro security-name guestuser
FTOS(conf)#
```

The security-name parameter maps the community string to an SNMPv3 user/security name as defined by the community MIB.

If a community string is configured without a security-name (for example, snmp-server community public ro), the community is mapped to a default security-name/group:

* v1v2creadu / v1v2creadg — maps to a community with ro permissions
* v1v2cwriteu/ v1v2cwriteg — maps to a community with rw permissions

This command is indexed by the *community-name* parameter.

If you do not configure the snmp-server community command, you cannot query SNMP data. Only Standard IPv4 ACL is supported in the optional *access-list-name.*

The command options security-name and *access-list-name* are recursive. In other words, each option can, in turn, accept any of the three options as a sub-option, and each of those sub-options can accept any of the three sub-options as a sub-option, and so forth. Figure 31-7 shows the creation of a standard IPv4 ACL called "snmp-ro-acl" and then assigning it to the SNMP community "guest":

Example   **Figure 31-7.   snmp-server community Command Example**

```
FTOS(conf)# ip access-list standard snmp-ro-acl
FTOS(conf-std-nacl)#seq 5 permit host 10.10.10.224
FTOS(conf-std-nacl)#seq 10 deny any count
!
FTOS(conf)#snmp-server community guest ro snmp-ro-acl
FTOS(conf)#
```

Related Commands	ip access-list standard	Names (or selects) a standard access list to filter based on IP address.
	show running-config snmp	Displays the current SNMP configuration and defaults.

snmp-server contact

Configure contact information for troubleshooting this SNMP node.

Syntax   snmp-server contact *text*

To delete the SNMP server contact information, use the no snmp-server contact command.

Parameters

text	Enter an alphanumeric text string, up to 55 characters long.

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

snmp-server enable traps

Enable SNMP traps.

Syntax   snmp-server enable traps [*notification-type*] [*notification-option*]

To disable traps, use the no snmp-server enable traps [*notification-type*] [*notification-option*] command.

Parameters

notification-type	Enter the type of notification from the list below:
	• ecfm — Notification of changes to ECFM
	• entity — Notification of changes to entity
	• envmon—Device notification when an environmental threshold is exceeded
	• eoam — Notification of changes to the EOAM state
	• ets — Notification of changes to the ets traps
	• fips — Notification of changes to the FIP snooping state
	• lacp — Notification of changes to the LACP state
	• pfc — Notification of changes to pfc traps
	• snmp — Notification of RFC 1157 traps.
	• stp — Notification of state change in Spanning Tree protocol (RFC 1493)
	• vrrp—Notification of state change in a VRRP group
	• xstp—Notification of state change in MSTP (802.1s), RSTP (802.1w), and PVST+
notification-option	For the envmon notification-type, enter one of the following optional parameters:
	• temperature
	For the snmp notification-type, enter one of the following optional parameters:
	• authentication
	• coldstart
	• linkdown
	• linkup

Defaults   Not enabled.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   FTOS supports up to 16 SNMP trap receivers.

If you do not configure this command, no traps controlled by this command are sent. If you do not specify a *notification-type* and *notification-option*, all traps are enabled.

Related Commands

snmp-server community	Enables SNMP and set the community string.

snmp-server engineID

Configure name for both the local and remote SNMP engines on the router.

Syntax   snmp-server engineID [local *engineID*] [remote *ip-address* udp-port *port-number engineID*]

To return to the default, use the no snmp-server engineID [local *engineID*] [remote *ip-address* udp-port *port-number engineID*] command.

Parameters		
local *engineID*	Enter the keyword local followed by the engine ID number that identifies the copy of the SNMP on the *local* device. Format (as specified in RFC 3411): 12 octets. • The first 4 octets are set to the private enterprise number. • The remaining 8 octets are the MAC address of the chassis.	
remote *ip-address*	Enter the keyword remote followed by the IP address that identifies the copy of the SNMP on the *remote* device.	
udp-port *port-number engineID*	Enter the keyword udp-port followed by the UDP (User Datagram Protocol) port number on the remote device. Range: 0 to 65535 Default: 162	

Defaults As above

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Changing the value of the SNMP Engine ID has important side effects. A user's password (entered on the command line) is converted to a message digest 5 algorithm (MD5) or secure hash algorithm (SHA) security digest. This digest is based on both the password and the local Engine ID. The command line password is then destroyed, as required by RFC 2274. Because of this deletion, if the local value of the Engine ID changes, the security digests of SNMPv3 users will be invalid, and the users will have to be reconfigured.

For the remote Engine ID, the host IP and UDP port are the indexes to the command that are matched to either overwrite or remove the configuration.

Related Commands

show snmp engineID	Displays SNMP engine and all remote engines that are configured on the router.
show running-config snmp	Displays the SNMP running configuration.

snmp-server group

Configure a new SNMP group or a table that maps SNMP users to SNMP views.

Syntax snmp-server group [*group_name* {1 | 2c | 3 {auth | noauth | priv}}] [read *name*] [write *name*] [notify *name*] [*access-list-name* | *access-list-name*]]

To remove a specified group, use the no snmp-server group [*group_name* {v1 | v2c | v3 {auth | noauth | priv}}] [read *name*] [write *name*] [notify *name*] [*access-list-name* | *access-list-name*]] command.

group_name		Enter a text string (up to 20 characters long) as the name of the group.
		Defaults: The following groups are created for mapping to read/write community/security-names.
		• v1v2creadg — maps to a community/security-name with ro permissions
		• 1v2cwriteg — maps to a community/security-name rw permissions
1 | 2c | 3		(OPTIONAL) Enter the security model version number (1, 2c, or 3).
		• 1 is the least secure version
		• 3 is the most secure of the security modes.
		• 2c allows transmission of informs and counter 64, which allows for integers twice the width of what is normally allowed.
		Default: 1
auth		(OPTIONAL) Enter the keyword auth to specify authentication of a packet without encryption.
noauth		(OPTIONAL) Enter the keyword noauth to specify no authentication of a packet.
priv		(OPTIONAL) Enter the keyword priv to specify both authentication and then scrambling of the packet.
read *name*		(OPTIONAL) Enter the keyword read followed by a name (a string of up to 20 characters long) as the read view name.
		Default: GlobalView is set by default and is assumed to be every object belonging to the Internet (1.3.6.1) OID space.
write *name*		(OPTIONAL) Enter the keyword write followed by a name (a string of up to 20 characters long) as the write view name.
notify *name*		(OPTIONAL) Enter the keyword notify followed by a name (a string of up to 20 characters long) as the notify view name.
access-list-name		(OPTIONAL) Enter the standard IPv4 access list name (a string up to 16 characters long).

Defaults   As defined above

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Figure 31-8 shows the group named harig as a version 3 user requiring both authentication and encryption and read access limited to the read named rview.

Example   **Figure 31-8.   snmp-server group Command Example**

```
FTOS#conf
FTOS(conf)# snmp-server group harig 3 priv read rview
FTOS#
```

✐   **Note:** The number of configurable groups is limited to 16 groups.

Related Commands	show snmp group	Displays the group name, security model, view status, and storage type of each group.
	show running-config snmp	Displays the SNMP running configuration.

snmp-server host

Configure the recipient of an SNMP trap operation.

Syntax snmp-server host *ip-address* [traps | informs] [version 1 | 2c | 3] [auth | no auth | priv] [*community-string*] [udp-port *port-number*] [*notification-type*]

To remove the SNMP host, use the no snmp-server host *ip-address* [traps | informs] [version 1 | 2c | 3] [auth | noauth | priv] [*community-string*] [udp-port *number*] [*notification-type*] command.

Parameters

ip-address	Enter the keyword host followed by the IP address of the host (configurable hosts is limited to 16).
traps	(OPTIONAL) Enter the keyword traps to send trap notifications to the specified host. Default: traps
informs	(OPTIONAL) Enter the keyword informs to send inform notifications to the specified host. Default: traps
version 1 | 2c | 3	(OPTIONAL) Enter the keyword version to specify the security model followed by the security model version number 1, 2c, or 3. • Version 1 is the least secure version • version 3 is the most secure of the security modes. • Version 2c allows transmission of informs and counter 64, which allows for integers twice the width of what is normally allowed. Default: Version 1
auth	(OPTIONAL) Enter the keyword auth to specify authentication of a packet without encryption.
noauth	(OPTIONAL) Enter the keyword noauth to specify no authentication of a packet.
priv	(OPTIONAL) Enter the keyword priv to specify both authentication and then scrambling of the packet.
community-string	Enter a text string (up to 20 characters long) as the name of the SNMP community. **Note:** For version 1 and version 2c security models, this string represents the name of the SNMP community. The string can be set using this command, however it is recommended that you set the community string using the snmp-server community command before executing this command. For version 3 security model, this string is the USM user security name.

udp-port *port-number*	(OPTIONAL) Enter the keywords udp-port followed by the port number of the remote host to use. Range: 0 to 65535. Default: 162
notification-type	(OPTIONAL) Enter one of the following keywords for the type of trap to be sent to the host: • ecfm - Notification of ECFM state changes • entity - Notification of entity changes • envmon - Environment monitor trap • eoam - Notificaiton of EOAM state changes • ets - Notification of ets trap changes • fips - Notification of FIP snooping state changes • lacp - Notificaiton of LACP state changes • pfc - Notification of pfc trap changes • snmp - SNMP notification (RFC 1157) • stp - Spanning Tree protocol notification (RFC 1493) • vrrp - State change in a VRRP group • xstp - State change in MSTP (802.1s), RSTP (802.1w), and PVST+ Default: All trap types are sent to host.

Defaults As shown

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

In order to configure the router to send SNMP notifications, you must enter at least one snmp-server host command. If you enter the command with no keywords, all trap types are enabled for the host. If you do not enter an snmp-server host command, no notifications are sent.

In order to enable multiple hosts, you must issue a separate snmp-server host command for each host. You can specify multiple notification types in the command for each host.

When multiple snmp-server host commands are given for the same host and type of notification (trap or inform), each succeeding command overwrites the previous command. Only the last snmp-server host command will be in effect. For example, if you enter an snmp-server host inform command for a host and then enter another snmp-server host inform command for the same host, the second command will replace the first.

The snmp-server host command is used in conjunction with the snmp-server enable command. Use the snmp-server enable command to specify which SNMP notifications are sent globally. For a host to receive most notifications, at least one snmp-server enable command and the snmp-server host command for that host must be enabled.

> **Note:** For v1 / v2c trap configuration, if the community-string is not defined using the snmp-server community command prior to using this command, the default form of the snmp-server community command will automatically be configured, with the community-name the same as specified in the snmp-server host command.

To send an inform, follow these steps:

1. Configure a remote engine ID.
2. Configure a remote user.
3. Configure a group for this user with access rights.
4. Enable traps.
5. Configure a host to receive informs.

| **Related Commands** | snmp-server enable traps | Enables the SNMP traps. |
| | snmp-server community | Configures a new community SNMPv1 or SNMPv2c. |

snmp-server location

Configure the location of the SNMP server.

Syntax snmp-server location *text*

To delete the SNMP location, use the no snmp-server location command.

| **Parameters** | *text* | Enter an alpha-numeric text string, up to 55 characters long. |

Defaults Not configured.

Command Modes CONFIGURATION

| **Command History** | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

snmp-server packetsize

Set the largest SNMP packet size permitted when the SNMP server is receiving a request or generating a reply, use the snmp-server packetsize global configuration command.

Syntax snmp-server packetsize *byte-count*

| **Parameters** | *byte-count* | Enter one of the following values 8, 16, 24 or 32. Packet sizes are 8000 bytes, 16000 bytes, 32000 bytes, and 64000 bytes. |

Defaults 8

Command Modes CONFIGURATION

| **Command History** | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

snmp-server trap-source

Configure a specific interface as the source for SNMP traffic.

Syntax	snmp-server trap-source *interface*

To disable sending traps out a specific interface, use the no snmp trap-source command.

Parameter

interface	Enter the following keywords and slot/port or number information:
	• For a Loopback interface, enter the keyword loopback followed by a number from 0 to 16383.
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   The IP address assigned to the management interface is the default.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   For this snmp-server trap-source command to be enabled, you must configure an IP address on the interface and enable the interface configured as an SNMP trap source.

Related Commands

snmp-server community	Sets the community string.

snmp-server user

Configure a new user to an SNMP group.

Syntax	snmp-server user *name* {*group_name* remote *ip-address* udp-port *port-number*} [1	2c	3] [encrypted] [auth {md5	sha} *auth-password*] [priv des56 *priv password*] [*access-list-name*]

To remove a user from the SNMP group, use the no snmp-server user *name* {*group_name* remote *ip-address* udp-port *port-number*} [1 | 2c | 3] [encrypted] [auth {md5 | sha} *auth-password*] [priv des56 *priv password*] [*access-list-name*] command.

Parameters

name	Enter the name of the user (not to exceed 20 characters), on the host, that connects to the agent.
group_name	Enter a text string (up to 20 characters long) as the name of the group.
	Defaults: The following groups are created for mapping to read/write community/security-names.
	• v1v2creadu — maps to a community with ro permissions
	• **v1v2cwriteu** — maps to a community rw permissions
remote *ip-address*	Enter the keyword remote followed by the IP address that identifies the copy of the SNMP on the *remote* device.

udp-port *port-number*	Enter the keyword udp-port followed by the UDP (User Datagram Protocol) port number on the remote device. Range: 0 to 65535. Default: 162
1 | 2c | 3	(OPTIONAL) Enter the security model version number (1, 2c, or 3). • 1 is the least secure version • 3 is the most secure of the security modes. • 2c allows transmission of informs and counter 64, which allows for integers twice the width of what is normally allowed. Default: 1
encrypted	(OPTIONAL) Enter the keyword encrypted to specify the password appear in encrypted format (a series of digits, masking the true characters of the string).
auth	(OPTIONAL) Enter the keyword auth to specify authentication of a packet without encryption.
md5 | sha	(OPTIONAL) Enter the keyword md5 or sha to designate the authentication level. md5 — Message Digest Algorithm sha — Secure Hash Algorithm
auth-password	(OPTIONAL) Enter a text string (up to 20 characters long) password that will enable the agent to receive packets from the host. Minimum: 8 characters long
priv des56	(OPTIONAL) Enter the keyword priv des56 to initiate a privacy authentication level setting using the CBC-DES privacy authentication algorithm (des56).
priv password	(OPTIONAL) Enter a text string (up to 20 characters long) password that will enables the host to encrypt the contents of the message it sends to the agent. Minimum: 8 characters long
access-list-name	(OPTIONAL) Enter the standard IPv4 access list name (a string up to 16 characters long).
access-list-name	(OPTIONAL) Enter an IPv4 access list name.

Defaults   As above

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   No default values exist for authentication or privacy algorithms and no default password exist. If you forget a password, you cannot recover it; the user must be reconfigured. You can specify either a plain-text password or an encrypted cypher-text password. In either case, the password will be stored in the configuration in an encrypted form and displayed as encrypted in the show running-config command.

If you have an encrypted password, you can specify the encrypted string instead of the plain-text password. Figure 31-9 shows how to specify the command with an encrypted string.

Examples   **Figure 31-9. snmp-server user Command Example (Encrypted)**

```
FTOS# snmp-server user privuser v3group v3 encrypted auth md5
9fc53d9d908118b2804fe80e3ba8763d priv des56 d0452401a8c3ce42804fe80e3ba8763d
```

Figure 31-10 shows how to enter a plain-text password as the string authpasswd for user authuser of group v3group.

Figure 31-10.   snmp-server user Command Example (Plain-text)

```
FTOS#conf
FTOS(conf)# snmp-server user authuser v3group v3 auth md5 authpasswd
```

Figure 31-11 configures a remote user named n3user with a v3 security model and a security level of authNOPriv.

Figure 31-11.   config Command Example

```
FTOS#conf
FTOS(conf)# snmp-server user n3user ngroup remote 172.31.1.3 udp-port 5009 3 auth
md5 authpasswd
```

> Ø   **Note:** The number of configurable users is limited to 16.

Related Commands

show snmp user	Displays the information configured on each SNMP user name.

snmp-server view

Configure an SNMPv3 view.

Syntax   snmp-server view *view-name oid-tree* {included | excluded}

To remove an SNMPv3 view, use the no snmp-server view *view-name oid-tree* {included | excluded} command.

Parameters

view-name	Enter the name of the view (not to exceed 20 characters).
oid-tree	Enter the OID sub tree for the view (not to exceed 20 characters).
included	(OPTIONAL) Enter the keyword included to include the MIB family in the view.
excluded	(OPTIONAL) Enter the keyword excluded to exclude the MIB family in the view.

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The *oid-tree* variable is a full sub-tree starting from 1.3.6 and can not specify the name of a sub-tree or a MIB. Figure 31-12 configures a view named rview that allows access to all objects under 1.3.6.1.

Example   **Figure 31-12.   snmp-server view Command Example**

```
FTOS#(conf) snmp-server view rview 1.3.6.1 included
```

show running-config snmp	Displays the SNMP running configuration.

snmp trap link-status

Enable the interface to send SNMP link traps, which indicate whether the interface is up or down.

Syntax   snmp trap link-status

To disable sending link trap messages, use the no snmp trap link-status command.

Defaults   Enabled.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   If the interface is expected to flap during normal usage, you can disable this command.

Syslog Commands

The following commands allow you to configure logging functions on all Dell Force10 switches:

- clear logging
- default logging buffered
- default logging console
- default logging monitor
- default logging trap
- logging
- logging buffered
- logging console
- logging facility
- logging history
- logging history size
- logging monitor
- logging on
- logging source-interface
- logging synchronous
- logging trap
- show logging
- show logging driverlog stack-unit
- terminal monitor

clear logging

Clear the messages in the logging buffer.

Syntax	clear logging
Defaults	none
Command Modes	EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	show logging	Displays logging settings and system messages in the internal buffer.

default logging buffered

Return to the default setting for messages logged to the internal buffer.

Syntax	default logging buffered
Defaults	size = 40960; level = 7 or debugging
Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	logging buffered	Sets the logging buffered parameters.

default logging console

Return the default settings for messages logged to the console.

Syntax	default logging console
Defaults	level = 7 or debugging
Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	logging console	Sets the logging console parameters.

default logging monitor

Return to the default settings for messages logged to the terminal.

Syntax default logging monitor

Defaults level = 7 or debugging

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

logging monitor	Sets the logging monitor parameters.
terminal monitor	Sends system messages to the terminal/monitor.

default logging trap

Return to the default settings for logging messages to the Syslog servers.

Syntax default logging trap

Defaults level = 6 or informational

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

logging trap	Limits the messages logged to the Syslog servers based on severity.

logging

Configure an IP address or host name of a Syslog server where logging messages will be sent. Multiple logging servers of IPv4 can be configured.

Syntax logging { *ipv4-address* | *hostname* }

To disable logging, enter no logging.

Parameters

ipv4-address	Enter an IPv4 address (A.B.C.D).
hostname	Enter the name of a host already configured and recognized by the switch.

Defaults Disabled

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

logging buffered

Enable logging and specify which messages are logged to an internal buffer. By default, all messages are logged to the internal buffer.

Syntax logging buffered [*level*] [*size*]

To return to the default values, use the default logging buffered command. To disable logging stored to an internal buffer, use the no logging buffered command.

Parameters

level	(OPTIONAL) Indicate a value from 0 to 7 or enter one of the following equivalent words: emergencies, alerts, critical, errors, warnings, notifications, informational, or debugging.
	Default: 7 or debugging.
size	(OPTIONAL) Indicate the size, in bytes, of the logging buffer. The number of messages buffered depends on the size of each message.
	Range: 40960 to 524288.
	Default: 40960 bytes.

Defaults *level* = 7; *size* = 40960 bytes

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information When you decrease the buffer size, all messages stored in the buffer are lost. Increasing the buffer size does not affect messages stored in the buffer.

Related Commands

clear logging	Clears the logging buffer.
default logging buffered	Returns the logging buffered parameters to the default setting.
show logging	Displays the logging setting and system messages in the internal buffer.

logging console

Specify which messages are logged to the console.

Syntax logging console [*level*]

To return to the default values, use the default logging console command. To disable logging to the console, use the no logging console command.

Parameters

level	(OPTIONAL) Indicate a value from 0 to 7 or enter one of the following parameters: emergencies, alerts, critical, errors, warnings, notifications, informational, or debugging.
	Default: 7 or debugging.

Defaults   7 or debugging

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

clear logging	Clears the logging buffer.
default logging console	Returns the logging console parameters to the default setting.
show logging	Displays the logging settings and system messages in the internal buffer.

logging facility

Configure the Syslog facility, used for error messages sent to Syslog servers.

Syntax   logging facility [*facility-type*]

To return to the default values, use the no logging facility command.

Parameters

facility-type	(OPTIONAL) Enter one of the following parameters.
	• auth (authorization system)
	• cron (Cron/at facility)
	• deamon (system deamons)
	• kern (kernel)
	• local0 (local use)
	• local1 (local use)
	• local2 (local use)
	• local3 (local use)
	• local4 (local use)
	• local5 (local use)
	• local6 (local use)
	• local7 (local use)
	• lpr (line printer system)
	• mail (mail system)
	• news (USENET news)
	• sys9 (system use)
	• sys10 (system use)
	• sys11 (system use)
	• sys12 (system use)
	• sys13 (system use)
	• sys14 (system use)
	• syslog (Syslog process)
	• user (user process)
	• uucp (Unix to Unix copy process)
	The default is local7.

Defaults   local7

Command Modes   CONFIGURATION

Related Commands	logging	Enables logging to a Syslog server.
	logging on	Enables logging.

logging history

Specify which messages are logged to the history table of the switch and the SNMP network management station (if configured).

Syntax	logging history *level*

To return to the default values, use the no logging history command.

Parameters	*level*	Indicate a value from 0 to 7 or enter one of the following equivalent words: emergencies, alerts, critical, errors, warnings, notifications, informational, or debugging.
		The default is 4.

Defaults 4 or warnings

Command Modes CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information When you configure the snmp-server trap-source command, the system messages logged to the history table are also sent to the SNMP network management station.

Related Commands	show logging history	Displays information logged to the history buffer.

logging history size

Specify the number of messages stored in the FTOS logging history table.

Syntax	logging history size *size*

To return to the default values, use the no logging history size command.

Parameters	*size*	Indicate a value as the number of messages to be stored.
		Range: 0 to 500.
		Default: 1 message.

Defaults 1 message

Command Modes CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

| **Usage Information** | When the number of messages reaches the limit you set with the logging history size command, older messages are deleted as newer ones are added to the table. |

| **Related Commands** | show logging history | Displays information logged to the history buffer. |

logging monitor

Specify which messages are logged to Telnet applications.

| **Syntax** | logging monitor [*level*] |

To disable logging to terminal connections, use the no logging monitor command.

| **Parameters** | *level* | Indicate a value from 0 to 7 or enter one of the following parameters: emergencies, alerts, critical, errors, warnings, notifications, informational, or debugging. The default is 7 or debugging. |

| **Defaults** | 7 or debugging |

| **Command Modes** | CONFIGURATION |

| **Command History** | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

| **Related Commands** | default logging monitor | Returns the logging monitor parameters to the default setting. |

logging on

Specify that debug or error messages are asynchronously logged to multiple destinations, such as logging buffer, Syslog server, or terminal lines.

| **Syntax** | logging on |

To disable logging to logging buffer, Syslog server and terminal lines, use the no logging on command.

| **Defaults** | Enabled |

| **Command Modes** | CONFIGURATION |

| **Command History** | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

| **Usage Information** | When you use the no logging on command, messages are logged only to the console. |

Related Commands	logging	Enables logging to Syslog server.
	logging buffered	Sets the logging buffered parameters.
	logging console	Sets the logging console parameters.
	logging monitor	Sets the logging parameters for the terminal connections.

logging source-interface

Specify that the IP address of an interface is the source IP address of Syslog packets sent to the Syslog server.

Syntax

logging source-interface *interface*

To disable this command and return to the default setting, use the no logging source-interface command.

Parameters

interface	Enter the following keywords and slot/port or number information:
	• For Loopback interfaces, enter the keyword loopback followed by a number from zero (0) to 16383.
	• For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1-128
	• For a Ten Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
	• For VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.

Defaults

Not configured.

Command Modes

CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

Syslog messages contain the IP address of the interface used to egress the router. By configuring the logging source-interface command, the Syslog packets contain the IP address of the interface configured.

Related Commands

logging	Enables the logging to another device.

logging synchronous

Synchronize unsolicited messages and FTOS output.

Syntax

logging synchronous [level *level* | all] [limit *number-of-buffers*]

To disable message synchronization, use the no logging synchronous [level *level* | all] [limit *number-of-buffers*] command.

Parameters

all	Enter the keyword all to ensure that all levels are printed asynchronously.
level *level*	Enter the keyword level followed by a number as the severity level. A high number indicates a low severity level and visa versa.
	Range: 0 to 7.
	Default: 2

all	Enter the keyword all to turn off all
limit *number-of-buffers*	Enter the keyword limit followed by the number of buffers to be queued for the terminal after which new messages are dropped
	Range: 20 to 300
	Default: 20

Defaults   Disabled. If enabled without *level* or *number-of-buffers* options specified, *level* = 2 and *number-of-buffers* = 20 are the defaults.

Command Modes   LINE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   When you enable logging synchronous , unsolicited messages appear between software prompts and outputs. Only the messages with a severity at or below the set level are sent to the console.

If the message queue limit is reached on a terminal line and messages are discarded, a system message appears on that terminal line. Messages may continue to appear on other terminal lines.

Related Commands

logging on	Enables logging.

logging trap

Specify which messages are logged to the Syslog server based the message severity.

Syntax   logging trap [*level*]

To return to the default values, use the default logging trap command. To disable logging, use the no logging trap command.

Parameters

level	Indicate a value from 0 to 7 or enter one of the following parameters: emergencies, alerts, critical, errors, warnings, notifications, informational, or debugging.
	The default is 6.

Defaults   6 or informational.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

logging	Enables the logging to another device.
logging on	Enables logging.

show logging

Display the logging settings and system messages logged to the internal buffer of the switch.

Syntax show logging [*number* | history [reverse][*number*] | reverse [*number*] | summary]

Parameters

number	(OPTIONAL) Enter the number of message to be displayed on the output. Range: 1 to 65535
history	(OPTIONAL) Enter the keyword history to view only information in the Syslog history table.
reverse	(OPTIONAL) Enter the keyword reverse to view the Syslog messages in FIFO (first in, first out) order.
summary	(OPTIONAL) Enter the keyword summary to view a table showing the number of messages per type and per slot.

Command Modes EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 31-13.   show logging Command Example (Partial)

```
FTOS#show logging
Syslog logging: enabled
    Console logging: level debugging
    Monitor logging: level debugging
    Buffer logging: level debugging, 311 Messages Logged, Size (40960 bytes)
    Trap logging: level informational
        Logging to 172.16.1.162
        Logging to 10.10.10.4
        Logging to 10.1.2.4
        Logging to 172.31.1.4
        Logging to 133.33.33.4
May 22 10:21:10: %STKUNIT0-M:CP %SYS-5-CONFIG_I: Configured from vty0 ( 10.11.68.22 )by admin
May 22 10:16:35: %STKUNIT0-M:CP %SYS-5-CONFIG_I: Configured from vty0 ( 10.11.68.22 )by admin
May 22 09:39:12: %STKUNIT0-M:CP %SYS-5-CONFIG_I: Configured from vty0 ( 10.11.68.22 )by admin
May 22 09:03:56: %STKUNIT0-M:CP %SYS-5-CONFIG_I: Configured from vty0 ( 10.11.68.22 )by admin
May 22 09:01:51: %STKUNIT0-M:CP %SYS-5-CONFIG_I: Configured from vty0 ( 10.11.68.22 )by admin
May 22 08:53:09: %STKUNIT0-M:CP %SEC-3-AUTHENTICATION_ENABLE_SUCCESS: Enable password authentication su
cess on vty0 ( 10.11.68.22 )
May 22 08:53:04: %STKUNIT0-M:CP %SEC-5-LOGIN_SUCCESS: Login successful for user admin on vty0
(10.11.68.22)
May 19 16:58:32: %STKUNIT0-M:CP %SEC-5-LOGOUT: Exec session is terminated for user admin on line vty2
(10.11.68.22)
May 19 14:22:48: %STKUNIT0-M:CP %SYS-5-CONFIG_I: Configured from vty2 ( 10.11.68.22 )by admin
May 19 12:05:43: %STKUNIT0-M:CP %SYS-5-CONFIG_I: Configured from vty2 ( 10.11.68.22 )by admin
May 19 10:23:59: %STKUNIT0-M:CP %SYS-5-CONFIG_I: Configured from vty0 ( 10.11.68.22 )by admin
May 19 10:23:58: %STKUNIT0-M:CP %SEC-5-LOGOUT: Exec
--More--
```

Figure 31-14.   show logging history Command Example

```
FTOS#show logging history
Syslog History Table: 1 maximum table entries,
saving level warnings or higher
 SNMP notifications not Enabled
May 22 08:53:09: %STKUNIT0-M:CP %SEC-3-AUTHENTICATION_ENABLE_SUCCESS: Enable
password authentication success on vty0 ( 10.11.68.22 )
FTOS#
```

show logging driverlog stack-unit

Display the driver log for the specified stack member.

Syntax	show logging driverlog stack-unit *unit#*

Parameters		
	stack-unit *unit#*	Enter the keyword stack-unit followed by the stack member ID of the switch for which you want to display the driver log.
		Range: 0 to 1

Defaults	none
Command Modes	EXEC
	EXEC Privilege

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	This command displays internal software driver information, which may be useful during troubleshooting switch initialization errors, such as a downed Port-Pipe.

terminal monitor

Configure the FTOS to display messages on the monitor/terminal.

Syntax	terminal monitor

To return to default settings, use the terminal no monitor command.

Defaults	Disabled.
Command Modes	EXEC
	EXEC Privilege

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands		
	logging monitor	Sets the logging parameters on the monitor/terminal.

Storm Control

Overview

The Dell Force10 operating software (FTOS) storm control feature allows users to limit or suppress traffic during a traffic storm.

Commands

The storm control commands are:

*   show storm-control broadcast
*   show storm-control multicast
*   show storm-control unknown-unicast
*   storm-control broadcast (Configuration)
*   storm-control broadcast (Interface)
*   storm-control multicast (Configuration)
*   storm-control multicast (Interface)
*   storm-control unknown-unicast (Configuration)
*   storm-control unknown-unicast (Interface)

Important Points to Remember

*   You can only apply interface commands on physical interfaces (virtual local area networks [VLANs] and link aggregation group [LAG] interfaces are not supported).
*   An INTERFACE-level command only supports storm control configuration on ingress.
*   An INTERFACE-level command overrides any CONFIGURATION-level ingress command for that physical interface, if both are configured.
*   Do not apply per-VLAN quality of service (QoS) on an interface that has storm control enabled (either on an interface or globally).

show storm-control broadcast

Display the storm control broadcast configuration.

Syntax   show storm-control broadcast [*interface*]

Parameters

interface	(OPTIONAL) Enter one of the following interfaces to display the interface specific storm control configuration.
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 32-1.   show storm-control broadcast Command Example**

```
FTOS#show storm-control broadcast tengigabitethernet 3/24

 Broadcast storm control configuration

Interface       Direction       Packets/Second
-----------------------------------------------
TenGig 3/24         Ingress              1000

FTOS#
```

show storm-control multicast

Display the storm control multicast configuration.

Syntax   show storm-control multicast [*interface*]

Parameters

interface	(OPTIONAL) Enter one of the following interfaces to display the interface specific storm control configuration.
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 32-2.   show storm-control multicast Command Example

```
FTOS#show storm-control multicast tengigabitethernet 1/0

 Multicast storm control configuration

Interface        Direction       Packets/Second
----------------------------------------------
TenGig 1/0            Ingress                 5

FTOS#
```

show storm-control unknown-unicast

Display the storm control unknown-unicast configuration

Syntax   show storm-control unknown-unicast [*interface*]

Parameters

interface	(OPTIONAL) Enter one of the following interfaces to display the interface specific storm control configuration.
	• For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information.
	• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 32-3.   show storm-control unknown-unicast Command Example**

```
FTOS#show storm-control unknown-unicast tengigabitethernet 3/0

 Unknown-unicast storm control configuration

Interface        Direction       Packets/Second
----------------------------------------------
TenGig 3/0            Ingress              1000

FTOS#
```

storm-control broadcast (Configuration)

Configure the packets per second of broadcast traffic.

Syntax   storm-control broadcast [*packets_per_second*] in

To disable broadcast rate-limiting, use the no storm-control broadcast [*packets_per_second*] in command.

Parameters	*packets_per_second*	Enter the packets per second of broadcast traffic allowed from the network. Range: 0 to 33554368.

Defaults   none

Command Modes   CONFIGURATION (conf)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Broadcast storm control is valid on Layer 2/Layer 3 interfaces only. Layer 2 broadcast traffic is treated as unknown-unicast traffic.

storm-control broadcast (Interface)

Configure the packets per second of broadcast traffic to be limited on the interface.

Syntax   storm-control broadcast [*packets_per_second*] in

To disable broadcast storm control on the interface, use the no storm-control broadcast [*packets_per_second*] in command.

Parameters	*packets_per_second*	Enter the packets per second of broadcast traffic allowed from the network. Range: 0 to 33554368

Defaults   none

Command Modes   INTERFACE (conf-if-*interface-slot/port*)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

storm-control multicast (Configuration)

Configure the packets per second (pps) of multicast traffic.

Syntax   storm-control multicast [*packets_per_second*] in

To disable storm-control for multicast traffic into the network, use the no storm-control multicast *[packets_per_second]* in command.

Parameters	*packets_per_second*	Enter the packets per second of multicast traffic allowed from the network followed by the keyword in. Range: 0 to 33554368

Defaults   none

Command Modes   CONFIGURATION (conf)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Broadcast traffic (all 0xFs) should be counted against broadcast storm control meter, not against the multicast storm control meter. It is possible, however, that some multicast control traffic may get dropped when storm control thresholds are exceeded.

storm-control multicast (Interface)

Configure the packets per second of multicast traffic allowed on a MXL Switch interface (ingress only).

Syntax   storm-control multicast [*packets_per_second*] in

To disable multicast storm control on the interface, use the no storm-control multicast [*packets_per_second*] in command.

Parameters

packets_per_second	Enter the packets per second of broadcast traffic allowed from the network. Range: 0 to 33554368

Defaults   none

Command Modes   INTERFACE (conf-if-*interface-slot/port*)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

storm-control unknown-unicast (Configuration)

Configure the packets per second of unknown-unicast traffic allowed on a MXL Switch (ingress rate only).

Syntax   storm-control unknown-unicast [*packets_per_second*] in

To disable storm control for unknown-unicast traffic, use the no storm-control unknown-unicast [*packets_per_second*] in command.

Parameters

packets_per_second	Enter the packets per second of broadcast traffic allowed from the network. Range: 0 to 33554368

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   Unknown Unicast Storm-Control is valid for Layer 2 and Layer 2/Layer 3 interfaces.

storm-control unknown-unicast (Interface)

Configure the packets per second of unknown-unicast traffic allowed on a MXL Switch interface (ingress only).

Syntax storm-control unknown-unicast [*packets_per_second*] in

To disable unknown-unicast storm control on the interface, use the no storm-control unknown-unicast [*packets_per_second*] in command.

Parameters

packets_per_second	Enter the packets per second of broadcast traffic allowed from the network. Range: 0 to 33554368

Defaults none

Command Modes INTERFACE (conf-if-*interface-slot/port*)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

33

Stacking Commands

Overview

For more information about using the MXL 10/40GbE Switch stacking feature, refer to the "Stacking MXL 10/40GbE Switches" chapter in the FTOS Configuration Guide.

Commands

The commands described in this chapter are used for managing the stacking of MXL 10/40GbE switch systems. The stacking commands are:

- redundancy disable-auto-reboot
- redundancy force-failover stack-unit
- reset stack-unit
- show redundancy
- show system stack-ports
- show system stack-unit stack-group
- stack-unit stack group
- stack-unit priority
- stack-unit provision
- stack-unit renumber

redundancy disable-auto-reboot

Prevent the MXL 10/40GbE switch stack unit from rebooting if they fail.

Syntax   **redundancy disable-auto-reboot stack-unit [***0-5* | members**]**

To return to the default, use the **no redundancy disable-auto-reboot stack-unit [0-5 | members]** command.

Default   Disabled (the failed switch is automatically rebooted).

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	When the command is given as redundancy disable-auto-reboot stack-unit, it prevents the MXL 10/40GbE switch stack management unit and standby unit from rebooting if they fail.
	When a particular unit number in the range 0-5 is issued as part of the CLI, it prevents that particular unit from rebooting upon failure.
	When members is issued as part of the CLI, all the units part of the stack are prevented from rebooting upon failure.
	The unit does not reboot until it is manually rebooted.

Related Commands	show redundancy	Displays the current redundancy status.

redundancy force-failover stack-unit

Force the backup unit in the stack to become the management unit.

Syntax	**redundancy force-failover stack-unit**

Defaults	Not enabled

Command Modes	EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

reset stack-unit

Reset any designated stack member except the management unit (master unit).

Syntax	**reset stack-unit** *0-5 hard*

Parameters	*0-5*	Enter the stack member unit identifier of the stack member to reset.
	hard	Reset the stack unit if the unit is in a problem state.

Default	none

Command Modes	EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	Resetting the management unit is not allowed (an error message is displayed if you try to do so). Resetting is a soft reboot, including flushing the forwarding tables.
	You can run this command directly on the stack standby unit (Standby Master) to reset the standby. You cannot reset any other unit from the standby unit.

Figure 33-1. reset stack-unit Command Example on the Stack Standby Unit

```
FTOS# show  system brief

Stack MAC : 00:1e:c9:f1:00:7b

Reload Type : jump-start [Next boot : normal-reload]

--  Stack Info  --
Unit  UnitType     Status    ReqTyp          CurTyp          Version     Ports
-------------------------------------------------------------------------------
  0   Management   online    MXL-10/40GbE    MXL-10/40GbE    9-1-0-853    56
  1   Standby      online    MXL-10/40GbE    MXL-10/40GbE    9-1-0-853    56
  2   Member       online    MXL-10/40GbE    MXL-10/40GbE    9-1-0-853    56
  3   Member       online    MXL-10/40GbE    MXL-10/40GbE    9-1-0-853    56
  4   Member       online    MXL-10/40GbE    MXL-10/40GbE    9-1-0-853    56
  5   Member       online    MXL-10/40GbE    MXL-10/40GbE    9-1-0-853    56

FTOS#reset stack-unit ?
<0-5>              Unit number id
FTOS#reset stack-unit 0
% Error: Reset of master unit is not allowed. <<Resetting master not allowed
FTOS(standby)#reset stack-unit 3
% Error: Reset of stack units from standby is not allowed.<<no reset of other member
FTOS(standby)#
FTOS(standby)#reset stack-unit 1<<Resetting standby unit success!
00:02:50: %STKUNIT4-S:CP %CHMGR-5-STACKUNIT_RESET: Stack unit 4 being reset
00:02:50: %STKUNIT4-S:CP %CHMGR-2-STACKUNIT_DOWN: Stack unit 4 down - reset
00:02:50: %STKUNIT4-S:CP %IFMGR-1-DEL_PORT: Removed port: TenGig 4/1-48
FTOS#rebooting

U-Boot 1.1.4 (June 6 2012 - 00:00:04)
```

Related Commands

reload	Reboots FTOS.
redundancy disable-auto-reboot	Resets the designated stack member.

show redundancy

Display the current redundancy configuration (status of automatic reboot configuration on stack management unit).

Syntax   **show redundancy**

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 33-2.   show redundancy Command Example**

```
FTOS#show redundancy

--   Stack-unit Status  --
-----------------------------------------------
 Mgmt ID:                         0
 Stack-unit ID:                   0
 Stack-unit Redundancy Role:      Primary
 Stack-unit State:                Active
 Stack-unit SW Version:           E8-3-16-160
 Link to Peer:                    Down
 Peer Stack-unit:                 not present

--   Stack-unit Redundancy Configuration  --
-----------------------------------------------
 Primary Stack-unit:              mgmt-id   0
 Auto Data Sync:                  Full
 Failover Type:                   Hot Failover
 Auto reboot Stack-unit:          Enabled
 Auto failover limit:             3 times in 60 minutes

--   Stack-unit Failover Record  --
-----------------------------------------------
 Failover Count:                  0
 Last failover timestamp:         None
 Last failover Reason:            None
 Last failover type:              None

--   Last Data Block Sync Record:  --
-----------------------------------------------
 Stack Unit Config:          no block sync done
   Start-up Config:          no block sync done
 Runtime Event Log:          no block sync done
   Running Config:           no block sync done
           ACL Mgr:          no block sync done
              LACP:          no block sync done
               STP:          no block sync done
              SPAN:          no block sync done
FTOS#
```

Related Commands

redundancy disable-auto-reboot	Prevents the system from auto-rebooting if it fails.

show system stack-ports

Display information about the stacking ports on all switches in the MXL 10/40GbE switch stack.

Syntax   **show system stack-ports** [**status** | **topology**]

Parameters

status	(OPTIONAL) Enter the keyword **status** to display the command output without the Connection field.
topology	(OPTIONAL) Enter the keyword **topology** to limit the table to just the Interface and Connection fields.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 33-3. show system stack-ports Command Example**

```
FTOS# show system stack-ports
Topology: Ring

 Interface    Connection    Link Speed    Admin     Link      Trunk
                            (Gb/s)        Status    Status    Group


 _____  _____   _____   _____  _____

 0/33         1/37          40            up        up
 0/37         2/33          40            up        up

 0/41         1/49          40            up        up

 0/45         2/53          40            up        up

 1/33         2/37          40            up        up

 1/37         0/33          40            up        up

 1/49         0/41          40            up        up

 1/53         2/49          40            up        up

 2/33         0/37          40            up        up

 2/37         1/33          40            up        up

 2/49         1/53          40            up        up

 2/53         0/45          40            up        up
```

Example   **Figure 33-4.   show system stack-ports status Command Example**

```
FTOS# show system stack-ports status
Topology: Ring

 Interface     Link Speed    Admin        Link         Trunk
               (Gb/s)        Status       Status       Group


 0/33          40            up           up
 0/37          40            up           up

 0/41          40            up           up

 0/45          40            up           up

 1/33          40            up           up

 1/37          40            up           up

 1/49          40            up           up

 1/53          40            up           up

 2/33          40            up           up

 2/37          40            up           up

 2/49          40            up           up

 2/53          40            up           up
```

Example   **Figure 33-5.   show system stack-ports topology Command Example**

```
FTOS# show system stack-ports
Topology: Ring

 Interface     Connection    Trunk
                             Group


 0/33          1/37
 0/37          2/33

 0/41          1/49

 0/45          2/53

 1/33          2/37

 1/37          0/33

 1/49          0/41

 1/53          2/49

 2/33          0/37

 2/37          1/33

 2/49          1/53

 2/53          0/45
```

Table 33-1. show system stack-ports Command Description

Field	Description
Topology	Lists the topology of stack ports connected: Ring, Daisy chain, or Standalone
Interface	The unit/port ID of the connected stack port on this unit
Link Speed	Link Speed of the stack port in Gb/s
Admin Status	The only currently listed status is Up.
Connection	The stack port ID to which this unit's stack port is connected

Related Commands

redundancy disable-auto-reboot	Resets the designated stack member.
show hardware stack-unit	Displays the data plane or management plane input and output statistics of the designated component of the designated stack member.
show system	Displays the current status of all stack members or a specific member.
	Upgrades the system image of the management unit.

show system stack-unit stack-group

Display the stack-groups present/configured for a MXL 10/40GbE switch stack unit.

Syntax   **show system stack-unit** *<unit-number>* **stack-group [configured]**

Parameters

unit number *<0-5>*	Number of the member stack unit. Valid values: 0 to 5. Default: 0.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

reload	Reboots FTOS.
show system	Displays the current status of all stack members or a specific member.

stack-unit stack group

Configure a 40GbE port for stacking mode.

Syntax   **stack-unit** *<unit number>* **stack-group** *<group number>*

Parameters

unit number *<0-5>*	Number of the member stack unit. Valid values: 0 to 5.
group number *<0-5>*	Number of the stacked port on the unit. Valid values: 0 to 5.

Command Modes   CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	reload	Reboots FTOS.
	show system	Displays the current status of all stack members or a specific member.
	show system stack-unit stack-group	Display the stack-groups present/configured for a MXL 10/40GbE switch stack unit.

stack-unit priority

Configure the ability of an MXL 10/40GbE switch to become the management unit of a stack.

Syntax   **stack-unit** *0-5* **priority** *1-14*

Parameters

0-5	Enter the stack member unit identifier, from 0 to 5, of the switch on which you want to set the management priority.
1-14	This preference parameter allows you to specify the management priority of one backup switch over another, with 1 the lowest priority and 14 the highest. The switch with the highest priority value will be chosen to become the management unit.

Defaults   0

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

reload	Reboots FTOS.
show system	Displays the current status of all stack members or a specific member.

stack-unit provision

Pre-configure a logical stacking ID of a switch that will join the stack. This is an optional command that is executed on the management unit.

Syntax   **stack-unit** *0-5* **provision** {*MXL-10/40GbE*}

Parameters

0-5	Enter a stack member identifier, from 0 to 5, of the switch that you want to add to the stack.
MXL-10/40GbE	Enter the model identifier of the switch to be added as a stack member. This identifier is also referred to as the *provision type*.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

reload	Reboots FTOS.
show system	Displays the current status of all stack members or a specific member.

stack-unit renumber

Change the stack member ID of any stack member or a stand-alone switch.

Syntax **stack-unit** *0-5* **renumber** *0-5*

Parameters

0-5	The first instance of this value is the stack member unit identifier, from 0 to 5, of the switch that you want add to the stack.
	The second instance of this value is the desired new unit identifier number.

Defaults none

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

You can renumber any switch, including the management unit or a stand-alone unit. You cannot renumber a unit to a number of an active member in the stack.

When executing this command on the Master, the stack reloads. When the members are renumbered, only that specific unit resets and comes up with the new unit number.

Example **Figure 33-6.   stack-unit renumber Command Example**

```
FTOS#stack-unit 0 renumber 2

Renumbering master unit will reload the stack. Proceed to renumber [confirm yes/
no]:
```

Related Commands

reload	Reboots FTOS.
redundancy disable-auto-reboot	Resets the designated stack member.
show system	Displays the current status of all stack members or a specific member.

Spanning Tree Protocol (STP)

Overview

The commands described in this chapter configure and monitor the IEEE 802.1d spanning tree protocol (STP). The STP commands are:

- bridge-priority
- debug spanning-tree
- description
- disable
- forward-delay
- hello-time
- max-age
- portfast bpdufilter default
- protocol spanning-tree
- show config
- show spanning-tree 0
- spanning-tree 0

bridge-priority

Set the bridge priority of the switch in an IEEE 802.1D Spanning Tree.

Syntax

bridge-priority {*priority-value* | primary | secondary}

To return to the default value, use the no bridge-priority command.

Parameters

priority-value	Enter a number as the bridge priority value. Range: 0 to 65535. Default: 32768.
primary	Enter the keyword primary to designate the bridge as the root bridge.
secondary	Enter the keyword secondary to designate the bridge as a secondary root bridge.

Defaults   *priority-value* = 32768

Command Modes   SPANNING TREE (The prompt is "conf-stp".)

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

debug spanning-tree

Enable debugging of the spanning tree protocol and view information on the protocol.

Syntax   debug spanning-tree { *stp-id* [all | bpdu | events | exceptions] | *protocol*}

To disable debugging, use the no debug spanning-tree command.

Parameters

stp-id	Enter zero (0). The switch supports one Spanning Tree group with a group ID of 0.
protocol	Enter the keyword for the type of STP to debug, either mstp, pvst, or rstp.
all	(OPTIONAL) Enter the keyword all to debug all spanning tree operations.
bpdu	(OPTIONAL) Enter the keyword bpdu to debug Bridge Protocol Data Units.
events	(OPTIONAL) Enter the keyword events to debug STP events.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   When you enable debug spanning-tree bpdu for multiple interfaces, the software only sends information on BPDUs for the last interface specified.

Related Commands

portfast bpdufilter default	Enters SPANNING TREE mode on the switch.

description

Enter a description of the spanning tree.

Syntax   description { *description*}

To remove the description from the Spanning Tree, use the no description { *description*} command.

Parameters

description	Enter a description to identify the Spanning Tree (80 characters maximum).

Defaults   none

Command Modes   SPANNING TREE (The prompt is "conf-stp".)

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

portfast bpdufilter default	Enters SPANNING TREE mode on the switch.

disable

Disable the spanning tree protocol globally on the switch.

Syntax	disable

To enable STP, use the no disable command.

Defaults	Enabled (that is, the spanning tree protocol is disabled.)

Command Modes	SPANNING TREE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

portfast bpdufilter default	Enters SPANNING TREE mode.

forward-delay

The amount of time the interface waits in the Listening State and the Learning State before transitioning to the Forwarding State.

Syntax	forward-delay *seconds*

To return to the default setting, use the no forward-delay command.

Parameters

seconds	Enter the number of seconds the FTOS waits before transitioning STP to the forwarding state. Range: 4 to 30 Default: 15 seconds.

Defaults	15 seconds

Command Modes	SPANNING TREE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

max-age	Changes the wait time before STP refreshes protocol configuration information.
hello-time	Changes the time interval between BPDUs.

hello-time

Set the time interval between generation of the spanning tree bridge protocol data units (BPDUs).

Syntax	hello-time *seconds*

To return to the default value, use the no hello-time command.

Parameters	seconds	Enter a number as the time interval between transmission of BPDUs.
		Range: 1 to 10.
		Default: 2 seconds.

Defaults	2 seconds

Command Modes	SPANNING TREE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	forward-delay	Changes the wait time before STP transitions to the Forwarding state.
	max-age	Changes the wait time before STP refreshes protocol configuration information.

max-age

Set the time interval for the spanning tree bridge to maintain configuration information before refreshing that information.

Syntax   max-age *seconds*

To return to the default values, use the no max-age command.

Parameters	seconds	Enter a number of seconds the FTOS waits before refreshing configuration information.
		Range: 6 to 40
		Default: 20 seconds.

Defaults	20 seconds

Command Modes	SPANNING TREE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	forward-delay	Changes the wait time before STP transitions to the Forwarding state.
	hello-time	Changes the time interval between BPDUs.

portfast bpdufilter default

Enable BPDU Filter globally to filter transmission of BPDU on port fast enabled interfaces.

Syntax   portfast bpdufilter default

To disable global bpdu filter default, use the no edge-port bpdufilter default command.

Defaults   Disabled

Command Modes   SPANNING TREE

protocol spanning-tree

Enter SPANNING TREE mode to enable and configure the spanning tree group.

Syntax	protocol spanning-tree *stp-id*

To disable the Spanning Tree group, use the no protocol spanning-tree *stp-id* command.

Parameters	*stp-id*	Enter zero (0). FTOS supports one Spanning Tree group, group 0.

Defaults	Not configured.

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 34-1. protocol spanning-tree Command Example**

```
FTOS(conf)#protocol spanning-tree 0
FTOS(conf-stp)#
```

Usage Information	STP is not enabled when you enter SPANNING TREE mode. To enable STP globally on the switch, use the no disable command from SPANNING TREE mode.

Related Commands	disable	Disables spanning tree group 0. To enable spanning tree group 0, use the no disable command.

show config

Display the current configuration for the mode. Only non-default values are displayed.

Syntax	show config

Command Modes	SPANNING TREE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 34-2. show config Command Example**

```
FTOS(conf-stp)#show config
protocol spanning-tree 0
 no disable
FTOS(conf-stp)#
```

show spanning-tree 0

Display the spanning tree group configuration and status of interfaces in the spanning tree group.

Syntax   show spanning-tree 0 [active | brief | guard | interface *interface* | root | summary]

Parameters

0	Enter 0 (zero) to display information about that specific Spanning Tree group.
active	(OPTIONAL) Enter the keyword active to display only active interfaces in Spanning Tree group 0.
brief	(OPTIONAL) Enter the keyword brief to display a synopsis of the Spanning Tree group configuration information.
guard	(OPTIONAL) Enter the keyword guard to display the type of guard enabled on an STP interface and the current port state.
interface *interface*	(OPTIONAL) Enter the keyword interface and the type slot/port of the interface you want displayed. Type slot/port options are the following: • For a Port Channel interface, enter the keyword port-channel followed by a number: • Range: 1-128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
root	(OPTIONAL) Enter the keyword root to display configuration information on the Spanning Tree group root.
summary	(OPTIONAL) Enter the keyword summary to only the number of ports in the Spanning Tree group and their state.

Command Modes   EXEC Privilege

Usage Information   You must enable spanning tree group 0 prior to using this command.

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 34-3.   show spanning-tree 0 Command Example**

```
FTOS#show spanning-tree 0
Executing IEEE compatible Spanning Tree Protocol
Bridge Identifier has priority 32768, Address 0001.e800.0a56
Configured hello time 2, max age 20, forward delay 15
Bpdu filter disabled globally
We are the root of the spanning tree
Current root has priority 32768 address 0001.e800.0a56
Topology change flag set, detected flag set
Number of topology changes 1 last change occurred 0:00:05 ago
from Tengigabitethernet 1/3
Timers: hold 1, topology change 35
hello 2, max age 20, forward_delay 15
Times: hello 1, topology change 1, notification 0, aging 2

Port 26 (Tengigabitethernet 1/1) is Forwarding
Port path cost 4, Port priority 8, Port Identifier 8.26
Designated root has priority 32768, address 0001.e800.0a56
Designated bridge has priority 32768, address 0001.e800.0a56
Designated port id is 8.26, designated path cost 0
Timers: message age 0, forward_delay 0, hold 0
Number of transitions to forwarding state 1
BPDU: sent:18, received 0
The port is not in the portfast mode

Port 27 (Tengigabitethernet 1/2) is Forwarding
Port path cost 4, Port priority 8, Port Identifier 8.27
Designated root has priority 32768, address 0001.e800.0a56
Designated bridge has priority 32768, address 0001.e800.0a56
Designated port id is 8.27, designated path cost 0
Timers: message age 0, forward_delay 0, hold 0
Number of transitions to forwarding state 1
BPDU: sent:18, received 0
The port is not in the portfast mode

Port 28 (Tengigabitethernet 1/3) is Forwarding
Port path cost 4, Port priority 8, Port Identifier 8.28
Designated root has priority 32768, address 0001.e800.0a56
Designated bridge has priority 32768, address 0001.e800.0a56
Designated port id is 8.28, designated path cost 0
Timers: message age 0, forward_delay 0, hold 0
Number of transitions to forwarding state 1
BPDU: sent:31, received 0
The port is not in the portfast mode
FTOS#
```

Table 34-1.   show spanning-tree 0 Command Description

Field	Description
"Bridge Identifier..."	Lists the bridge priority and the MAC address for this STP bridge.
"Configured hello..."	Displays the settings for hello time, max age, and forward delay.
"Bpdu filter..."	States whether BPDU Filter is enabled/disabled globally.
"We are..."	States whether this bridge is the root bridge for the STG.
"Current root..."	Lists the bridge priority and MAC address for the root bridge.
"Topology flag..."	States whether the topology flag and the detected flag were set.
"Number of..."	Displays the number of topology changes, the time of the last topology change, and on what interface the topology change occurred.
"Timers"	Lists the values for the following bridge timers: hold time, topology change, hello time, max age, and forward delay.

Table 34-1.   show spanning-tree 0 Command Description

Field	Description
"Times"	List the number of seconds since the last: • hello time • topology change • notification • aging
"Port 1..."	Displays the Interface type slot/port information and the status of the interface (Disabled or Enabled).
"Port path..."	Displays the path cost, priority, and identifier for the interface.
"Designated root..."	Displays the priority and MAC address of the root bridge of the STG that the interface belongs.
"Designated port..."	Displays the designated port ID

Figure 34-4.   show spanning-tree 0 brief Command Example

```
FTOS#show span 0 brief
Executing IEEE compatible Spanning Tree Protocol
Root ID Priority 32768
Address 0001.e800.0a56
Root Bridge hello time 2, max age 20, forward delay 15
Bridge ID Priority 32768,
Address 0001.e800.0a56
Configured hello time 2, max age 20, forward delay 15
Bpdu filter disabled globally

Interface                                    Designated
Name          PortID Prio Cost Sts Cost  Bridge ID          PortID
------------- ------ ---- ---- --- ----- ---------------- ------
Tengig 1/1     8.26   8    4   FWD   0   32768 0001.e800.0a56  8.26
Tengig 1/2     8.27   8    4   FWD   0   32768 0001.e800.0a56  8.27
Tengig 1/3     8.28   8    4   FWD   0   32768 0001.e800.0a56  8.28
FTOS#
```

Figure 34-5.   show spanning-tree 0 guard Command Example

```
FTOS#show spanning-tree 0 guard

Interface
Name         Instance Sts        Guard type   Bpdu Filter
---------    -------- ---------   ----------   -----------
Tengig 0/1   0        INCON(Root) Rootguard    No
Tengig 0/2   0        LIS         Loopguard    No
Tengig 0/3   0        EDS (Shut)  Bpduguard    No
```

Table 34-2.   show spanning-tree 0 guard Command Description

Field	Description
Interface Name	STP interface
Instance	STP 0 instance
Sts	Port state: root-inconsistent (INCON Root), forwarding (FWD), listening (LIS), blocking (BLK), or shut down (EDS Shut)

Table 34-2.   show spanning-tree 0 guard Command Description

Field	Description
Guard Type	Type of STP guard configured (Root, Loop, or BPDU guard)
Bpdu Filter	BPDU Filter enabled - Yes, BPDU Filter disabled - No

spanning-tree 0

Assigns a Layer 2 interface to STP instance 0 and configures a port cost or port priority, or enables loop guard, root guard, or the Portfast feature on the interface.

Syntax

spanning-tree stp-id {cost cost | {rootguard} | portfast [bpduguard [shutdown-on-violation] | bpdufilter] | priority priority}

To disable the spanning tree group on an interface, use the no spanning-tree stp-id {cost cost | {rootguard} | portfast [bpduguard [shutdown-on-violation] | bpdufilter] | priority priority} command.

Parameters

stp-id	Enter the STP instance ID. Range: 0
cost *cost*	Enter the keyword cost followed by a number as the cost. Range: 1 to 65535 Defaults: • 40-Gigabit Ethernet interface = 1 • 10-Gigabit Ethernet interface = 2 • Port Channel interface with 40-Gigabit Ethernet = 1 • Port Channel interface with 10-Gigabit Ethernet = 1
rootguard	Enter the keyword rootguard to enable STP root guard on a port or port-channel interface.
portfast [bpduguard [shutdown-on-violation] | bpdufilter]	Enter the keyword portfast to enable Portfast to move the interface into forwarding mode immediately after the root fails. Enter the optional keyword bpduguard to disable the port when it receives a BPDU. Enter the optional keyword shutdown-on-violation to hardware disable an interface when a BPDU is received and the port is disabled. Enter the keyword bpdufilter to enable on an interface; it should stop sending and receiving BPDUs on the port fast enabled ports.
priority *priority*	Enter keyword priority followed by a number as the priority. Range: zero (0) to 15 Default: 8

Defaults

cost = depends on the interface type; *priority* = 8

Command Modes

INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

If you enable **portfast bpduguard** on an interface and the interface receives a BPDU, the software disables the interface and sends a message stating that fact. The port is in ERR_DISABLE mode, yet appears in the **show interface** commands as enabled. If you do not enable the **shutdown-on-violation** command, BPDUs are still sent to the CPU.

STP root guard is supported on a port or port-channel enabled in any Spanning Tree mode: Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), Multiple Spanning Tree Protocol (MSTP), and Per-VLAN Spanning Tree Plus (PVST+).

Root guard is supported on any STP-enabled port or port-channel except when used as a stacking port. When enabled on a port, root guard applies to all VLANs configured on the port.

System Time and Date

Overview

The commands in this chapter configure time values on the system, either using the Dell Force10 operating software (FTOS), the hardware, or using the network time protocol (NTP). With NTP, the switch can act only as a client to an NTP clock host. For more information, refer to the "Network Time Protocol" section of the Management chapter in the *FTOS Configuration Guide*.

Commands

The NTP commands are:

- calendar set
- clock read-calendar
- clock set
- clock summer-time date
- clock summer-time recurring
- clock timezone
- clock update-calendar
- debug ntp
- ntp authenticate
- ntp authentication-key
- ntp broadcast client
- ntp disable
- ntp multicast client
- ntp server
- ntp source
- ntp trusted-key
- ntp update-calendar
- show calendar
- show clock
- show ntp associations
- show ntp status

calendar set

Set the time and date for the switch hardware clock.

Syntax	**calendar set** *time month day year*

Parameters

time	Enter the time in hours:minutes:seconds. For the hour variable, use the 24-hour format, for example, 17:15:00 is 5:15 pm.
month	Enter the name of one of the 12 months in English.
	You can enter the name of a day to change the order of the display to *time day month year*.
day	Enter the number of the day.
	Range: 1 to 31.
	You can enter the name of a month to change the order of the display to *time day month year*.
year	Enter a four-digit number as the year.
	Range: 1993 to 2035.

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example **Figure 35-1. calendar set Command Example**

```
FTOS#calendar set 12:11:00 21 may 2012
FTOS#
```

Usage Information You can change the order of the *month* and *day* parameters to enter the time and date as *time day month year*.

In the switch, the hardware clock is separate from the software and is called the calendar. This hardware clock runs continuously. After the hardware clock (the calendar) is set, the FTOS automatically updates the software clock after system bootup.You cannot delete the hardware clock (calendar).

To manually update the software with the hardware clock, use the command clock read-calendar.

Related Commands

clock read-calendar	Sets the software clock based on the hardware clock.
clock set	Sets the software clock.
clock update-calendar	Sets the hardware clock based on the software clock.
show clock	Displays the clock settings.

clock read-calendar

Set the software clock on the switch from the information set in hardware clock (calendar).

Syntax	**clock read-calendar**

Defaults Not configured.

| Command Modes | EXEC Privilege |

| Command History | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information

In the switch, the hardware clock is separate from the software and is called the calendar. This hardware clock runs continuously. After the hardware clock (the calendar) is set, the FTOS automatically updates the software clock after system bootup.

You cannot delete this command (that is, there is not a "no" version of this command).

clock set

Set the software clock in the switch.

Syntax **clock set** *time month day year*

Parameters

time	Enter the time in hours:minutes:seconds. For the hour variable, use the 24-hour format, example, 17:15:00 is 5:15 pm.
month	Enter the name of one of the 12 months, in English. You can enter the number of a day and change the order of the display to *time day month year*.
day	Enter the number of the day. Range: 1 to 31. You can enter the name of a month to change the order of the display to *time month day year*.
year	Enter a four-digit number as the year. Range: 1993 to 2035.

Defaults Not configured

Command Modes EXEC Privilege

| Command History | Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Example **Figure 35-2. clock set Command Example**

```
FTOS#clock set 12:11:00 21 may 2012

FTOS#
```

Usage Information

You can change the order of the *month* and *day* parameters to enter the time and date as *time day month year*. You cannot delete the software clock.

The software clock runs only when the software is up. The clock restarts, based on the hardware clock, when the switch reboots.

Dell Force10 recommends using an outside time source, such as NTP, to ensure accurate time on the switch.

Related Commands

| ntp update-calendar | Sets the switch using the NTP settings. |

clock summer-time date

Set a date (and time zone) on which to convert the switch to daylight saving time on a one-time basis.

Syntax   **clock summer-time** *time-zone* **date** *start-month start-day start-year start-time end-month end-day end-year end-time* [*offset*]

To delete a daylight saving time zone configuration, use the no clock summer-time command.

Parameters

time-zone	Enter the three-letter name for the time zone. This name is displayed in the show clock output.
start-month	Enter the name of one of the 12 months in English. You can enter the name of a day to change the order of the display to *time day month year*.
start-day	Enter the number of the day. Range: 1 to 31. You can enter the name of a month to change the order of the display to *time day month year*.
start-year	Enter a four-digit number as the year. Range: 1993 to 2035.
start-time	Enter the time in hours:minutes. For the hour variable, use the 24-hour format, example, 17:15 is 5:15 pm.
end-day	Enter the number of the day. Range: 1 to 31. You can enter the name of a month to change the order of the display to *time day month year*.
end-month	Enter the name of one of the 12 months in English. You can enter the name of a day to change the order of the display to *time day month year*.
end-time	Enter the time in hours:minutes. For the hour variable, use the 24-hour format, example, 17:15 is 5:15 pm.
end-year	Enter a four-digit number as the year. Range: 1993 to 2035.
offset	(OPTIONAL) Enter the number of minutes to add during the summer-time period. Range: 1 to1440. Default: 60 minutes

Defaults   Not configured.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

calendar set	Sets the hardware clock.
clock summer-time recurring	Sets a date (and time zone) on which to convert the switch to daylight saving time each year.
show clock	Displays the current clock settings.

clock summer-time recurring

Set the software clock to convert to daylight saving time on a specific day each year.

Syntax **clock summer-time** *time-zone* **recurring** [*start-week start-day start-month start-time end-week end-day end-month end-time* [*offset*]]

To delete a daylight saving time zone configuration, use the no clock summer-time command.

Parameters

time-zone	Enter the three-letter name for the time zone. This name is displayed in the show clock output.
	You can enter up to eight characters.
start-week	(OPTIONAL) Enter one of the following as the week that daylight saving begins and then enter values for *start-day* through *end-time*:
	• *week-number:* Enter a number from 1-4 as the number of the week in the month to start daylight saving time.
	• **first:** Enter this keyword to start daylight saving time in the first week of the month.
	• **last:** Enter this keyword to start daylight saving time in the last week of the month.
start-day	Enter the name of the day that you want daylight saving time to begin. Use English three letter abbreviations, for example, Sun, Sat, Mon, etc.
	Range: Sun – Sat
start-month	Enter the name of one of the 12 months in English.
start-time	Enter the time in hours:minutes. For the hour variable, use the 24-hour format, example, 17:15 is 5:15 pm.
end-week	Enter the one of the following as the week that daylight saving ends:
	• *week-number:* enter a number from 1-4 as the number of the week to end daylight saving time.
	• **first:** enter the keyword first to end daylight saving time in the first week of the month.
	• **last:** enter the keyword last to end daylight saving time in the last week of the month.
end-day	Enter the weekday name that you want daylight saving time to end. Enter the weekdays using the three letter abbreviations, for example Sun, Sat, Mon etc.
	Range: Sun to Sat
end-month	Enter the name of one of the 12 months in English.
end-time	Enter the time in hours:minutes:seconds. For the hour variable, use the 24-hour format, example, 17:15:00 is 5:15 pm.
offset	(OPTIONAL) Enter the number of minutes to add during the summer-time period.
	Range: 1 to 1440.
	Default: 60 minutes.

Defaults Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

calendar set	Sets the hardware clock.
clock summer-time date	Sets a date (and time zone) on which to convert the switch to daylight saving time on a one-time basis.
show clock	Displays the current clock settings.

clock timezone

Configure a timezone for the switch.

Syntax **clock timezone** *timezone-name offset*

To delete a timezone configuration, use the no clock timezone command.

Parameters

timezone-name	Enter the name of the timezone. You cannot use spaces.
offset	Enter one of the following: • a number from 1 to 23 as the number of hours in addition to UTC for the timezone. • a minus sign (-) followed by a number from 1 to 23 as the number of hours

Default Not configured.

Command Modes CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Coordinated universal time (UTC) is the time standard based on the International Atomic Time standard, commonly known as Greenwich Mean time. When determining system time, you must include the differentiator between UTC and your local timezone. For example, San Jose, CA is the Pacific Timezone with a UTC offset of -8.

clock update-calendar

Set the switch hardware clock based on the software clock.

Syntax **clock update-calendar**

Defaults Not configured.

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Use this command only if you are sure that the hardware clock is inaccurate and the software clock is correct.

You cannot delete this command (that is, there is not a "no" form of this command).

Related Commands

calendar set	Sets the hardware clock.

debug ntp

Display NTP transactions and protocol messages for troubleshooting.

Syntax   **debug ntp** {**adjust** | **all** | **authentication** | **events** | **loopfilter** | **packets** | **select** | **sync**}

To disable debugging of NTP transactions, use the **no debug ntp** {**adjust** | **all** | **authentication** | **events** | **loopfilter** | **packets** | **select** | **sync**} command.

Parameters

adjust	Enter the keyword **adjust** to display information on NTP clock adjustments.
all	Enter the keyword **all** to display information on all NTP transactions.
authentication	Enter the keyword **authentication** to display information on NTP authentication transactions.
events	Enter the keyword **events** to display information on NTP events.
loopfilter	Enter the keyword **loopfilter** to display information on NTP local clock frequency.
packets	Enter the keyword **packets** to display information on NTP packets.
select	Enter the keyword **select** to display information on the NTP clock selection.
sync	Enter the keyword **sync** to display information on the NTP clock synchronization.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ntp authenticate

Enable authentication of NTP traffic between the switch and the NTP time serving hosts.

Syntax   **ntp authenticate**

To disable NTP authentication, use the no ntp authentication command.

Defaults   Not enabled.

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   You also must configure an authentication key for NTP traffic using the ntp authentication-key command.

Related Commands

ntp authentication-key	Configures the authentication key for NTP traffic.
ntp trusted-key	Configures a key to authenticate.

ntp authentication-key

Specify a key for authenticating the NTP server.

Syntax

ntp authentication-key *number* **md5** [**0** | **7**] *key*

Parameters

number	Specify a number for the authentication key. Range: 1 to 4294967295. This number must be the same as the number parameter configured in the ntp trusted-key command.
md5	Specify that the authentication key will be encrypted using MD5 encryption algorithm.
0	Specify that authentication key will be entered in an unencrypted format (default).
7	Specify that the authentication key will be entered in DES encrypted format.
key	Enter the authentication key in the previously specified format.

Defaults

NTP authentication is not configured by default. If you do not specify the option [**0** | **7**], 0 is selected by default.

Command Modes

CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

After configuring the ntp authentication-key command, to complete NTP authentication, configure the ntp trusted-key command.

FTOS versions 8.2.1.0 and later use an encryption algorithm to store the authentication key that is different from previous FTOS versions; beginning in version 8.2.1.0, FTOS uses DES encryption to store the key in the startup-config when you enter the command **ntp authentication-key**. Therefore, if your system boots with a startup-configuration from an FTOS versions prior to 8.2.1.0 in which you have configured **ntp authentication-key**, the system cannot correctly decrypt the key, and cannot authenticate NTP packets. In this case you must re-enter this command and save the running-config to the startup-config.

Related Commands

ntp authenticate	Enables NTP authentication.
ntp trusted-key	Configures a trusted key.

ntp broadcast client

Set up the interface to receive NTP broadcasts from an NTP server.

Syntax

ntp broadcast client

To disable broadcast, use the no ntp broadcast client command.

Defaults

Disabled

Command Modes

INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ntp disable

Prevent an interface from receiving NTP packets.

Syntax   **ntp disable**

To re-enable NTP on an interface, use the no ntp disable command.

Default   Disabled (that is, if an NTP host is configured, all interfaces receive NTP packets)

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ntp multicast client

Configure the switch to receive NTP information from the network via multicast.

Syntax   **ntp multicast client** [*multicast-address*]

To disable multicast reception, use the no ntp multicast client [*multicast-address*] command.

Parameters

multicast-address	(OPTIONAL) Enter a multicast address. Enter an IPv4 address in dotted decimal format. If you do not enter a multicast address, the address 224.0.1.1 is configured if the interface address is IPv4.

Defaults   Not configured.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ntp server

Configure an NTP time-serving host.

Syntax   **ntp server** {*hostname* | *ipv4-address*} [**key** *keyid*] [**prefer**] [**version** *number*]

Parameters

ipv4-address	Enter an IPv4 address (A.B.C.D).
hostname	Enter the hostname of the server.
key *keyid*	(OPTIONAL) Enter the keyword **key** and a number as the NTP peer key. Range: 1 to 4294967295
prefer	(OPTIONAL) Enter the keyword **prefer** to indicate that this peer has priority over other servers.
version *number*	(OPTIONAL) Enter the keyword **version** and a number to correspond to the NTP version used on the server. Range: 1 to 3

Defaults   Not configured.

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information You can configure multiple time serving hosts (up to 250). From these time serving hosts, the FTOS chooses one NTP host with which to synchronize. To determine which server was selected, use the show ntp associations.

Because a large number of polls to NTP hosts can impact network performance, Dell Force10 recommends limiting the number of hosts configured.

Related Commands	show ntp associations	Displays NTP servers configured and their status.

ntp source

Specify an interface's IP address to be included in the NTP packets.

Syntax ntp source *interface*

To delete the configuration, use the no ntp source command.

Parameters	*interface*	Enter the following keywords and slot/port or number information:
		• For Loopback interfaces, enter the keyword **loopback** followed by a number from zero (0) to 16383.
		• For a Port Channel interface, enter the keyword **lag** followed by a number:
		Range: 1-128
		• For a 10-Gigabit Ethernet interface, enter the keyword **TenGigabitEthernet** followed by the slot/port information.
		• For a 40-Gigabit Ethernet interface, enter the keyword fortyGigE followed by the slot/port information.
		• For VLAN interface, enter the keyword **vlan** followed by a number from 1 to 4094.

Defaults	Not configured.

Command Modes	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

ntp trusted-key

Set a key to authenticate the system to which NTP will synchronize.

Syntax ntp trusted-key *number*

To delete the key, use the no ntp trusted-key *number* command.

Parameters	*number*	Enter a number as the trusted key ID.
		Range: 1 to 4294967295.

Defaults	Not configured.

Command Modes	CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The *number* parameter in the ntp trusted-key command must be the same number as the *number* parameter in the ntp authentication-key command. If you change the ntp authentication-key command, you must also change the ntp trusted-key command.

Related Commands

ntp authentication-key	Sets an authentication key for NTP.
ntp authenticate	Enables the NTP authentication parameters you set.

ntp update-calendar

Configure the FTOS to update the calendar (the hardware clock) with the NTP-derived time.

Syntax ntp update-calendar [*minutes*]

To return to default setting, use the no ntp update-calendar command.

Parameters

minutes	(OPTIONAL) Enter the number of minutes between updates from NTP to the hardware clock.
	Range: 1 to 1440.
	Default: 60 minutes.

Defaults	Not enabled.

Command Modes	CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show calendar

Display the current date and time based on the switch hardware clock.

Syntax show calendar

Command Modes	EXEC
	EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 35-3.   show calendar Command Example**

```
FTOS#show calendar
12:29:34 pacific Tue May 22 2012
FTOS#
```

Related
Commands

show clock	Displays the time and date from the switch software clock.

show clock

Display the current clock settings.

Syntax   show clock [detail]

Parameters

detail	(OPTIONAL) Enter the keyword **detail** to view the source information of the clock.

Command Modes   EXEC

EXEC Privilege

Command
History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 35-4.   show clock Command Example**

```
FTOS#show clock
12:30:04.402 pacific Tue May 22 2012
FTOS#
```

Example   **Figure 35-5.   show clock detail Command Example**

```
FTOS#show clock detail
12:30:26.892 pacific Tue May 22 2012
Time source is RTC hardware
Summer time starts 00:00:00 UTC Wed Mar 14 2012
Summer time ends 00:00:00 pacific Wed Nov 7 2012
FTOS#
```

Related
Commands

clock summer-time recurring	Displays the time and date from the switch hardware clock.
show calendar	Displays the time and date from the switch hardware clock.

show ntp associations

Display the NTP master and peers.

Syntax   show ntp associations

Command Modes   EXEC

EXEC Privilege

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example

Figure 35-6.   show ntp associations Command Example

```
FTOS#show ntp associations
remote          ref clock       st when poll reach   delay   offset    disp
==========================================================================
 10.10.120.5     0.0.0.0         16    -   256    0     0.00    0.000 16000.0
*172.16.1.33     127.127.1.0     11    6    16   377    -0.08  -1499.9  104.16
 172.31.1.33     0.0.0.0         16    -   256    0     0.00    0.000 16000.0
 192.200.0.2     0.0.0.0         16    -   256    0     0.00    0.000 16000.0
* master (synced), # master (unsynced), + selected, - candidate
FTOS#
```

Table 35-1.   show ntp associations Command Fields

Field	Description
(none)	One or more of the following symbols could be displayed: • * means synchronized to this peer • # means almost synchronized to this peer • + means the peer was selected for possible synchronization • - means the peer is a candidate for selection • ~ means the peer is statically configured
remote	Displays the remote IP address of the NTP peer.
ref clock	Displays the IP address of the remote peer's reference clock.
st	Displays the peer's stratum, that is, the number of hops away from the external time source. A 16 in this column means the NTP peer cannot reach the time source.
when	Displays the last time the switch received an NTP packet.
poll	Displays the polling interval (in seconds).
reach	Displays the reachability to the peer (in octal bitstream).
delay	Displays the time interval or delay for a packet to complete a round-trip to the NTP time source (in milliseconds).
offset	Displays the relative time of the NTP peer's clock to the switch clock (in milliseconds).
disp	Displays the dispersion.

**Related
Commands**

show ntp status	Displays current NTP status.

show ntp status

Display the current NTP status.

Syntax   show ntp status

Command Modes   EXEC

EXEC Privilege

**Command
History**

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 35-7.   show ntp status Command Example**

```
FTOS#show ntp status
Clock is unsynchronized, stratum 16, no reference clock
frequency is 0.000 ppm, stability is 0.000 ppm, precision is 4294967279
reference time is 00000000.00000000 (6:28:16.000 UTC Thu Feb 7 2036)
clock offset is 0.000000 msec, root delay is 0.00000 sec
root dispersion is 0.00000 sec, peer dispersion is 0.000 msec
peer mode is unspec
FTOS#
```

Table 35-2.   show ntp status Command Description

Field	Description
"Clock is..."	States whether or not the switch clock is synchronized, which NTP stratum the system is assigned and the IP address of the NTP peer.
"frequency is..."	Displays the frequency (in ppm), stability (in ppm) and precision (in Hertz) of the clock in this system.
"reference time is..."	Displays the reference time stamp.
"clock offset is..."	Displays the system offset to the synchronized peer and the time delay on the path to the NTP root clock.
"root dispersion is..."	Displays the root and path dispersion.
"peer mode is..."	State what NTP mode the switch is. This should be client mode.

Related Commands

show ntp associations	Displays information on the NTP Master and Peer configurations.

Uplink Failure Detection (UFD)

Overview

Uplink failure detection (UFD) provides detection of the loss of upstream connectivity and, if used with network interface controller (NIC) teaming, automatic recovery from a failed link.

Commands

The UFD commands described in this chapter are:

- clear ufd-disable
- debug uplink-state-group
- description
- downstream
- downstream auto-recover
- downstream disable links
- enable
- show running-config uplink-state-group
- show uplink-state-group
- uplink-state-group
- upstream

clear ufd-disable

Re-enable one or more downstream interfaces on the switch/router that are in a UFD-disabled error state so that an interface can send and receive traffic.

Syntax   **clear ufd-disable** {**interface** *interface* | **uplink-state-group** *group-id*}

Parameters	**interface** *interface*	Specifies one or more downstream interfaces.
		For *interface*, enter one of the following interface types:
		10-Gigabit Ethernet: **tengigabitethernet** {*slot/port* |*slot/port-range*}
		40-Gigabit Ethernet: **fortygigabitethernet** {*slot/port* |*slot/port-range*}
		Port channel: **port-channel** {1-512	*port-channel-range*}
		Where *port-range* and *port-channel-range* specify a range of ports separated by a dash (-) and/or individual ports/port channels in any order; for example:
		`tengigabitethernet 1/1-2,5,9,11-12`
		`port-channel 1-3,5`
		A comma is required to separate each port and port-range entry.
	uplink-state-group *group-id*	Re-enables all UFD-disabled downstream interfaces in the group. Valid *group-id* values are 1 to 16.

Command Modes   EXEC Mode

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Related Commands

downstream	Assigns a port or port-channel to the uplink-state group as a downstream interface.
upstream	Assigns a port or port-channel to the uplink-state group as an upstream interface.
uplink-state-group	Creates an uplink-state group and enable the tracking of upstream links.

debug uplink-state-group

Enable debug messages for events related to a specified uplink-state group or all groups.

Syntax   **debug uplink-state-group** [*group-id*]

To turn off debugging event messages, use the **no debug uplink-state-group** [*group-id*] command.

Parameters

| *group-id* | Enables debugging on the specified uplink-state group. Valid *group-id* values are 1 to 16. |

Defaults   none

Command Modes   EXEC Privilege

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Related Commands

| clear ufd-disable | Re-enables downstream interfaces that are in a UFD-disabled error state. |

description

Enter a text description of an uplink-state group.

Syntax **description** *text*

Parameters

text	Text description of the uplink-state group.
	Maximum length: 80 alphanumeric characters.

Defaults none

Command Modes UPLINK-STATE-GROUP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

uplink-state-group	Creates an uplink-state group and enable the tracking of upstream links.

Example **Figure 36-1. description Command Example**

```
FTOS(conf-uplink-state-group-3)#description Testing UFD feature
FTOS(conf-uplink-state-group-3)#show config
!
uplink-state-group 3
 description Testing UFD feature
```

downstream

Assign a port or port-channel to the uplink-state group as a downstream interface.

Syntax **downstream** *interface*

To delete a downstream interface, use the **no downstream** *interface* command.

Parameters

interface	Enter one of the following interface types:
	10-Gigabit Ethernet: **tengigabitethernet** {*slot*/*port* | *slot*/*port-range*}
	40-Gigabit Ethernet: **fortygigabitethernet** {*slot*/*port* |*slot*/*port-range*}
	Port channel: **port-channel** {1-512 | *port-channel-range*}
	Where *port-range* and *port-channel-range* specify a range of ports separated by a dash (-) and/or individual ports/port channels in any order; for example:
	`tengigabitethernet 1/1-2,5,9,11-12`
	`port-channel 1-3,5`
	A comma is required to separate each port and port-range entry.

Defaults none

Command Modes UPLINK-STATE-GROUP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	You can assign physical port or port-channel interfaces to an uplink-state group.
	You can assign an interface to only one uplink-state group. You must configure each interface assigned to an uplink-state group as either an upstream or downstream interface, but not both.
	You can assign individual member ports of a port channel to the group. An uplink-state group can contain either the member ports of a port channel or the port channel itself, but not both.

Related Commands	downstream	Assigns a port or port-channel to the uplink-state group as a downstream interface.
	upstream	Assigns a port or port-channel to the uplink-state group as an upstream interface.
	uplink-state-group	Creates an uplink-state group and enable the tracking of upstream links.

downstream auto-recover

Enable auto-recovery so that UFD-disabled downstream ports in an uplink-state group automatically come up when a disabled upstream port in the group comes back up.

Syntax	**downstream auto-recover**
	To disable auto-recovery on downstream links, use the **no downstream auto-recover** command.

Defaults	The auto-recovery of UFD-disabled downstream ports is enabled.

Command Modes	UPLINK-STATE-GROUP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands	downstream	Assigns a port or port-channel to the uplink-state group as a downstream interface.
	upstream	Assigns a port or port-channel to the uplink-state group as an upstream interface.
	uplink-state-group	Creates an uplink-state group and enable the tracking of upstream links.

downstream disable links

Configure the number of downstream links in the uplink-state group that are disabled if one upstream link in an uplink-state group goes down.

Syntax	**downstream disable links** {*number*	all}
	To revert to the default setting, use the **no downstream disable links** command.

Parameters	*number*	Enter the number of downstream links to be brought down by UFD. Range: 1 to 1024.
	all	Brings down all downstream links in the group.

Defaults	All

Command Modes	UPLINK-STATE-GROUP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

When one upstream interface in an uplink-state group goes down, a user-configurable number of downstream interfaces in an uplink-state group are put into a link-down state with an UFD-Disabled error message.

If all upstream interfaces in an uplink-state group go down, all downstream interfaces in the same uplink-state group are put into a link-down state.

Related Commands

downstream	Assigns a port or port-channel to the uplink-state group as a downstream interface.
upstream	Assigns a port or port-channel to the uplink-state group as an upstream interface.
uplink-state-group	Creates an uplink-state group and enable the tracking of upstream links.

enable

Re-enable upstream-link tracking for an uplink-state group after it has been disabled.

Syntax   **enable**

To disable upstream-link tracking without deleting the uplink-state group, use the **no enable** command.

Parameters

group-id	Enables debugging on the specified uplink-state group. Valid *group-id* values are 1 to 16.

Defaults   Upstream-link tracking is automatically enabled in an uplink-state group.

Command Modes   UPLINK-STATE-GROUP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

uplink-state-group	Creates an uplink-state group and enable the tracking of upstream links.

show running-config uplink-state-group

Display the current configuration of one or more uplink-state groups.

Syntax   **show running-config uplink-state-group** [*group-id*]

Parameters

group-id	Displays the current configuration of all uplink-state groups or a specified group. Valid *group-id* values are 1 to 16.

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 36-2.   show running-config uplink-state-group Command Example**

```
FTOS#show running-config uplink-state-group
!
uplink-state-group 3
 no enable
 description Testing UFD feature
 downstream disable links 2
 downstream TenGigabitEthernet 0/1-2,5,9,11-12
 upstream TenGigabitEthernet 0/3-4
```

Related Commands

show uplink-state-group	Displays status information on a specified uplink-state group or all groups.
uplink-state-group	Creates an uplink-state group and enable the tracking of upstream links.

show uplink-state-group

Display status information on a specified uplink-state group or all groups.

Syntax   **show uplink-state-group** [*group-id*] [detail]

Parameters

group-id	Displays status information on a specified uplink-state group or all groups. Valid *group-id* values are 1 to 16.
detail	Displays additional status information on the upstream and downstream interfaces in each group

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 36-3.   show uplink-state-group Command Examples

```
FTOS# show uplink-state-group

Uplink State Group: 1    Status: Enabled, Up
Uplink State Group: 3    Status: Enabled, Up
Uplink State Group: 5    Status: Enabled, Down
Uplink State Group: 6    Status: Enabled, Up
Uplink State Group: 7    Status: Enabled, Up
Uplink State Group: 16   Status: Disabled, Up


FTOS# show uplink-state-group 16
Uplink State Group: 16  Status: Disabled, Up


FTOS#show uplink-state-group detail
(Up): Interface up   (Dwn): Interface down    (Dis): Interface disabled

Uplink State Group    : 1       Status: Enabled, Up
Upstream Interfaces   :
Downstream Interfaces :

Uplink State Group    : 3       Status: Enabled, Up
Upstream Interfaces   : Te 0/46(Up) Te 0/47(Up)
Downstream Interfaces : Te 13/0(Up) Te 13/1(Up) Te 13/3(Up) Te 13/5(Up)
                        Te 13/6(Up)

Uplink State Group    : 5       Status: Enabled, Down
Upstream Interfaces   : Te 0/0(Dwn) Te 0/3(Dwn) Te 0/5(Dwn)
Downstream Interfaces : Te 13/2(Dis) Te 13/4(Dis) Te 13/11(Dis) Te 13/12(Dis)
                        Te 13/13(Dis) Te 13/14(Dis) Te 13/15(Dis)

Uplink State Group    : 6       Status: Enabled, Up
Upstream Interfaces   :
Downstream Interfaces :

Uplink State Group    : 7       Status: Enabled, Up
Upstream Interfaces   :
Downstream Interfaces :

Uplink State Group    : 16      Status: Disabled, Up
Upstream Interfaces   : Te 0/41(Dwn) Po 8(Dwn)
Downstream Interfaces : Te 0/40(Dwn)
```

Related Commands

show running-config uplink-state-group	Displays the current configuration of one or more uplink-state groups.
uplink-state-group	Creates an uplink-state group and enable the tracking of upstream links.

uplink-state-group

Create an uplink-state group and enable the tracking of upstream links on a switch/router.

Syntax   **uplink-state-group** *group-id*

To delete an uplink-state group, use the **no uplink-state-group** *group-id* command.

To disable upstream-link tracking without deleting the uplink-state group, use the **no enable** command in Uplink-State-Group Configuration mode.

Parameters

group-id	Enter the ID number of an uplink-state group. Range: 1-16.

Defaults   none

Command Modes   CONFIGURATION

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

After you enter the command, you enter Uplink-State-Group Configuration mode to assign upstream and downstream interfaces to the group.

An uplink-state group is considered to be operationally UP if at least one upstream interface in the group is in the Link-Up state.

An Uplink-State group is considered to be operationally DOWN if no upstream interfaces in the group are in the link-up state. No uplink-state tracking is performed when a group is disabled or in an operationally down state.

Related Commands

show running-config uplink-state-group	Displays the current configuration of one or more uplink-state groups.
show uplink-state-group	Displays status information on a specified uplink-state group or all groups.

Example   **Figure 36-4.   uplink-state-group Command Example**

```
FTOS(conf)#uplink-state-group 16
FTOS(conf)#
02:23:17: %STKUNIT0-M:CP %IFMGR-5-ASTATE_UP: Changed uplink state group Admin
state to up: Group 16
```

upstream

Assign a port or port-channel to the uplink-state group as an upstream interface.

Syntax   **upstream** *interface*

To delete an upstream interface, use the **no upstream** *interface* command.

Parameters

interface	Enter one of the following interface types:
	10-Gigabit Ethernet: **tengigabitethernet** {*slot/port*	*slot/port-range*}
	40-Gigabit Ethernet: **fortygigabitethernet** {*slot/port* |*slot/port-range*}
	Port channel: **port-channel** {1-512	*port-channel-range*}
	Where *port-range* and *port-channel-range* specify a range of ports separated by a dash (-) and/or individual ports/port channels in any order; for example:
	tengigabitethernet 1/1-2,5,9,11-12
	port-channel 1-3,5
	A comma is required to separate each port and port-range entry.

Defaults   none

Command Modes   UPLINK-STATE-GROUP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

You can assign physical port or port-channel interfaces to an uplink-state group.

You can assign an interface to only one uplink-state group. You must configure each interface assigned to an uplink-state group as either an upstream or downstream interface, but not both.

You can assign individual member ports of a port channel to the group. An uplink-state group can contain either the member ports of a port channel or the port channel itself, but not both.

Related Commands

downstream	Assigns a port or port-channel to the uplink-state group as a downstream interface.
upstream	Assigns a port or port-channel to the uplink-state group as an upstream interface.
uplink-state-group	Creates an uplink-state group and enable the tracking of upstream links.

Example   **Figure 36-5.   upstream Command Example**

```
FTOS(conf-uplink-state-group-16)# upstream tengigabitethernet 1/10-15
FTOS(conf-uplink-state-group-16)#
```

VLAN Stacking

Overview

With the virtual local area network (VLAN)-stacking feature (also called stackable VLANs and *QinQ*), you can "stack" VLANs into one tunnel and switch them through the network transparently.

The VLAN stacking commands described in this chapter are:

- dei enable
- dei honor
- dei mark
- member
- show interface dei-honor
- show interface dei-mark
- vlan-stack access
- vlan-stack compatible
- vlan-stack dot1p-mapping
- vlan-stack protocol-type
- vlan-stack trunk

For information about basic VLAN commands, refer to Virtual LAN (VLAN) Commands in the Layer 2 chapter.

Important Points to Remember

- If the spanning tree protocol (STP) is *not* enabled across the stackable VLAN network, STP bridge protocol data units (BPDUs) from the customer's networks are tunneled across the stackable VLAN network**.**
- If STP *is* enabled across the stackable VLAN network, STP BPDUs from the customer's networks are consumed and *not* tunneled across the stackable VLAN network *unless* you enable the tunneling protocol.
- Layer 3 protocols are not supported on a stackable VLAN network.
- Assigning an IP address to a stackable VLAN is supported when all the members are only stackable VLAN trunk ports. IP addresses on a stackable VLAN-enabled VLAN is not supported if the VLAN contains stackable VLAN access ports. This facility is provided for the simple network management protocol (SNMP) over a stackable VLAN-enabled VLAN containing only stackable VLAN trunk interfaces. Layer 3 routing protocols on such a VLAN are not supported.

- Dell Force10 recommends not using the same MAC address, on different customer VLANs, on the same stackable VLAN.
- Interfaces configured using stackable VLAN access or stackable VLAN trunk commands do not switch traffic for the default VLAN. These interfaces switch traffic only when they are added to a non-default VLAN.

dei enable

Make packets eligible for dropping based on their drop eligible indicator (DEI) value.

Syntax	dei enable

Defaults	Packets are colored green; no packets are dropped.

Command Mode	CONFIGURATION

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

dei honor

Honor the incoming DEI value by mapping it to an FTOS drop precedence. You can enter the command once for 0 and once for 1.

Syntax	dei honor {0	1} {green	red	yellow}

Parameters	0	1	Enter the bit value you want to map to a color.
	green	red	yellow	Choose a color: • Green: High priority packets that are the least preferred to be dropped. • Yellow: Lower priority packets that are treated as best-effort. • Red: Lowest priority packets that are always dropped (regardless of congestion status).

Defaults	Disabled; packets with an unmapped DEI value are colored green.

Command Mode	INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	You must first enable DEI for this configuration to take effect.

Related Commands	dei enable	Enables DEI.

dei mark

Set the DEI value on egress according to the color currently assigned to the packet.

Syntax dei mark {green | yellow} {0 | 1}

Parameters

0 | 1	Enter the bit value you want to map to a color.
green | yellow	Choose a color: • Green: High priority packets that are the least preferred to be dropped. • Yellow: Lower priority packets that are treated as best-effort.

Defaults All the packets on egress are marked with DEI 0.

Command Mode INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information You must first enable DEI for this configuration to take effect.

Related Commands

dei enable	Enables DEI.

member

Assign a Stackable VLAN access or trunk port to a VLAN. The VLAN must contain the vlan-stack compatible command in its configuration.

Syntax **member** *interface*

To remove an interface from a Stackable VLAN, use the **no member** *interface* command.

Parameters

interface	Enter the following keywords and slot/port or number information: • For a Port Channel interface, enter the keyword port-channel followed by a number: Range: 1 to 128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a 40-Gigabyte Ethernet interface, enter the keyword **fortyGigE** followed by the slot/ port information.

Defaults Not configured.

Command Mode conf-if-vl-<vlan-id>-stack

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information You must enable stackable VLAN (using the vlan-stack compatible command) on the VLAN prior to adding a member to the VLAN.

Related Commands	vlan-stack compatible	Enables stackable VLAN on a VLAN.

show interface dei-honor

Display the dei honor configuration.

Syntax   show interface dei-honor [*interface slot/port*]

Parameters

interface slot/port	Enter the interface type followed by the slot and port number.

Command Mode   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 37-1.   show interface dei-honor Command Example**

```
FTOS#show interface dei-honor

Default Drop precedence: Green
Interface            CFI/DEI                 Drop precedence
---------------------------------------------------------------
Te 0/1               0                       Green
Te 0/1               1                       Yellow
Te 8/9               1                       Red
Te 8/40              0                       Yellow
```

Related Commands	dei honor	Honors the incoming DEI value.

show interface dei-mark

Display the dei mark configuration.

Syntax   show interface dei-mark [interface *slot/port*]

Parameters

interface slot/port	Enter the interface type followed by the slot and port number.

Command Mode   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 37-2.   show interface dei-mark Command Example**

```
FTOS#show interface dei-mark

Default CFI/DEI Marking: 0
Interface            Drop precedence       CFI/DEI
------------------------------------------------------
Te 0/1               Green                 0
Te 0/1               Yellow                1
Te 8/9               Yellow                0
Te 8/40              Yellow                0
```

vlan-stack access

Specify a Layer 2 port or port channel as an access port to the Stackable VLAN network.

Syntax   vlan-stack access

To remove access port designation, use the no vlan-stack access command.

Defaults   Not configured.

Command Modes   INTERFACE

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information   Prior to enabling this command, to place the interface in Layer 2 mode, you must enter the switchport command.

To remove the access port designation, the port must be removed (use the no member *interface* command) from all stackable VLAN-enabled VLANs.

vlan-stack compatible

Enable the Stackable VLAN feature on a VLAN.

Syntax   vlan-stack compatible

To disable the stackable VLAN feature on a VLAN, use the no vlan-stack compatible command.

Defaults   Not configured.

Command Modes   CONF-IF-VLAN

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information   You must remove the members prior to disabling the stackable VLAN feature.

To view the stackable VLANs, use the show vlan command in EXEC Privilege mode. Stackable VLANs contain members, designated by the M in the Q column of the command output.

Figure 37-3.   show vlan Command Example with Stackable VLANs

```
FTOS#show vlan

Codes: * - Default VLAN, G - GVRP VLANs

    NUM     Status    Q Ports
*    1      Inactive
     2      Active    M Te 13/13
                      M Te 13/0-2
     3      Active    M Po1(Te 13/14-15)
                      M Te 13/18
                      M Te 13/3
     4      Active    M Po1(Te 13/14-15)
                      M Te 13/18
                      M Te 13/4
     5      Active    M Po1(Te 13/14-15)
                      M Te 13/18
                      M Te 13/5
FTOS#
```

vlan-stack dot1p-mapping

Map C-Tag dot1p values to a S-Tag dot1p value. C-Tag values may be separated by commas and dashed ranges are permitted. Dynamic Mode CoS overrides any Layer 2 QoS configuration in case of conflicts.

Syntax   vlan-stack dot1p-mapping c-tag-dot1p *values* sp-tag-dot1p *value*

Parameters

c-tag-dot1p *value*	Enter the keyword followed by the customer dot1p value that will be mapped to a service provider do1p value.
	Range: 0 to 5
sp-tag-dot1p *value*	Enter the keyword followed by the service provider dot1p value.
	Range: 0 to 5

Defaults   none

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

vlan-stack protocol-type

Define the Stackable VLAN tag protocol identifier (TPID) for the outer VLAN tag (also called the *VMAN tag*). If you do not configure this command, FTOS assigns the value 0x9100.

Syntax   vlan-stack protocol-type *number*

Parameters

number	Enter the hexadecimal number as the Stackable VLAN tag.
	You may specify both bytes of the 2-byte S-Tag TPID.
	Range: 0 to FFFF
	Default: 9100

Defaults   0x9100

| **Command Modes** | CONFIGURATION |

Usage Information

For specific interoperability limitations regarding the S-Tag TPID, refer to the *FTOS Configuration Guide*.

Related Commands

| portmode hybrid | Sets a port (physical ports only) to accept both tagged and untagged frames. A port configured this way is identified as a hybrid port in report displays. |
| vlan-stack trunk | Specifies a Layer 2 port or port channel as a trunk port to the stackable VLAN network. |

vlan-stack trunk

Specify a Layer 2 port or port channel as a trunk port to the stackable VLAN network.

Syntax   vlan-stack trunk

To remove a trunk port designation from the selected interface, use the no vlan-stack trunk command.

Defaults   Not configured.

Command Modes   INTERFACE

Usage Information

Prior to using this command, to place the interface in Layer 2 mode, you must execute the switchport command.

To remove the trunk port designation, the port must first be removed (using the no member *interface* command) from all stackable VLAN-enabled VLANs.

A VLAN-Stack trunk port is also allowed to be configured as a tagged port and as an untagged port for single-tagged VLANs. When the VLAN-Stack trunk port is also a member of an untagged VLAN, the port should be in hybrid mode. For more information, refer to portmode hybrid.

In Figure 37-4, a VLAN-Stack trunk port is configured and then also made part of a single-tagged VLAN.

In Figure 37-5, the tag protocol identifier (TPID) is set to 8848. The "Tengig 3/10" port is configured to act as a VLAN-stack access port, while the "Tengig 8/0" port acts as a VLAN-Stack trunk port, switching stackable VLAN traffic for VLAN 10, while also switching untagged traffic for VLAN 30 and tagged traffic for VLAN 40. (To allow VLAN 30 traffic, the native VLAN feature is required, by using the portmode hybrid command. For more information, refer to portmode hybrid in the Interfaces chapter.

Example 1   **Figure 37-4.   Adding a Stackable VLAN Trunk Port to a Tagged VLAN**

```
FTOS(conf-if-te-0/42)#switchport
FTOS(conf-if-te-0/42)#vlan-stack trunk
FTOS(conf-if-te-0/42)#show config
!
interface Tengigabitethernet 0/42
 no ip address
 switchport
 vlan-stack trunk
 no shutdown
FTOS(conf-if-te-0/42)#interface vlan 100
FTOS(conf-if-vl-100)#vlan-stack compatible
FTOS(conf-if-vl-100-stack)#member Tengigabitethernet 0/42
FTOS(conf-if-vl-100-stack)#show config
!
interface Vlan 100
 no ip address
 vlan-stack compatible
 member Tengigabitethernet 0/42
 shutdown
FTOS(conf-if-vl-100-stack)#interface vlan 20
FTOS(conf-if-vl-20)#tagged Tengigabitethernet 0/42
FTOS(conf-if-vl-20)#show config
!
interface Vlan 20
 no ip address
 tagged Tengigabitethernet 0/42
 shutdown
FTOS(conf-if-vl-20)#do show vlan

Codes: * - Default VLAN, G - GVRP VLANs
Q: U - Untagged, T - Tagged
   x - Dot1x untagged, X - Dot1x tagged
   G - GVRP tagged, M - Vlan-stack

   NUM     Status    Description              Q Ports
*  1       Inactive
   20      Active                             T Te 0/42
   100     Active                             M Te 0/42
FTOS(conf-if-vl-20)#
```

Example 2   **Figure 37-5.   Adding a Stackable VLAN Trunk Port to Tagged and Untagged VLANs**

```
FTOSFTOS(conf)#vlan-stack protocol-type 88A8
FTOS(conf)#interface Tengigabitethernet 3/10
FTOS(conf-if-te-3/10)#no shutdown
FTOS(conf-if-te-3/10)#switchport
FTOS(conf-if-te-3/10)#vlan-stack access
FTOS(conf-if-te-3/10)#exit

FTOS(conf)#interface Tengigabitethernet 8/0
FTOS(conf-if-te-10/0)#no shutdown
FTOS(conf-if-te-10/0)#portmode hybrid
FTOS(conf-if-te-10/0)#switchport
FTOS(conf-if-te-10/0)#vlan-stack trunk
FTOS(conf-if-te-10/0)#exit

FTOS(conf)#interface vlan 10
FTOS(conf-if-vlan)#vlan-stack compatible
FTOS(conf-if-vlan)#member Te 7/0, Te 3/10, Te 8/0
FTOS(conf-if-vlan)#exit

FTOS(conf)#interface vlan 30
FTOS(conf-if-vlan)#untagged Te 8/0
FTOS(conf-if-vlan)#exit
FTOS(conf)#

FTOS(conf)#interface vlan 40
FTOS(conf-if-vlan)#tagged Te 8/0
FTOS(conf-if-vlan)#exit
FTOS(conf)#
```

38

Virtual Router Redundancy Protocol (VRRP)

IPv4 VRRP Commands

The virtual router redundancy protocol (VRRP) chapter describes the commands:

- advertise-interval
- authentication-type
- clear counters vrrp
- debug vrrp
- description
- disable
- hold-time
- preempt
- priority
- show config
- show vrrp
- track
- virtual-address
- vrrp delay minimum
- vrrp delay reload
- vrrp-group

advertise-interval

Set the time interval between VRRP advertisements.

Syntax　advertise-interval *seconds*

To return to the default settings, use the no advertise-interval command.

Parameters

seconds	Enter a number of seconds. Range: 1 to 255. Default: 1 second.

Defaults　1 second.

Command Modes　INTERFACE-VRRP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information Dell Force10 recommends keeping the default setting for this command. If you do change the time interval between VRRP advertisements on one router, you must change it on all routers.

authentication-type

Enable authentication of VRRP data exchanges.

Syntax authentication-type simple [*encryption-type*] *password*

To delete an authentication type and password, use the no authentication-type command.

Parameters

simple	Enter the keyword simple to specify simple authentication.
encryption-type	(OPTIONAL) Enter one of the following numbers: • 0 (zero) for an un-encrypted (clear text) password • 7 (seven) for hidden text password.
password	Enter a character string up to 8 characters long as a password. If you do not enter an encryption-type, the password is stored as clear text.

Defaults Not configured.

Command Modes VRRP

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information The password is displayed in the show config output if the encryption-type is unencrypted or clear text. If you choose to encrypt the password, the show config displays an encrypted text string.

clear counters vrrp

Clear the counters maintained on VRRP operations.

Syntax clear counters vrrp [*vrrp-id*]

Parameters

vrrp-id	(OPTIONAL) Enter the number of the VRRP group ID. Range: 1 to 255

Command Modes EXEC Privilege

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

debug vrrp

Allows you to enable debugging of VRRP.

Syntax   debug vrrp *interface* [*vrrp-id*] {all | packets | state | timer}

To disable debugging, use the no debug vrrp *interface* [*vrrp-id*] {all | packets | state | timer} command.

Parameters

interface	Enter the following keywords and slot/port or number information: • For Port Channel interface types, enter the keyword port-channel followed by the number: Range: 1 to 128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a VLAN interface, enter the keyword vlan followed by the VLAN ID. The VLAN ID range is from 1 to 4094.
vrrp-id	(OPTIONAL) Enter a number from 1 to 255 as the VRRP group ID.
all	Enter the keyword all to enable debugging of all VRRP groups.
bfd	Enter the keyword bfd to enable debugging of all VFFP BFD interactions
packets	Enter the keyword packets to enable debugging of VRRP control packets.
state	Enter the keyword state to enable debugging of VRRP state changes.
timer	Enter the keyword timer to enable debugging of the VRRP timer.

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   If no options are specified, debug is active on all interfaces and all VRRP groups.

description

Configure a short text string describing the VRRP group.

Syntax   description *text*

To delete a VRRP group description, use the no description command.

Parameters

text	Enter a text string up to 80 characters long.

Defaults   Not enabled.

Command Modes   VRRP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

disable

Disable a VRRP group.

| **Syntax** | disable |

To re-enable a disabled VRRP group, use the no disable command.

| **Defaults** | VRRP is enabled. |

| **Command Modes** | VRRP |

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

| **Usage Information** | To enable VRRP traffic, assign an IP address to the VRRP group using the virtual-address command and enter no disable. |

Related Commands		
	virtual-address	Specifies the IP address of the virtual router.

hold-time

Specify a delay (in seconds) before a switch becomes the MASTER virtual router. By delaying the initialization of the VRRP MASTER, the new switch can stabilize its routing tables.

| **Syntax** | hold-time *seconds* |

To return to the default value, use the no hold-time command.

Parameters		
	seconds	Enter a number of seconds.
		Range: 0 to 65535.
		Default: zero (0) seconds.

| **Defaults** | zero (0) seconds |

| **Command Modes** | VRRP |

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

| **Usage Information** | If a switch is a MASTER and you change the hold timer, you must disable and re-enable VRRP for the new hold timer value to take effect. |

Related Commands		
	disable	Disables a VRRP group.

preempt

Permit a BACKUP router with a higher priority value to preempt or become the MASTER router.

Syntax preempt

To prohibit preemption, use the no preempt command.

Defaults Enabled (that is, a BACKUP router can preempt the MASTER router).

Command Modes VRRP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

priority

Specify a VRRP priority value for the VRRP group. This value is used by the VRRP protocol during the MASTER election process.

Syntax priority *priority*

To return to the default value, use the no priority command.

Parameters

priority	Enter a number as the priority. Enter 255 only if the router's virtual address is the same as the interface's primary IP address (that is, the router is the OWNER).
	Range: 1 to 255
	Default: 100

Defaults 100

Command Modes VRRP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information To guarantee that a VRRP group becomes MASTER, configure the VRRP group's virtual address with same IP address as the interface's primary IP address and change the priority of the VRRP group to 255.

If you set the priority to 255 and the virtual-address is not equal to the interface's primary IP address, an error message appears.

> **Note:** Configuring VRRP priority 255 on an interface on which DHCP Client is enabled is not supported.

show config

View the non-default VRRP configuration.

Syntax   show config [verbose]

Parameters

verbose	(OPTIONAL) Enter the keyword verbose to view all VRRP group configuration information, including defaults.

Command Modes   VRRP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 38-1.   show config Command Example**

```
FTOS(conf-if-vrid-4)#show con
 vrrp-group 4
  virtual-address 119.192.182.124
 !
```

show vrrp

View the VRRP groups that are active. If no VRRP groups are active, the FTOS returns "No Active VRRP group."

Syntax   show vrrp [*vrrp-id*] [*interface*] [brief]

Parameters

vrrp-id	(OPTIONAL) Enter the Virtual Router Identifier for the VRRP group to view only that group. Range: 1 to 255.
interface	(OPTIONAL) Enter the following keywords and slot/port or number information: • For Port Channel interface types, enter the keyword port-channel followed by the number: Range: 1 to 128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a VLAN interface, enter the keyword vlan followed by the VLAN ID. The VLAN ID range is from 1 to 4094.
brief	(OPTIONAL) Enter the keyword brief to view a table of information on the VRRP groups.

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 38-2.   show vrrp brief Command Example**

```
FTOS>Interface Grp Pri  Pre State  Master addr     Virtual addr(s)
Description-------------------------------------------------------------------------
TenGig 10/37  1   100  Y   Master 200.200.200.200 200.200.200.201
TenGig10/37  2   100  Y   Master 200.200.200.200 200.200.200.202 200.200.200.203
Description
TenGig10/37  3   100  Y   Master 1.1.1.1          1.1.1.2
TenGig10/37  4   100  Y   Master 200.200.200.200 200.200.200.206 200.200.200.207 ... short
desc

FTOS>
```

Table 38-1.   show vrrp brief Command Description

Item	Description
Interface	Lists the interface type, slot and port on which the VRRP group is configured.
Grp	Displays the VRRP group ID.
Pri	Displays the priority value assigned to the interface.
	If the track command is configured to track that interface and the interface is disabled, the *cost* is subtracted from the priority value assigned to the interface.
Pre	States whether preempt is enabled on the interface.
	• Y = Preempt is enabled.
	• N = Preempt is not enabled.
State	Displays the operational state of the interface by using one of the following:
	• NA/IF (the interface is not available).
	• MASTER (the interface associated with the MASTER router).
	• BACKUP (the interface associated with the BACKUP router).
Master addr	Displays the IP address of the MASTER router.
Virtual addr(s)	Displays the virtual IP addresses of the VRRP routers associated with the interface.

Figure 38-3.   show vrrp Command Example

```
FTOS>show vrrp
------------------
TenGigabitEthernet 12/3, VRID: 1, Net: 10.1.1.253
 State: Master, Priority: 105, Master: 10.1.1.253 (local)
 Hold Down: 0 sec, Preempt: TRUE, AdvInt: 1 sec
 Adv rcvd: 0, Adv sent: 1862, Gratuitous ARP sent: 0
 Virtual MAC address:
  00:00:5e:00:01:01
 Virtual IP address:
  10.1.1.252
 Authentication: (none)
 Tracking states for 1 interfaces:
  Up  Tengigabitethernet 12/17 priority-cost 10
------------------
Tengigabitethernet 12/4, VRID: 2, Net: 10.1.2.253
 State: Master, Priority: 110, Master: 10.1.2.253 (local)
 Hold Down: 10 sec, Preempt: TRUE, AdvInt: 1 sec
 Adv rcvd: 0, Adv sent: 1862, Gratuitous ARP sent: 0
 Virtual MAC address:
  00:00:5e:00:01:02
 Virtual IP address:
  10.1.2.252
 Authentication: (none)
 Tracking states for 2 interfaces:
  Up  Tengigabitethernet 2/1 priority-cost 10
  Up  Tengigabitethernet 12/17 priority-cost 10
FTOS>
```

Table 38-2.   show vrrp Command Description

Line Beginning with	Description
Tengigabitethernet 12/3...	Displays the Interface, the VRRP group ID, and the network address.
	If the interface is not sending VRRP packets, 0.0.0.0 appears as the network address.
State: master...	Displays the interface's state:
	• **Na/lf** (not available),
	• **master** (MASTER virtual router)
	• **backup** (BACKUP virtual router)
	the interface's priority and the IP address of the MASTER.
Hold Down:...	This line displays additional VRRP configuration information:
	• **Hold Down** displays the hold down timer interval in seconds.
	• **Preempt** displays TRUE if preempt is configured and FALSE if preempt is not configured.
	• **AdvInt** displays the Advertise Interval in seconds.
Adv rcvd:...	This line displays counters for the following:
	• **Adv rcvd** displays the number of VRRP advertisements received on the interface.
	• **Adv sent** displays the number of VRRP advertisements sent on the interface.
	• **Gratuitous** ARP sent displays the number of gratuitous ARPs sent.
Virtual MAC address	Displays the virtual MAC address of the VRRP group.
Virtual IP address	Displays the virtual IP address of the VRRP router to which the interface is connected.

Table 38-2.   show vrrp Command Description

Authentication:...	States whether authentication is configured for the VRRP group. If it is, the authentication type and the password are listed.
Tracking states...	This line is displayed if the track command is configured on an interface. Below this line, the following information on the tracked interface is displayed: • **Dn** or **Up** states whether the interface is down or up. • the interface type slot/port information

track

Monitor an interface and lower the priority value of the VRRP group on that interface if it is disabled.

Syntax   track *interface* [priority-cost *cost*]

To disable monitoring, use the no track *interface* command.

Parameters

interface	Enter the following keywords and slot/port or number information: • For a Loopback interface, enter the keyword loopback followed by a number from 0 to 16383. • For Port Channel interface types, enter the keyword port-channel followed by the number: Range: 1-128 • For a 10-Gigabit Ethernet interface, enter the keyword TenGigabitEthernet followed by the slot/port information. • For a VLAN interface, enter the keyword vlan followed by a number from 1 to 4094.
cost	(OPTIONAL) Enter a number as the amount to be subtracted from the priority value. Range: 1 to 254. Default: 10.

Defaults   *cost* = 10

Command Modes   VRRP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   If you disable the interface, the cost value is subtracted from the priority value and forces a new MASTER election if the priority value is lower than the priority value in the BACKUP virtual routers.

virtual-address

Configure up to 12 IP addresses of virtual routers in the VRRP group. You must set at least one virtual address for the VRRP group to start sending VRRP packets.

Syntax	virtual-address *ip-address1* [... *ip-address12*]

To delete one or more virtual IP addresses, use the no virtual-address *ip-address1* [... *ip-address12*] command.

Parameters

ip-address1	Enter an IP address of the virtual router in dotted decimal format.
	The IP address must be on the same subnet as the interface's primary IP address.
... *ip-address12*	(OPTIONAL) Enter up to 11 additional IP addresses of virtual routers in dotted decimal format. Separate the IP addresses with a space.
	The IP addresses must be on the same subnet as the interface's primary IP address.

Defaults	Not configured.
Command Modes	VRRP

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The VRRP group only becomes active and sends VRRP packets when a virtual IP address is configured. When you delete the virtual address, the VRRP group stops sending VRRP packets.

A system message appears after you enter or delete the virtual-address command.

To guarantee that a VRRP group becomes MASTER, configure the VRRP group's virtual address with the same IP address as the interface's primary IP address and change the priority of the VRRP group to 255.

You can ping the virtual addresses configured in all VRRP groups.

vrrp delay minimum

Set the delay time for VRRP initialization after an interface comes up.

Syntax	vrrp delay minimum *seconds*

Parameters

seconds	Enter the number of seconds for the delay for VRRP initialization after an interface becomes operational.
	Range: 0 to 900 (0 indicates no delay)

Defaults	0
Command Modes	INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	This command applies to a single interface.When used in conjunction with the vrrp delay reload CLI, the later timer rules the VRRP enabling. For example, if vrrp delay reload is 600 and the vrrp delay minimum is 300:

- When the system reloads, VRRP waits 600 seconds (10 minutes) to bring up VRRP on all interfaces that are up and configured for vrrp.
- When an interface comes up, whether as part of a system reload or an interface reload, the system waits 300 seconds (5 minutes) to bring up VRRP on that interface.

Related Commands	vrrp delay reload	Sets the delay time for VRRP initialization after a system reboot.

vrrp delay reload

Set the delay time for VRRP initialization after a system reboot.

Syntax	vrrp delay minimum *seconds*

Parameters	*seconds*	Enter the number of seconds for the delay.
		Range: 0 to 900 (0 indicates no delay)

Defaults	0

Command Modes	INTERFACE

Command History	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information	This command applies to a all the VRRP configured interfaces on a system. When used in conjunction with the vrrp delay minimum CLI, the later timer rules the VRRP enabling. For example, if vrrp delay reload is 600 and the vrrp delay minimum is 300:

- When the system reloads, VRRP waits 600 seconds (10 minutes) to bring up VRRP on all interfaces that are up and configured for vrrp.
- When an interface comes up, whether as part of a system reload or an interface reload, the system waits 300 seconds (5 minutes) to bring up VRRP on that interface.

You must save the configuration and reload the system for the delay timers to take affect.

Related Commands	vrrp delay minimum	Sets the delay time for VRRP initialization after a line card reboot.

vrrp-group

Assign a VRRP ID to an interface. You can configure up to 12 VRRP groups per interface.

Syntax   vrrp-group *vrrp-id*

Parameters

vrrp-id	Enter a number as the group ID.
	Range: 1 to 255.

Defaults   Not configured.

Command Modes   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information   The VRRP group only becomes active and sends VRRP packets when a virtual IP address is configured. When you delete the virtual address, the VRRP group stops sending VRRP packets.

Related Commands

virtual-address	Assigns up to 12 virtual IP addresses per VRRP group.

Debugging and Diagnostics

This chapter contains three sections:

- Offline Diagnostic Commands
- Buffer Tuning Commands
- Hardware Commands

Offline Diagnostic Commands

The offline diagnostics test suite is useful for isolating faults and debugging hardware. While tests are running, the Dell Force10 operating software (FTOS) results are saved as a text file (TestReport-SU-X.txt) in the flash directory. The show file command is available only on Master and Standby.

Important Points to Remember

- Offline diagnostics can only be run when the unit is offline.
- You can only run offline diagnostics on a unit to which you are connected via the console. In other words, you cannot run diagnostics on a unit to which you are connected via a stacking link.
- Diagnostic results are stored in a file (TestReport-SU-X.txt) in the flash directory. To review the results, use the show file command, which prints the results to the screen.
- Diagnostics only test connectivity, not the entire data path.

The offline diagnostics commands are:

- diag stack-unit
- offline stack-unit
- online stack-unit

diag stack-unit

Run offline diagnostics on a stack unit.

Syntax   **diag stack-unit** *number* [**alllevels** | **level0** | **level1** | **level2**] verbose no-reboot

Parameters

number	Enter the stack-unit number. Range: 0 to 5
alllevels	Enter the keyword **alllevels** to run the complete set of offline diagnostic tests.

level0	Enter the keyword **level0** to run Level 0 diagnostics. Level 0 diagnostics check for the presence of various components and perform essential path verifications. In addition, they verify the identification registers of the components on the board.
level1	Enter the keyword **Level1** to run Level 1 diagnostics. Level 1 diagnostics is a smaller set of diagnostic tests with support for automatic partitioning. They perform status/self test for all the components on the board and test their registers for appropriate values. In addition, they perform extensive tests on memory devices (e.g., SDRAM, flash, NVRAM, EEPROM, and CPLD) wherever possible. There are no tests on 10G links. At this level, stack ports are shut down automatically.
level2	Enter the keyword **level2** to run Level 2 diagnostics. Level 2 diagnostics is a full set of diagnostic tests with no support for automatic partitioning. Level 2 diagnostics are used primarily for on-board loopback tests and more extensive component diagnostics. Various components on the board are put into loop back mode, and test packets are transmitted through those components. These diagnostics also perform snake tests using VLAN configurations. You must physically remove the unit from the stack to test 10G links.
verbose	Enter the keyword **verbose** to run the diagnostic in verbose mode. Verbose mode gives more information in the output than standard mode.
no-reboot	Enter the keyword **no-reboot** to avoid automatic rebooting of the chassis after completion of diagnostic execution. Generally, this option is never used because if you run the diagnostic once again without rebooting the chassis, it may cause an issue with the diagnostic results.

Defaults none

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

offline stack-unit

Place a stack unit in the offline state.

Syntax **offline stack-unit** *number*

Parameters

number	Enter the stack unit number. Range: 0 to 5

Defaults none

Command Mode EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Usage Information

The system reboots when the off-line diagnostics complete. This is an automatic process. A warning message appears when the **offline stack-unit** command is implemented.

```
Warning - Diagnostic execution will cause stack-unit to reboot after
completion of diags.

Proceed with Offline-Diags [confirm yes/no]:y
```

online stack-unit

Place a stack unit in the online state.

Syntax	**online stack-unit** *number*	

Parameters

number	Enter the stack unit number.
	range: 0 to 5

Defaults   none

Command Mode   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Buffer Tuning Commands

The buffer tuning commands are:

- buffer (Buffer Profile)
- buffer (Configuration)
- buffer-profile (Configuration)
- buffer-profile (Interface)
- show buffer-profile
- show buffer-profile interface

⚠ **Warning:** Altering the buffer allocations is a sensitive operation. Do not use any buffer tuning commands without first contacting the Dell Force10 Technical Assistance Center (TAC).

buffer (Buffer Profile)

Allocate an amount of dedicated buffer space, dynamic buffer space, or packet pointers to queues 0 to 3.

Syntax   **buffer [dedicated | dynamic | packets-pointers] queue0** *number* **queue1** *number* **queue2** *number* **queue3** *number*

Parameters

dedicated	Enter this keyword to configure the amount of dedicated buffer space per queue.
dynamic	Enter this keyword to configure the amount of dynamic buffer space per Field Processor.
packets-pointers	Enter this keyword to configure the number of packet pointers per queue.

queue0 *number*	Enter this keyword to allocate an amount of buffer space or packet pointers to Queue 0.
	Dedicated Buffer Range: 0-2013
	Dynamic Buffer Range:
	    FP: 0-2013
	    CSF: 0-131200 (in multiples of 80)
	Packet Pointer Range: 0-2047

queue1 *number*	Enter this keyword to allocate an amount of buffer space or packet pointers to Queue 1.
	Dedicated Buffer Range: 0-2013
	Dynamic Buffer Range:
	    FP: 0-2013
	    CSF: 0-131200 (in multiples of 80)
	Packet Pointer Range: 0-2047

queue2 *number*	Enter this keyword to allocate an amount of buffer space or packet pointers to Queue 2.
	Dedicated Buffer Range: 0-2013
	Dynamic Buffer Range:
	    FP: 0-2013
	    CSF: 0-131200 (in multiples of 80)
	Packet Pointer Range: 0-2047

queue3 *number*	Enter this keyword to allocate an amount of buffer space or packet pointers to Queue 3.
	Dedicated Buffer Range: 0-2013
	Dynamic Buffer Range:
	    FP: 0-2013
	    CSF: 0-131200 (in multiples of 80)
	Packet Pointer Range: 0-2047

Defaults none

Command Mode BUFFER PROFILE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

buffer-profile (Configuration)	Creates a buffer profile that can be applied to an interface.

buffer (Configuration)

Apply a buffer profile to all Field or Switch Fabric processors in a port-pipe.

buffer [**csf** | **fp-uplink**] **port-set** *port-pipe* **buffer-policy** *buffer-profile*

Parameters

csf	Enter this keyword to apply a buffer profile to all Switch Fabric processors in a port-pipe.
fp-uplink	Enter this keyword to apply a buffer profile to all Field Processors in a a port-pipe.

port-set *port-pipe*	Enter the keyword **port-set** followed by the port-pipe number.
	Range: 0-1
buffer-policy *buffer-profile*	Enter the keyword **buffer-policy** followed by the name of a buffer profile you created.

Defaults　none

Command Mode　BUFFER PROFILE

Usage Information　If you attempt to apply a buffer profile to a non-existent port-pipe, FTOS displays the following message. However, the configuration still appears in the running-config.

```
%DIFFSERV-2-DSA_BUFF_CARVING_INVALID_PORT_SET: Invalid FP port-set 2 for
stack-unit 2. Valid range of port-set is <0-1>
```

When you remove a buffer-profile using the no buffer-profile [fp | csf] command from CONFIGURATION mode, the buffer-profile name still appears in the output of show buffer-profile [detail | summary]. After a line card reset, the buffer profile correctly returns to the default values, but the profile name remains. Remove it from the show buffer-profile [detail | summary] command output by entering no buffer [fp-uplink | csf] buffer-policy from CONFIGURATION mode and no buffer-policy from INTERFACE mode.

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Related Commands

| buffer-profile (Configuration) | Creates a buffer profile that can be applied to an interface. |

buffer-profile (Configuration)

Create a buffer profile that can be applied to an interface.

Syntax　**buffer-profile** {{**fp** | **csf**} *profile-name* | **global** {**1Q**|**4Q**}

Parameters

fp	Enter this keyword to create a buffer profile for the Field Processor.
csf	Enter this keyword to create a buffer profile for the Switch Fabric Processor.
profile-name	Create a name for the buffer profile.
global	Apply one of two pre-defined buffer profiles to all of the port-pipes in the system.
1Q	Enter this keyword to choose a pre-defined buffer profile for single queue (i.e non-QoS) applications.
4Q	Enter this keyword to choose a pre-defined buffer profile for four queue (i.e QoS) applications.

Defaults　global 4Q

Command Mode　CONFIGURATION

Command History

| Version 8.3.16.1 | Introduced on MXL 10/40GbE Switch IO Module |

Usage Information The **buffer-profile global** command fails if you have already applied a custom buffer-profile on an interface. Similarly, when you configure buffer-profile global, you cannot not apply buffer-profile on any interface.

If the default buffer-profile (4Q) is active, FTOS displays an error message instructing you to remove the default configuration using the no buffer-profile global command.

You must reload the system for the global buffer-profile to take effect.

Related Commands

buffer (Buffer Profile)	Allocates an amount of dedicated buffer space, dynamic buffer space, or packet pointers to queues 0 to 3.

buffer-profile (Interface)

Apply a buffer profile to an interface.

Syntax **buffer-profile** *profile-name*

Parameters

profile-name	Enter the name of the buffer profile you want to apply to the interface.

Defaults none

Command Mode INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

buffer-profile (Configuration)	Creates a buffer profile that can be applied to an interface.

show buffer-profile

Display the buffer profile that is applied to an interface.

Syntax **show buffer-profile** {**detail** | **summary**} {**csf** | **fp-uplink**}

Parameters

detail	Display the buffer allocations of the applied buffer profiles.
summary	Display the buffer-profiles that are applied to line card port-pipes in the system.
csf	Display the Switch Fabric Processor buffer profiles that you have applied to line card port-pipes in the system.
fp-uplink	Display the Field Processor buffer profiles that you have applied to line card port-pipes in the system.

Defaults none

Command Mode INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Figure 39-1.   show buffer-profile Command Example

```
FTOS#show buffer-profile summary fp-uplink
Stack Unit Port-set              Buffer-profile
0                    0                       test1
4                    0                       test2
FTOS#
```

Related Commands   buffer-profile (Configuration)   Creates a buffer profile that can be applied to an interface.

show buffer-profile interface

Display the buffer profile that is applied to an interface.

Syntax   **show buffer-profile** {**detail** | **summary**} **interface** *interface slot/port*

Parameters

detail	Display the buffer allocations of a buffer profile.
summary	Display the Field Processors and Switch Fabric Processors that are applied in the system.
interface *interface*	Enter the keyword interface followed by the interface type, either **tengigabitethernet** or **fortygigabitethernet**.
slot/port	Enter the slot and port number of the interface.

Defaults   none

Command Mode   INTERFACE

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example   **Figure 39-2.   show buffer-profile interface Command Example**

```
FTOS#show buffer-profile detail csf linecard 4 port-set 0
Linecard 4 Port-set 0
Buffer-profile test
Queue#            Dedicated Buffer      Buffer Packets
                  (Bytes)
0                 36960                 718
1                 18560                 358
2                 18560                 358
3                 18560                 358
4                 9600                  64
5                 9600                  64
6                 9600                  64
7                 9600                  63
FTOS#
```

Related Commands   buffer-profile (Configuration)   Creates a buffer profile that can be applied to an interface.

Hardware Commands

These commands display information from a hardware sub-component or ASIC.

The hardware commands are:

- clear hardware stack-unit
- clear hardware system-flow
- show hardware layer2 acl
- show hardware layer3
- show hardware stack-unit
- show hardware system-flow

clear hardware stack-unit

Clear statistics from selected hardware components.

Syntax	clear hardware stack-unit *0–5* {counters	unit *0–1* counters	cpu data-plane statistics	cpu party-bus statistics	stack-port *0–52*}

Parameters		
	stack-unit *0-5*	Enter the keyword stack-unit followed by 0 to 5 to select a particular stack member and then enter one of the following command options to clear a specific collection of data.
	counters	Enter the keyword counters to clear the counters on the selected stack member.
	unit *0–0* counters	Enter the keyword unit along with a port-pipe number, from *0* to *1*, followed by the keyword counters to clear the counters on the selected port-pipe.
	cpu data-plane statistics	Enter the keywords cpu data-plane statistics to clear the data plane statistics.
	cpu party-bus statistics	Enter the keywords cpu party-bus statistics to clear the management statistics.
	stack-port *33–56*	Enter the keyword stack-port followed by the port number of the stacking port to clear the statistics of the particular stacking port.
		Range: 33 to 56
		Note: You can identify stack port numbers by physical inspection of the rear modules. The numbering is the same as for the 10G ports. You can also inspect the output of the show system stack-ports command.

Defaults	none

Command Modes	EXEC Privilege

Command History		
	Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands		
	show hardware stack-unit	Displays the data plane or management plane input and output statistics of the designated component of the designated stack member.

clear hardware system-flow

Clear system-flow statistics from selected hardware components.

Syntax   clear hardware system-flow layer2 stack-unit *0-5* port-set *0-0* counters

Parameters

stack-unit *0-5*	Enter the keyword stack-unit followed by 0 to 5 to select a particular stack member and then enter one of the following command options to clear a specific collection of data.
port-set *0–0* **counters**	Enter the keyword port-set along with a port-pipe number, followed by the keyword **counters** to clear the system-flow counters on the selected port-pipe.

Defaults   none

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Related Commands

show hardware stack-unit	Displays the data plane or management plane input and output statistics of the designated component of the designated stack member.

show hardware layer2 acl

Display Layer 2 ACL data for the selected stack member and stack member port-pipe.

Syntax   show hardware layer2 acl stack-unit *0-5* port-set *0-0*

Parameters

stack-unit *0-5*	Enter the keyword stack-unit followed by 0 to 5 to select a stack ID.
port-set *0-0*	Enter the keyword port-set with a port-pipe number — 0.

Defaults   none

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show hardware layer3

Display Layer 3 ACL or QoS data for the selected stack member and stack member port-pipe.

Syntax   show hardware layer3 {acl | qos} stack-unit *0-5* port-set *0-0*

Parameters

acl	qos	Enter either the keyword acl or the keyword qos to select between ACL or QoS data.

stack-unit *0-5*	Enter the keyword stack-unit followed by a numeral from 0 to 5 to select a stack ID.
port-set *0-0*	Enter the keyword port-set with a port-pipe number — 0.

Defaults none

Command Modes EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

show hardware stack-unit

Display the data plane or management plane input and output statistics of the designated component of the designated stack member.

Syntax show hardware stack-unit *0-5* {buffer [buffer unit | port [(*1-56*) | all] total buffer | buffer unit (*1*) port (*1-56*) queue [(*0-14*) | a11] buffer-info} {phy-firmware-version} {cpu data-plane statistics [stack-port *0-52*] | cpu party-bus statistics | cpu private-mgmt statistics | drops [unit *0-1* [port *1-56*]] | stack-port *33-56* | unit *0-0* {counters | details | port-stats [detail] | register}}

Parameters

stack-unit *0-5* {*command-option*}	Enter the keyword stack-unit followed by 0 to 5 to select a particular stack member and then enter one of the following command options to display a collection of data based on the option entered.
buffer	Enter the keyword buffer, optionally followed by the keywords total-buffer to show the total buffer statistics per stack unit. Enter the keywords buffer unit then total-buffer to display the buffer details per unit and mode of allocation. To display the forwarding plane statistics containing the packet buffer usage per port per stack unit, enter the keywords buffer unit followed by port and the port number (*1-56* or all), then buffer-info. To display the forwarding plane statistics containing the packet buffer statistics per COS per port, enter the keywords buffer unit and port (*1-56*), and queue (*0-14* or all), and buffer-info. Buffer unit default: 1
phy-firmware-version	Each member of the stack is updated automatically with the latest firmware while booting as well as during OIR. Enter the keyword phy-firmware-version, to dump the physical firmware version for stack units.
cpu data-plane statistics	Enter the keywords cpu data-plane statistics, optionally followed by the keywords stack port and its number — 0 to 52 — to display the data plane statistics, which shows the High Gig (Higig) port raw input/output counter statistics to which the stacking module is connected.
cpu party-bus statistics	Enter the keywords cpu party-bus statistics, to display the Management plane input/output counter statistics of the pseudo party bus interface.
cpu private-mgmt statistics	Enter the keywords cpu private-mgmt statistics, to display the Management plane input/output counter statistics of the Private Management interface.

drops [unit *0-0* [port *1-56*]]	Enter the drops keyword to display internal drops on the selected stack member. Optionally, use the unit keyword with 0 to select port-pipe 0, and then use port *1-56* to select a port on that port-pipe.
stack-port *33-56*	Enter this keyword and a stacking port number to select a stacking port for which to display statistics. Identify the stack port number as you would to identify a 10G port that was in the same place in one of the rear modules. **Note:** You can identify stack port numbers by physical inspection of the rear modules. The numbering is the same as for the 10G ports. You can also inspect the output of the show system stack-ports command.
unit *0-0* {counters | details | port-stats [detail] | register}	Enter the unit keyword followed by 0 for port-pipe 0, and then enter one of the following keywords to troubleshoot errors on the selected port-pipe and to give status on why a port is not coming up to register level: counters, details, port-stats [detail], or register

Defaults   none

Command Modes   EXEC

EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1   **Figure 39-3.   show hardware stack-unit phy-firmware-version Command Example**

```
FTOS#show hardware stack-unit 0 phy-firmware-version

PortNumber          Status            Programmed Version      SW Version
=========================================================================
41                    Present             01.06
01.06
42                    Present             01.06
01.06
43                    Present             01.06
01.06
44                    Present             01.06
01.06
45                    Present             01.06
01.06
46                    Present             01.06
01.06
47                    Present             01.06
01.06
48                    Present             01.06
01.06
49                  Not Present           N/A
N/A
FTOS#
```

In the above example, the "Status" field represents presence of OPTM ports, "Programmed version" field represents loaded firmware version, and "SW version" represents SDK version.

Example 2   **Figure 39-4.   show hardware stack-unit cpu data-plane statistics Command Example**

```
FTOS#show hardware stack-unit 0 cpu data-plane statistics

bc pci driver statistics for device:
 rxHandle       :0
 noMhdr         :0
 noMbuf         :0
 noClus         :0
 recvd          :0
 dropped        :0
 recvToNet      :0
 rxError        :0
 rxDatapathErr  :0
 rxPkt(COS0)    :0
 rxPkt(COS1)    :0
 rxPkt(COS2)    :0
 rxPkt(COS3)    :0
 rxPkt(COS4)    :0
 rxPkt(COS5)    :0
 rxPkt(COS6)    :0
 rxPkt(COS7)    :0
 rxPkt(UNIT0)   :0
 transmitted    :1696
 txRequested    :1696
 noTxDesc       :0
 txError        :0
 txReqTooLarge  :0
 txInternalError :0
 txDatapathErr  :0
 txPkt(COS0)    :0
 txPkt(COS1)    :0
 txPkt(COS2)    :0
 txPkt(COS3)    :0
 txPkt(COS4)    :0
 txPkt(COS5)    :0
 txPkt(COS6)    :0
 txPkt(COS7)    :0
 txPkt(UNIT0)   :0
FTOS#
```

Example 3   **Figure 39-5.   show hardware stack-unit cpu party-bus statistics Command Example**

```
FTOS#show hardware stack-unit 0 cpu party-bus statistics
Input Statistics:
    8189 packets, 8076608 bytes
    0 dropped, 0 errors
Output Statistics:
    366 packets, 133100 bytes
    0 errors
FTOS#
```

Example 4   **Figure 39-6.   show hardware stack-unit drops (drop summary for entire switch) Command Example**

```
FTOS#show hard stack-unit 0 drops
UNIT No: 0

Total Ingress Drops          : 7841475
Total IngMac Drops           : 0
Total Mmu Drops              : 0
Total EgMac Drops            : 0
Total Egress Drops           : 43321

FTOS#
```

Example 5   **Figure 39-7.   show hardware stack-unit drops unit (drop summary per port) Command Example**

```
FTOS#show hard stack-unit 0 drops unit 0

PortNumber Ingress Drops IngMac Drops Total Mmu Drops EgMac Drops Egress Drops
1            0            0            0               0           0
2            0            0            0               0           0
3            0            0            0               0           0
4            0            0            0               0           0
FTOS#
```

Example 6   **Figure 39-8.   show hardware stack-unit drops (drop counters per port) Command Example**

```
FTOS#show hardware stack-unit 0 drops unit 0 port 27
 --- Ingress Drops      ---
Ingress Drops                 : 0
IBP CBP Full Drops            : 0
PortSTPnotFwd Drops           : 0
IPv4 L3 Discards              : 0
Policy Discards               : 0
Packets dropped by FP         : 0
(L2+L3) Drops                 : 0
Port bitmap zero Drops        : 0
Rx VLAN Drops                 : 0
 --- Ingress MAC counters---
Ingress FCSDrops              : 0
Ingress MTUExceeds            : 0
 --- MMU Drops         ---
HOL DROPS                     : 0
TxPurge CellErr               : 0
Aged Drops                    : 0
 --- Egress MAC counters---
Egress FCS Drops              : 0
 --- Egress FORWARD PROCESSOR Drops   ---
IPv4 L3UC Aged & Drops        : 0
TTL Threshold Drops           : 0
INVALID VLAN CNTR Drops       : 0
L2MC Drops                    : 0
PKT Drops of ANY Conditions   : 0
Hg MacUnderflow               : 0
TX Err PKT Counter            : 0 25
FTOS#
```

Example 7   **Figure 39-9.   show hardware stack-unit port-statistics Command Example**

```
FTOS#show hardware stack-unit 0 unit 0 port-stats
           ena/  speed/ link auto    STP                      lrn   inter   max  loop
      port link  duplex scan neg?   state  pause  discrd ops   face frame  back
       xe0 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
       xe1 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1554
       xe2  up    1G FD   SW  Yes  Forward              None    FA  GMII 11996
       xe3 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
       xe4 down  10G FD   SW  Yes   Block               None    FA    KR  8996
       xe5 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
       xe6 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
       xe7 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
       xe8 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
       xe9 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
      xe10 down  10G FD   SW  Yes  Forward               Tag    F     KR  1550
      xe11 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
      xe12 !ena   1G FD   SW  Yes   Block               None    FA  GMII 11996
      xe13 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
      xe14 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
      xe15 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
      xe16 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
      xe17 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
      xe18 down   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
      xe19 !ena   1G FD   SW  Yes  Forward               Tag    F   GMII  1550
      xe20 down   1G FD   SW  Yes  Forward               Tag    F   GMII  1550

FTOS#
```

Example 8   **Figure 39-10.   show hardware stack-unit unit 0 register Command Example**

```
FTOS#show hardware stack-unit 0 unit 0 register
0x0f180d34 ALTERNATE_EMIRROR_BITMAP_PARITY_CONTROL.ipipe0 = 0x00000001
0x0f180d35 ALTERNATE_EMIRROR_BITMAP_PARITY_STATUS_INTR.ipipe0 = 0x00000000
0x0f180d36 ALTERNATE_EMIRROR_BITMAP_PARITY_STATUS_NACK.ipipe0 = 0x00000000
0x0018070c ARB_EOP_DEBUG.ipipe0 = 0x00000000
0x00180312 ARB_RAM_DBGCTRL.ipipe0 = 0x00000000
0x03300000 ASF_PORT_SPEED.cpu0 = 0x00000000
0x03322000 ASF_PORT_SPEED.xe0 = 0x00000000
0x03326000 ASF_PORT_SPEED.xe1 = 0x00000000
0x0332a000 ASF_PORT_SPEED.xe2 = 0x00000007
0x0332e000 ASF_PORT_SPEED.xe3 = 0x00000000
0x03323000 ASF_PORT_SPEED.xe4 = 0x00000000
0x03327000 ASF_PORT_SPEED.xe5 = 0x00000000
0x0332b000 ASF_PORT_SPEED.xe6 = 0x00000000
0x0332f000 ASF_PORT_SPEED.xe7 = 0x00000000
0x03324000 ASF_PORT_SPEED.xe8 = 0x00000000
0x03328000 ASF_PORT_SPEED.xe9 = 0x00000000
0x0332c000 ASF_PORT_SPEED.xe10 = 0x00000000
0x03330000 ASF_PORT_SPEED.xe11 = 0x00000000
0x03325000 ASF_PORT_SPEED.xe12 = 0x00000000
0x03329000 ASF_PORT_SPEED.xe13 = 0x00000000
0x0332d000 ASF_PORT_SPEED.xe14 = 0x00000000
0x03331000 ASF_PORT_SPEED.xe15 = 0x00000000
0x03332000 ASF_PORT_SPEED.xe16 = 0x00000000
0x03336000 ASF_PORT_SPEED.xe17 = 0x00000000
0x0333a000 ASF_PORT_SPEED.xe18 = 0x00000000
0x0333e000 ASF_PORT_SPEED.xe19 = 0x00000000
0x03333000 ASF_PORT_SPEED.xe20 = 0x00000000
0x03337000 ASF_PORT_SPEED.xe21 = 0x00000000
0x0333b000 ASF_PORT_SPEED.xe22 = 0x00000000
0x0333f000 ASF_PORT_SPEED.xe23 = 0x00000000
0x03334000 ASF_PORT_SPEED.xe24 = 0x00000000
0x03338000 ASF_PORT_SPEED.xe25 = 0x00000000
0x0333c000 ASF_PORT_SPEED.xe26 = 0x00000000
0x03340000 ASF_PORT_SPEED.xe27 = 0x00000000
0x03335000 ASF_PORT_SPEED.xe28 = 0x00000000
0x03339000 ASF_PORT_SPEED.xe29 = 0x00000000
!----------------- output truncated ---------------!
```

Example 9   **Figure 39-11.   show hardware stack-unit unit details Command Example**

```
FTOS#show hardware stack-unit 0 unit 0 details

********************************************************

The total no of FP & CSF Devices in the Card is 1
The total no of FP Devices in the Card is 1
The total no of CSF Devices in the Card is 0
The number of ports in device 0 is - 49
The number of Hg ports in devices 0 is - 1
The CPU Port of the device is 0
The staring unit no the SWF in the device is 0
********************************************************

bcmLinkMonStatusShow: The Current Link Status Is

Front End Link Status         0x20000000000000000000000000
Front End Port Present Status 0x00000000000000000000000000
Back Plane Link Status        0x00000000

********************************************************

Link Status of all the ports in the Device - 0

The linkStatus of Front End Port 1 is FALSE
The linkStatus of Front End Port 2 is FALSE
The linkStatus of Front End Port 3 is TRUE
The linkStatus of Front End Port 4 is FALSE
The linkStatus of Front End Port 5 is FALSE
The linkStatus of Front End Port 6 is FALSE
The linkStatus of Front End Port 7 is FALSE
The linkStatus of Front End Port 8 is FALSE
The linkStatus of Front End Port 9 is FALSE
The linkStatus of Front End Port 10 is FALSE
The linkStatus of Front End Port 11 is FALSE
The linkStatus of Front End Port 12 is FALSE
The linkStatus of Front End Port 13 is FALSE
The linkStatus of Front End Port 14 is FALSE
The linkStatus of Front End Port 15 is FALSE
The linkStatus of Front End Port 16 is FALSE
The linkStatus of Front End Port 17 is FALSE
The linkStatus of Front End Port 18 is FALSE
The linkStatus of Front End Port 19 is FALSE
The linkStatus of Front End Port 20 is FALSE
The linkStatus of Front End Port 21 is FALSE
The linkStatus of Front End Port 22 is FALSE
The linkStatus of Front End Port 23 is FALSE
The linkStatus of Front End Port 24 is FALSE
The linkStatus of Front End Port 25 is FALSE
The linkStatus of Front End Port 26 is FALSE
The linkStatus of Front End Port 27 is FALSE
The linkStatus of Front End Port 28 is FALSE
The linkStatus of Front End Port 29 is FALSE
The linkStatus of Front End Port 30 is FALSE
The linkStatus of Front End Port 31 is FALSE
The linkStatus of Front End Port 32 is FALSE
The linkStatus of Front End Port 37 is FALSE
!----------------- output truncated ---------------!
```

Example 10   **Figure 39-12.   show hardware stack-unit per stack unit buffer Command Example**

```
FTOS(conf)#sh hardware stack-unit 0 buffer total-buffer

FTOS#sh hardware stack-unit 0 buffer total-buffer

Total Buffers allocated per Stack-Unit 46080
```

Example 11   **Figure 39-13.   show hardware stack-unit per port buffer (a Specific Port) Command Example**

```
FTOS(conf)#show hardware stack-unit 0 buffer unit 0 port 1 buffer-info
-----   Buffer Stats for Unit 0 Port 1 -----
Maximum Shared Limit for the Port: 30720
Default Packet Buffer allocate for the Port: 120

Used Packet Buffer for the Port: 0
```

Example 12   **Figure 39-14.   show hardware stack-unit queue buffer Command Example**

```
FTOS(conf)#show hardware stack-unit 0 buffer unit 0 port 1 queue 2 buffer-info

-----   Buffer Stats for Unit 0 Port 1 Queue 2 -----
 Maximum Shared Limit: 30720
 Default Packet Buffer allocate for the Queue: 8
 Used Packet Buffer: 0
```

Related Commands

clear hardware system-flow	Clears statistics from selected hardware components.
show interfaces stack-unit	Displays information on all interfaces on a specific stack member.
show processes cpu	Displays CPU usage information based on running processes.
show system stack-ports	Displays information about the stacking ports on all switches in the stack.
show system	Displays the current status of all stack members or a specific member.

show hardware system-flow

Display Layer 3 ACL or QoS data for the selected stack member and stack member port-pipe.

Syntax   show hardware system-flow layer2 stack-unit *0-5* port-set *0-0* [counters]

Parameters

acl | qos	For the selected stack member and stack member port-pipe, display which system flow entry the packet hits and what queue the packet takes as it dumps the raw system flow tables.
stack-unit *0-5*	Enter the keyword stack-unit followed by 0 to 5 to select a stack member ID.
port-set *0-0* [counters]	Enter the keyword port-set with a port-pipe number — 0.
	(OPTIONAL) Enter the keyword counters to display hit counters for the selected ACL or QoS option.

Defaults   none

Command Modes   EXEC Privilege

Command History

Version 8.3.16.1	Introduced on MXL 10/40GbE Switch IO Module

Example 1   **Figure 39-15.   show hardware system-flow layer2 counters Command Example**

```
FTOS#show hardware system-flow layer2 stack-unit 0 port-set 0 counters
-----------------------------------------------------------------------
        EntryId                 Description              #HITS
-----------------------------------------------------------------------
        2048                    STP BPDU Redirects       0
        2047                    LLDP BPDU Redirects      164904
        2045                    LACP traffic Redirects   0
        2044                    GVRP traffic Redirects   0
        2043                    ARP Reply Redirects      0
        2042                    802.1x frames Redirects  0
        2041                    VRRP frames Redirects    0
        2040                    IPv6VRRP frames Redirects 0
        2039                    GRAT ARP                 0
        2036                    IPv6 Mcast Control Traffic 128840
        2000                    VLT ARP SYNC Frames      0
        1999                    ICL Hellos               0
        1998                    ICL MAC SYNC Frames      0
        1997                    VLT Tunneled STP Frames  0
        1995                    DROP Cases               43207
        1917                    L3 Term Traffic ClassID 1 to Q6 0
        1916                    L3 CPU Bound Traffic ClassId 2 to Q5    0
        1915                    Unknown MCAST Packets                  0
        1792                    BGP with TTL1, L4 SRC port Redirects   0
        1791                    BGP with TTL1, L4 DST Port Redirects   0
25
FTOS#
```

Example 2   **Figure 39-16.   show hardware system-flow layer2 (non-counters) Command Example**

```
FTOS#show hardware system-flow layer2 stack-unit 0 port-set 0

############### FP Entry for redirecting STP BPDU to CPU Port ################
EID 2048: gid=1,
        slice=15, slice_idx=0x00, prio=0x800, flags=0x82, Installed
            tcam: color_indep=0,            higig=0, higig_mask=0,
            KEY=0x00000000 00000000 00000000 0180c200 00000000 00000000 00000000
, FPF4=0x00
        MASK=0x00000000 00000000 00000000 ffffffff ffff0000 00000000 00000000
,      0x00
        action={act=Drop, param0=0(0x00), param1=0(0x00)},
        action={act=CosQCpuNew, param0=7(0x07), param1=0(0x00)},
        action={act=CopyToCpu, param0=0(0x00), param1=0(0x00)},
        action={act=UpdateCounter, param0=1(0x01), param1=0(0x00)},
        meter=NULL,
        counter={idx=0, mode=0x01, entries=1}

################# FP Entry for redirecting LLDP BPDU to RSM ################
EID 2047: gid=1,
        slice=15, slice_idx=0x01, prio=0x7ff, flags=0x82, Installed
            tcam: color_indep=0,            higig=0, higig_mask=0,
            KEY=0x00000000 00000000 00000000 0180c200 000e0000 00000000 00000000
, FPF4=0x00
        MASK=0x00000000 00000000 00000000 ffffffff ffff0000 00000000 00000000
,      0x00
        action={act=Drop, param0=0(0x00), param1=0(0x00)},
        action={act=CosQCpuNew, param0=7(0x07), param1=0(0x00)},
        action={act=CopyToCpu, param0=0(0x00), param1=0(0x00)},
        action={act=UpdateCounter, param0=1(0x01), param1=0(0x00)},
        meter=NULL,
        counter={idx=1, mode=0x01, entries=1}

############### FP Entry for redirecting LACP traffic to CPU Port ############
EID 2045: gid=1,
        slice=15, slice_idx=0x02, prio=0x7fd, flags=0x82, Installed
            tcam: color_indep=0,            higig=0, higig_mask=0,
            KEY=0x00000000 00000000 00000000 0180c200 00020000 00000000 00000000
, FPF4=0x00
        MASK=0x00000000 00000000 00000000 ffffffff ffff0000 00000000 00000000
,      0x00
        action={act=Drop, param0=0(0x00), param1=0(0x00)},
        action={act=CosQCpuNew, param0=7(0x07), param1=0(0x00)},
        action={act=CopyToCpu, param0=0(0x00), param1=0(0x00)},
        action={act=UpdateCounter, param0=1(0x01), param1=0(0x00)},
        meter=NULL,
        counter={idx=2, mode=0x01, entries=1}

################# FP Entry for redirecting GVRP traffic to RSM ###########
EID 2044: gid=1,
        slice=15, slice_idx=0x03, prio=0x7fc, flags=0x82, Installed
            tcam: color_indep=0,            higig=0, higig_mask=0,
            KEY=0x00000000 00000000 00000000 0180c200 00210000 00000000 00000000
, FPF4=0x00
        MASK=0x00000000 00000000 00000000 ffffffff ffff0000 00000000 00000000
,      0x00
        action={act=Drop, param0=0(0x00), param1=0(0x00)},
        action={act=CosQCpuNew, param0=7(0x07), param1=0(0x00)},
        action={act=CopyToCpu, param0=0(0x00), param1=0(0x00)},
        action={act=UpdateCounter, param0=1(0x01), param1=0(0x00)},
        meter=NULL,
        counter={idx=3, mode=0x01, entries=1}

################# FP Entry for redirecting ARP Replies to RSM #############
EID 2043: gid=1,
        slice=15, slice_idx=0x04, prio=0x7fb, flags=0x82, Installed
            tcam: color_indep=0,            higig=0, higig_mask=0,
            KEY=0x00000000 00000000 00000000 00000000 00000000 00000806 00001600
, FPF4=0x00
        MASK=0x00000000 00000000 00000000 00000000 00000000 0000ffff 00001600
,      0x00
        action={act=Drop, param0=0(0x00), param1=0(0x00)},
        action={act=CosQCpuNew, param0=6(0x06), param1=0(0x00)},
        action={act=CopyToCpu, param0=0(0x00), param1=0(0x00)},
        action={act=UpdateCounter, param0=1(0x01), param1=0(0x00)},
!--------- output truncated ----------------!
```

40

Internet Control Message Protocol (ICMP) Message Types

This chapter lists and describes the possible internet control message protocol (ICMP) Message Types resulting from a ping. The first three columns list the possible symbol or type/code. For example, you would receive a ! or 03 as an echo reply from your ping.

Table 40-1. ICMP Messages and Their Definitions

Symbol	Type	Code	Description	Query	Error
•			Timeout (no reply)		
!	0	3	echo reply	•	
U	3		destination unreachable:		
		0	network unreachable		•
		1	host unreachable		•
		2	protocol unreachable		•
		3	port unreachable		•
		4	fragmentation needed but don't fragment bit set		•
		5	source route failed		•
		6	destination network unknown		•
		7	destination host unknown		•
		8	source host isolated (obsolete)		•
		9	destination network administratively prohibited		•
		10	destination host administratively prohibited		•
		11	network unreachable for TOS		•
		12	host unreachable for TOS		•
		13	communication administratively prohibited by filtering		•
		14	host precedence violation		•
		15	precedence cutoff in effect		•
C	4	0	source quench		•
	5		redirect		•
		0	redirect for network		•
		1	redirect for host		•
		2	redirect for type-of-service and network		•
		3	redirect for type-of-service and host		•
	8	0	echo request	•	

Table 40-1.   ICMP Messages and Their Definitions

Symbol	Type	Code	Description	Query	Error
	9	0	router advertisement	•	
	10	0	router solicitation	•	
&	11		time exceeded:		
		0	time-to-live equals 0 during transit		•
		1	time-to-live equals 0 during reassembly		•
	12		parameter problem:		
		1	IP header bad (catchall error)		•
		2	required option missing		•
	13	0	timestamp request	•	
	14	0	timestamp reply	•	
	15	0	information request (obsolete)	•	
	16	0	information reply (obsolete)	•	
	17	0	address mask request	•	
	18	0	address mask reply	•	

SNMP Traps

This chapter lists the traps sent by FTOS. Each trap is listed by the fields Message ID, Trap Type, and Trap Option, and the next is the message(s) associated with the trap.

Table 41-1. SNMP Traps and Error Messages

Message ID	Trap Type	Trap Option
COLD_START	**SNMP**	**COLDSTART**
%SNMP-5-SNMP_COLD_START: SNMP COLD_START trap sent.		
WARM_START	SNMP	WARMSTART
COPY_CONFIG_COMPLETE	**SNMP**	**NONE**
SNMP Copy Config Command Completed		
LINK_DOWN	**SNMP**	**LINKDOWN**
%IFA-1-PORT_LINKDN: changed interface state to down:%d		
LINK_UP	**SNMP**	**LINKUP**
%IFA-1-PORT_LINKUP: changed interface state to up:%d		
AUTHENTICATION_FAIL	**SNMP**	**AUTH**
%SNMP-3-SNMP_AUTH_FAIL: SNMP Authentication failed.Request with invalid community string.		
EGP_NEIGHBOR_LOSS	SNMP	NONE
OSTATE_DOWN	**SNMP**	**LINKDOWN**
%IFM-1-OSTATE_DN: changed interface state to down:%s %IFM-5-CSTATE_DN:Changed interface Physical state to down: %s		
OSTATE_UP	**SNMP**	**LINKUP**
%IFM-1-OSTATE_UP: changed interface state to up:%s %IFM-5-CSTATE_UP: Changed interface Physical state to up: %s		
RMON_RISING_THRESHOLD	**SNMP**	**NONE**
%STKUNIT0-M:CP %SNMP-4-RMON_RISING_THRESHOLD: RMON rising threshold alarm from SNMP OID <oid>		
RMON_FALLING_THRESHOLD	**SNMP**	**NONE**
%STKUNIT0-M:CP %SNMP-4-RMON_FALLING_THRESHOLD: RMON falling threshold alarm from SNMP OID <oid>		
RMON_HC_RISHING_THRESHOLD	**SNMP**	**NONE**
%STKUNIT0-M:CP %SNMP-4-RMON_HC_RISING_THRESHOLD: RMON high-capacity rising threshold alarm from SNMP OID <oid>		
RMON_HC_FALLING_THRESHOLD	**SNMP**	**NONE**
%STKUNIT0-M:CP %SNMP-4-RMON_HC_FALLING_THRESHOLD: RMON high-capacity falling threshold alarm from SNMP OID <oid>		

Table 41-1. SNMP Traps and Error Messages (continued)

Message ID	Trap Type	Trap Option
RESV	**NONE**	**NONE**
N/A		
CHM_MIN_ALRM_TEMP	**ENVMON**	**TEMP**
%CHMGR-2-MINOR_TEMP: Minor alarm: chassis temperature		
CHM_MIN_ALRM_TEMP_CLR	**ENVMON**	**TEMP**
%CHMRG-5-MINOR_TEMP_CLR: Minor alarm cleared: chassis temperature normal (%s %d temperature is within threshold of %dC)		
CHM_MAJ_ALRM_TEMP	**ENVMON**	**TEMP**
%CHMGR-2-MAJOR_TEMP: Major alarm: chassis temperature high (%s temperature reaches or exceeds threshold of %dC)		
CHM_MAJ_ALRM_TEMP_CLR	**ENVMON**	**TEMP**
%CHMGR-2-MAJOR_TEMP_CLR: Major alarm cleared: chassis temperature lower (%s %d temperature is within threshold of %dC)		
TME_TASK_SUSPEND	**ENVMON**	**NONE**
%TME-2-TASK SUSPENDED: SUSPENDED - svce:%d - inst:%d - task:%s		
TME_TASK_TERM	**ENVMON**	**NONE**
%TME-2-ABNORMAL_TASK_TERMINATION: CRASH - task:%s %s		
CHM_CPU_THRESHOLD	**ENVMON**	**NONE**
%CHMGR-5-CPU_THRESHOLD: Cpu %s usage above threshold. Cpu5SecUsage (%d)		
CHM_CPU_THRESHOLD_CLR	**ENVMON**	**NONE**
%CHMGR-5-CPU_THRESHOLD_CLR: Cpu %s usage drops below threshold. Cpu5SecUsage (%d)		
CHM_MEM_THRESHOLD	**ENVMON**	**NONE**
%CHMGR-5-MEM_THRESHOLD: Memory %s usage above threshold. MemUsage (%d)		
CHM_MEM_THRESHOLD_CLR	**ENVMON**	**NONE**
%CHMGR-5-MEM_THRESHOLD_CLR: Memory %s usage drops below threshold. MemUsage (%d)		
MACMGR_STN_MOVE	**ENVMON**	**NONE**
%MACMGR-5-DETECT_STN_MOVE: Station Move threshold exceeded for Mac %s in vlan %d		
VRRP_BADAUTH	**PROTO**	**NONE**
%RPM1-P:RP2 %VRRP-3-VRRP_BAD_AUTH: vrid-1 on TenGig 11/12 rcvd pkt with authentication type mismatch. %RPM1-P:RP2 %VRRP-3-VRRP_BAD_AUTH: vrid-1 on TenGig 11/12 rcvd pkt with authentication failure.		
VRRP_GO_MASTER	**PROTO**	**NONE**
%VRRP-6-VRRP_MASTER: vrid-%d on %s entering MASTER		
VRRP_PROTOCOL_ERROR	**PROTO**	**NONE**
VRRP_PROTOERR: VRRP protocol error on %S		
BGP4_ESTABLISHED	**PROTO**	**NONE**
%TRAP-5-PEER_ESTABLISHED: Neighbor %a, state %s		
BGP4_BACKW_XSITION	**PROTO**	**NONE**
%TRAP-5-BACKWARD_STATE_TRANS: Neighbor %a, state %s		
ETS_TRAP_TYPE_MODULE_STATUS_CHANGE	**ETS**	**NONE**
%DIFFSERV-5-ETS_TRAP_TYPE_MODULE_STATUS_CHANGE: ETS Module status changed to enabled		

Table 41-1. SNMP Traps and Error Messages (continued)

Message ID	Trap Type	Trap Option
%DIFFSERV-5-ETS_TRAP_TYPE_MODULE_STATUS_CHANGE: ETS Module status changed to disabled		
ETS_TRAP_TYPE_ADMIN_MODE_CHANGE	ETS	NONE
%DIFFSERV-5-ETS_TRAP_TYPE_ADMIN_MODE_CHANGE : ETS Admin mode changed to on for port %s		
%DIFFSERV-5-ETS_TRAP_TYPE_ADMIN_MODE_CHANGE : ETS Admin mode changed to off for port %s		
ETS_TRAP_TYPE_OPER_STATE_CHANGE	ETS	NONE
%DIFFSERV-5-ETS_TRAP_TYPE_OPER_STATE_CHANGE: ETS Oper state changed to init for port %s		
%DIFFSERV-5-ETS_TRAP_TYPE_OPER_STATE_CHANGE: ETS Oper state changed to off for port %s		
%DIFFSERV-5-ETS_TRAP_TYPE_OPER_STATE_CHANGE: ETS Oper state changed to recommended for port %s		
%DIFFSERV-5-ETS_TRAP_TYPE_OPER_STATE_CHANGE: ETS Oper state changed to rxConfigSrc for port %s		
ETS_TRAP_TYPE_PEER_STATE_CHANGE	ETS	NONE
%DIFFSERV-5-ETS_TRAP_TYPE_PEER_STATE_CHANGE : ETS Peer state changed to enabled for port %s		
%DIFFSERV-5-ETS_TRAP_TYPE_PEER_STATE_CHANGE : ETS Peer state changed to disabled for port %s		
PFC_TRAP_TYPE_MODULE_STATUS_CHANGE	PFC	NONE
%DIFFSERV-5-PFC_TRAP_TYPE_MODULE_STATUS_CHANGE: PFC Module status changed to enabled		
%DIFFSERV-5-PFC_TRAP_TYPE_MODULE_STATUS_CHANGE: PFC Module status changed to disabled		
PFC_TRAP_TYPE_ADMIN_MODE_CHANGE	PFC	NONE
%DIFFSERV-5-PFC_TRAP_TYPE_ADMIN_MODE_CHANGE : PFC Admin mode changed to on for port %s		
%DIFFSERV-5-PFC_TRAP_TYPE_ADMIN_MODE_CHANGE : PFC Admin mode changed to off for port %s		
PFC_TRAP_TYPE_OPER_STATE_CHANGE	PFC	NONE
%DIFFSERV-5-PFC_TRAP_TYPE_OPER_STATE_CHANGE: PFC Oper state changed to init for port %s		
%DIFFSERV-5-PFC_TRAP_TYPE_OPER_STATE_CHANGE: PFC Oper state changed to off for port %s		
%DIFFSERV-5-PFC_TRAP_TYPE_OPER_STATE_CHANGE: PFC Oper state changed to recommended for port %s		
%DIFFSERV-5-PFC_TRAP_TYPE_OPER_STATE_CHANGE: PFC Oper state changed to rxConfigSrc for port %s		
PFC_TRAP_TYPE_PEER_STATE_CHANGE	PFC	NONE
%DIFFSERV-5-PFC_TRAP_TYPE_PEER_STATE_CHANGE: PFC Peer state changed to enabled for port %s		
%DIFFSERV-5-PFC_TRAP_TYPE_PEER_STATE_CHANGE: PFC Peer state changed to disabled for port %s		
FIPS_MAX_FCF_LIMIT_RCH	FIPS	NONE
%FCOE-5-MAX_FCF_LIMIT_RCH: Number of FCFs reached maximum allowed limit in VLAN %d		
FIPS_MAX_ENODE_LIMIT_RCH	FIPS	NONE
%FCOE-5-MAX_ENODE_LIMIT_RCH: Number of ENodes reached maximum allowed limit in the system		
FIPS_MAX_SESSION_LIMIT_RCH	FIPS	NONE
%FCOE-5-MAX_SESSION_LIMIT_RCH: Number of sessions reached maximum allowed limit in the system		
FIPS_FCF_DROP	FIPS	NONE
%FCOE-5-FCF_DROP: New FCF(%d,%s) discovered in Vlan %d is dropped as max-FCF-limit per VLAN is reached		
FIPS_ENODE_DROP	FIPS	NONE
%FCOE-5-ENODE_DROP: New ENode(%d,%s) discovered in interface %s dropped as max-ENode-limit in system reached		

Table 41-1. SNMP Traps and Error Messages (continued)

Message ID	Trap Type	Trap Option
FIPS_SESSION_DROP	**FIPS**	**NONE**
%FCOE-5-SESSION_DROP: New session(%d,%s) request in interface %s dropped as max-session-limit in system reached		
FIPS_ACL_INSTALL_FAIL	**FIPS**	**NONE**
%FCOE-5-ACL_INSTALL_FAIL: problem in installing ACL entries due to no space or hardware failure		
CHMGR_ENT_LAST_CHANGE_TIME	**ENTITY**	**NONE**
No error messages. Time, at which there is a change in a physical entity, is logged.		

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