IBM Networking OS™ 7.6 ISCLI-Industry Standard CLI for the
RackSwitch G8264

Command Reference

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Note: Before using this information and the product it supports, read the general information in the *Safety information and Environmental Notices and User Guide* documents on the IBM *Documentation* CD and the *Warranty Information* document that comes with the product.

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IBM Networking OS™ 7.6 ISCLI-Industry Standard CLI for the RackSwitch G8264

Contents

Preface

The *IBM N/OS™ 7.6 ISCLI–Industry Standard CLI for the RackSwitch G8264 Command Reference* describes how to configure and use the IBM N/OS 7.6 software with your RackSwitch G8264 (G8264). This guide lists each command, together with the complete syntax and a functional description, from the IS Command Line Interface (ISCLI).

For documentation on installing the switches physically, see the *Installation Guide* for your RackSwitch G8264. For details about configuration and operation of your G8264, see the *IBM N/OS 7.6 Application Guide*.

Who Should Use This Book

This book is intended for network installers and system administrators engaged in configuring and maintaining a network. The administrator should be familiar with Ethernet concepts, IP addressing, the IEEE 802.1D Spanning Tree Protocol, and SNMP configuration parameters.

How This Book Is Organized

Chapter 1, "ISCLI Basics," describes how to connect to the switch and access the information and configuration commands. This chapter provides an overview of the command syntax, including command modes, global commands, and shortcuts.

Chapter 2, "Information Commands," shows how to view switch configuration parameters.

Chapter 3, "Statistics Commands," shows how to view switch performance statistics.

Chapter 4, "Configuration Commands," shows how to configure switch system parameters, ports, VLANs, Spanning Tree Protocol, SNMP, Port Mirroring, IP Routing, Port Trunking, and more.

Chapter 5, "Operations Commands," shows how to use commands which affect switch performance immediately, but do not alter permanent switch configurations (such as temporarily disabling ports). The commands describe how to activate or deactivate optional software features.

Chapter 6, "Boot Options," describes the use of the primary and alternate switch images, how to load a new software image, and how to reset the software to factory defaults.

Chapter 7, "Maintenance Commands," shows how to generate and access a dump of critical switch state information, how to clear it, and how to clear part or all of the forwarding database.

Appendix A, "IBM N/OS System Log Messages," shows a listing of syslog messages.

Appendix B, "Getting help and technical assistance," lists the resources available from IBM to assist you.

"Index" includes pointers to the description of the key words used throughout the book.

Typographic Conventions

The following table describes the typographic styles used in this book.

Table 1. Typographic Conventions

Typeface or Symbol	**Meaning**
`plain fixed-width text`	This type is used for names of commands, files, and directories used within the text. For example: View the `readme.txt` file. It also depicts on-screen computer output and prompts.
`bold fixed-width text`	This bold type appears in command examples. It shows text that must be typed in exactly as shown. For example: `show sys-info`
bold body text	This bold type indicates objects such as window names, dialog box names, and icons, as well as user interface objects such as buttons, and tabs.
italicized body text	This italicized type indicates book titles, special terms, or words to be emphasized.
angle brackets < >	Indicate a variable to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: If the command syntax is `ping` *<IP address>* you enter `ping 192.32.10.12`
braces { }	Indicate required elements in syntax descriptions where there is more than one option. You must choose only one of the options. Do not type the braces when entering the command. Example: If the command syntax is `show portchannel` {*<1-64>*|`hash`|`information`} you enter: **`show`** `portchannel` *<1-64>* or show `portchannel` hash or show `portchannel` information

Table 1. Typographic Conventions (continued)

Typeface or Symbol	**Meaning**
brackets [ ]	Indicate optional elements in syntax descriptions. Do not type the brackets when entering the command. Example: If the command syntax is `show ip interface` **[***<1-126>***]** you enter `show ip interface` or `show ip interface` *<1-126>*
vertical line |	Separates choices for command keywords and arguments. Enter only one of the choices. Do not type the vertical line when entering the command. Example: If the command syntax is `show portchannel` {*<1-64>*|`hash`|`information`} you must enter: **`show`** `portchannel` *<1-64>* or show `portchannel` hash or show `portchannel` information

How to Get Help

If you need help, service, or technical assistance, call IBM Technical Support:

US toll free calls: 1-800-414-5268

International calls: 1-408-834-7871

You also can visit our web site at the following address:

`http://www.ibm.com`

Click the **Support** tab.

The warranty card received with your product provides details for contacting a customer support representative. If you are unable to locate this information, please contact your reseller. Before you call, prepare the following information:

- Serial number of the switch unit
- Software release version number
- Brief description of the problem and the steps you have already taken
- Technical support dump information (`# show tech-support`)

Chapter 1. ISCLI Basics

Your RackSwitch G8264 is ready to perform basic switching functions right out of the box. Some of the more advanced features, however, require some administrative configuration before they can be used effectively.

This guide describes the individual ISCLI commands available for the G8264.

The ISCLI provides a direct method for collecting switch information and performing switch configuration. Using a basic terminal, the ISCLI allows you to view information and statistics about the switch, and to perform any necessary configuration.

This chapter explains how to access the IS Command Line Interface (ISCLI) for the switch.

Accessing the ISCLI

The first time you start the G8264, it boots into IBM N/OS CLI. To access the ISCLI, enter the following command and reset the G8264:

```
Main# boot/mode iscli
```

To access the IBM N/OS CLI, enter the following command from the ISCLI and reload the G8264:

```
Router(config)# boot cli-mode ibmos-cli
```

The switch retains your CLI selection, even when you reset the configuration to factory defaults. The CLI boot mode is not part of the configuration settings.

If you downgrade the switch software to an earlier release, it will boot into IBM N/OS CLI. However, the switch retains the CLI boot mode, and will restore your CLI choice.

ISCLI Command Modes

The ISCLI has three major command modes listed in order of increasing privileges, as follows:

- **User EXEC mode**

  This is the initial mode of access. By default, password checking is disabled for this mode, on console.

- **Privileged EXEC mode**

  This mode is accessed from User EXEC mode. This mode can be accessed using the following command: `enable`

- **Global Configuration mode**

  This mode allows you to make changes to the running configuration. If you save the configuration, the settings survive a reload of the G8264. Several sub-modes can be accessed from the Global Configuration mode. For more details, see Table 2.

Each mode provides a specific set of commands. The command set of a higher-privilege mode is a superset of a lower-privilege mode—all lower-privilege mode commands are accessible when using a higher-privilege mode.

Table 2. lists the ISCLI command modes.

Table 2. ISCLI Command Modes

Command Mode/Prompt	**Command used to enter or exit**
User EXEC `G8264>`	Default mode, entered automatically on console Exit: `exit` or `logout`
Privileged EXEC `G8264#`	Enter Privileged EXEC mode, from User EXEC mode: `enable` Exit to User EXEC mode: `disable` Quit ISCLI: `exit` or `logout`
Global Configuration `G8264(config)#`	Enter Global Configuration mode, from Privileged EXEC mode: `configure terminal` Exit to Privileged EXEC: `end` or `exit`
Interface IP `G8264(config-ip-if)#`	Enter Interface IP Configuration mode, from Global Configuration mode: `interface ip` *<interface number>* Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
Interface loopback `G8264(config-ip-loopback)#`	Enter Interface Loopback Configuration mode, from Global Configuration mode: `interface loopback` *<1-5>* Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`

Table 2. ISCLI Command Modes (continued)

Command Mode/Prompt	**Command used to enter or exit**
Interface port `G8264(config-if)#`	Enter Port Configuration mode, from Global Configuration mode: `interface port` *<port number or alias>* Exit to Privileged EXEC mode: `exit` Exit to Global Configuration mode: `end`
Interface PortChannel `Router(config-PortChannel)#`	Enter PortChannel (trunk group) Configuration mode, from Global Configuration mode: `interface portchannel {`*<trunk number>*`|lacp `*<key>*`}` Exit to Privileged EXEC mode: `exit` Exit to Global Configuration mode: `end`
VLAN `G8264(config-vlan)#`	Enter VLAN Configuration mode, from Global Configuration mode: `vlan` *<VLAN number>* Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
Router OSPF `G8264(config-router-ospf)#`	Enter OSPF Configuration mode, from Global Configuration mode: `router ospf` Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
Router OSPFv3 `G8264(config-router-ospf3)#`	Enter OSPFv3 Configuration mode, from Global Configuration mode: `ipv6 router ospf` Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
Router BGP `G8264(config-router-bgp)#`	Enter BGP Configuration mode, from Global Configuration mode: `router bgp` Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
Router RIP `G8264(config-router-rip)#`	Enter RIP Configuration mode, from Global Configuration mode: `router rip` Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`

Table 2. ISCLI Command Modes (continued)

Command Mode/Prompt	**Command used to enter or exit**
Route Map `G8264(config-route-map)#`	Enter Route Map Configuration mode, from Global Configuration mode: `route-map` *<1-64>* Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
Router VRRP `G8264(config-vrrp)#`	Enter VRRP Configuration mode, from Global Configuration mode: `router vrrp` Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
PIM Component `G8264(config-ip-pim-comp)#`	Enter Protocol Independent Multicast (PIM) Component Configuration mode, from Global Configuration mode: `ip pim component` *<1-2>* Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
IKEv2 Proposal `Router(config-ikev2-prop)#`	Enter IKEv2 Proposal Configuration mode, from Global Configuration mode: `ikev2 proposal` Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
MLD Configuration `Router(config-router-mld)#`	Enter Multicast Listener Discovery Protocol Configuration mode, from Global Configuration mode: `ipv6 mld` Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
OpenFlow Instance `G8264(config-openflow-instance)#`	Enter OpenfFlow Instance Configuration mode, from Global Configuration mode: `openflow instance` Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`

Table 2. ISCLI Command Modes (continued)

Command Mode/Prompt	**Command used to enter or exit**
VSI Database `G8264(conf-vsidb)#`	Enter Virtual Station Interface Database Configuration mode, from Global Configuration mode: `virt evb vsidb` <*VSIDB_number*> Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`
EVB Profile `G8264(conf-evbprof)#`	Enter Edge Virtual Bridging VSI Type Profile Configuration mode, from Global Configuration mode: `virt evb profile` <*1-16*> Exit to Global Configuration mode: `exit` Exit to Privileged EXEC mode: `end`

Global Commands

Some basic commands are recognized throughout the ISCLI command modes. These commands are useful for obtaining online help, navigating through the interface, and for saving configuration changes.

For help on a specific command, type the command, followed by `help`.

Table 3. Description of Global Commands

Command	**Action**
`?`	Provides more information about a specific command or lists commands available at the current level.
`list`	Lists the commands available at the current level.
`exit`	Go up one level in the command mode structure. If already at the top level, exit from the command line interface and log out.
`copy running-config startup-config`	Write configuration changes to non-volatile flash memory.
`logout`	Exit from the command line interface and log out.
`ping`	Use this command to verify station-to-station connectivity across the network. The format is as follows: `ping` *<host name>*|*<IP address>* `[-n` *<tries (0-4294967295)>*`] [-w` *<msec delay (0-4294967295)>*`] [-l` *<length (0/32-65500/2080)>*`] [-s` *<IP source>*`] [-v` *<tos (0-255)>*`] [-f] [-t] [-m|-mgt|-d|-data]` Where: – `-n`: Sets the number of attempts (optional). – `-w`: Sets the number of milliseconds between attempts (optional). – `-l`: Sets the ping request payload size (optional). – `-s`: Sets the IP source address for the IP packet (optional). – `-v`: Sets the Type Of Service bits in the IP header. – `-f`: Sets the *don't fragment* bit in the IP header (only for IPv4 addresses). – `-t:` Pings continuously (same as `-n 0`). By default, the `-m` or `-mgt` option for management port is used. To use data ports, specify the `-d` or `-data` option.

Table 3. Description of Global Commands

Command	Action
`traceroute`	Use this command to identify the route used for station-to-station connectivity across the network. The format is as follows: `traceroute` *<hostname>*|*<IP address>* [*<max-hops (1-32)>* [*<msec-delay (1-4294967295)>*]] `[-m|-mgt|-d|-data]` Where *hostname/IP address* is the hostname or IP address of the target station, *max-hops* (optional) is the maximum distance to trace (1-32 devices), and *msec-delay* (optional) is the number of milliseconds to wait for the response. By default, the `-m` or `-mgt` option for management port is used. To use data ports, specify the `-d` or `-data` option. As with `ping`, the DNS parameters must be configured if specifying hostnames.
`telnet`	This command is used to form a Telnet session between the switch and another network device. The format is as follows: `telnet` {*<hostname>*|*<IP address>*} [*<port>*] `[-m|-mgt|-d|-data]` Where *IP address* or *hostname* specifies the target station. Use of a hostname requires DNS parameters to be configured on the switch. *Port* is the logical Telnet port or service number. By default, the `-m` or `-mgt` option for management port is used. To use data ports, specify the `-d` or `-data` option.
`show history`	This command displays the last ten issued commands.
`show who`	Displays a list of users who are currently logged in.
`show line`	Displays a list of users who are currently logged in, in table format.

Command Line Interface Shortcuts

The following shortcuts allow you to enter commands quickly and easily.

CLI List and Range Inputs

For VLAN and port commands that allow an individual item to be selected from within a numeric range, lists and ranges of items can now be specified. For example, the `vlan` command permits the following options:

```
# vlan 1,3,4094                         (access VLANs 1, 3, and 4094)
# vlan 1-20                             (access VLANs 1 through 20)
# vlan 1-5,90-99,4090-4094              (access multiple ranges)
# vlan 1-5,19,20,4090-4094              (access a mix of lists and ranges)
```

The numbers in a range must be separated by a dash: *<start of range>*-*<end of range>*

Multiple ranges or list items are permitted using a comma: *<range or item 1>*,*<range or item 2>*

Do not use spaces within list and range specifications.

Ranges can also be used to apply the same command option to multiple items. For example, to access multiple ports with one command:

```
# interface port 1-4                    (Access ports 1 though 4)
```

Command Abbreviation

Most commands can be abbreviated by entering the first characters which distinguish the command from the others in the same mode. For example, consider the following full command and a valid abbreviation:

```
Router(config)# spanning-tree stp 2 bridge hello 2
    or
Router(config)# sp stp 2 br h 2
```

Tab Completion

By entering the first letter of a command at any prompt and pressing <Tab>, the ISCLI displays all available commands or options that begin with that letter. Entering additional letters further refines the list of commands or options displayed. If only one command fits the input text when <Tab> is pressed, that command is supplied on the command line, waiting to be entered.

If multiple commands share the typed characters, when you press <Tab>, the ISCLI completes the common part of the shared syntax.

User Access Levels

To enable better switch management and user accountability, three levels or *classes* of user access have been implemented on the G8264. Levels of access to CLI, Web management functions, and screens increase as needed to perform various switch management tasks. Conceptually, access classes are defined as follows:

- **user**

  Interaction with the switch is completely passive—nothing can be changed on the G8264. Users may display information that has no security or privacy implications, such as switch statistics and current operational state information.
- **oper**

  Operators can make temporary changes on the G8264. These changes are lost when the switch is rebooted/reset. Operators have access to the switch management features used for daily switch operations. Because any changes an operator makes are undone by a reset of the switch, operators cannot severely impact switch operation.
- **admin**

  Administrators are the only ones that may make permanent changes to the switch configuration—changes that are persistent across a reboot/reset of the switch. Administrators can access switch functions to configure and troubleshoot problems on the G8264. Because administrators can also make temporary (operator-level) changes as well, they must be aware of the interactions between temporary and permanent changes.

Access to switch functions is controlled through the use of unique surnames and passwords. Once you are connected to the switch via local Telnet, remote Telnet, or SSH, you are prompted to enter a password. The default user names/password for each access level are listed in the following table.

Note: It is recommended that you change default switch passwords after initial configuration and as regularly as required under your network security policies.

Table 4. User Access Levels

User Account	Description and Tasks Performed	Password
User	The User has no direct responsibility for switch management. He or she can view all switch status information and statistics, but cannot make any configuration changes to the switch.	`user`
Operator	The Operator can make temporary changes that are lost when the switch is rebooted/reset. Operators have access to the switch management features used for daily switch operations.	
Administrator	The superuser Administrator has complete access to all command modes, information, and configuration commands on the RackSwitch G8264, including the ability to change both the user and administrator passwords.	`admin`

Note: With the exception of the “admin” user, access to each user level can be disabled by setting the password to an empty value.

Idle Timeout

By default, the switch will disconnect your Telnet session after ten minutes of inactivity. This function is controlled by the following command, which can be set from 1 to 60 minutes, or disabled when set to 0:

```
system idle <0-60>
```

Command mode: Global Configuration

Chapter 2. Information Commands

You can view configuration information for the switch in both the user and administrator command modes. This chapter discusses how to use the command line interface to display switch information.

Table 5. Information Commands

Command Syntax and Usage
`show interface status` *<port alias or number>* Displays configuration information about the selected port(s), including: – Port alias and number – Port speed – Duplex mode (half, full, or auto) – Flow control for transmit and receive (no, yes, or both) – Link status (up, down, or disabled) **Command mode:** All For details, see page 112.
`show interface trunk` *<port alias or number>* Displays port status information, including: – Port alias and number – Whether the port uses VLAN Tagging or not – Port VLAN ID (PVID) – Port name – VLAN membership – FDB Learning status – Flooding status For details, see page 112. **Command mode:** All
`show interface transceiver` Displays the status of the port transceiver module on each port. For details, see page 114. **Command mode:** All
`show information-dump` Dumps all switch information available (10K or more, depending on your configuration). If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump commands. **Command mode:** All

System Information

The information provided by each command option is briefly described in Table 6, with pointers to where detailed information can be found.

Table 6. System Information Options

Command Syntax and Usage
`show sys-info` Displays system information, including: – System date and time – Switch model name and number – Switch name and location – Time of last boot – MAC address of the switch management processor – IP address of management interface – Hardware version and part number – Software image file and version number – Configuration name – Log-in banner, if one is configured – Internal temperatures – Fan status – Power supply status For details, see page 25. **Command mode:** All
`show logging [severity` *<0-7>*`] [reverse]` Displays the current syslog configuration, followed by the most recent 2000 syslog messages, as displayed by the `show logging messages` command. For details, see page 26. **Command mode:** All
`show access user` Displays configured user names and their status. **Command mode:** All

CLI Display Information

These commands allow you to display information about the number of lines per screen displayed in the CLI.

Table 7. CLI Display Information Options

Command Syntax and Usage
`show terminal-length` Displays the number of lines per screen displayed in the CLI for the current session. A value of 0 means paging is disabled. **Command mode:** All
`show line console length` Displays the number of lines per screen displayed in the CLI by default for console sessions. A value of 0 means paging is disabled. **Command mode:** All
`show line vty length` Displays the number of lines per screen displayed in the CLI by default for Telnet and SSH sessions. A value of 0 means paging is disabled. **Command mode:** All

Error Disable and Recovery Information

These commands allow you to display information about the Error Disable and Recovery feature for interface ports.

Table 8. Error Disable Information Options

Command Syntax and Usage
`show errdisable recovery` Displays a list ports with their Error Recovery status. **Command mode:** All
`show errdisable timers` Displays a list of active recovery timers, if applicable. **Command mode:** All
`show errdisable information` Displays all Error Disable and Recovery information. **Command mode:** All
`show errdisable link-flap information` Displays ports that have been disabled due to excessive link flaps. **Command mode:** All

SNMPv3 System Information

SNMP version 3 (SNMPv3) is an extensible SNMP Framework that supplements the SNMPv2 framework by supporting the following:

- a new SNMP message format
- security for messages
- access control
- remote configuration of SNMP parameters

For more details on the SNMPv3 architecture please refer to RFC2271 to RFC2276.

Table 9. SNMPv3 Information Options

Command Syntax and Usage
`show snmp-server v3 user` Displays User Security Model (USM) table information. To view the table, see page 18. **Command mode:** All
`show snmp-server v3 view` Displays information about view, subtrees, mask and type of view. To view a sample, see page 19. **Command mode:** All
`show snmp-server v3 access` Displays View-based Access Control information. To view a sample, see page 20. **Command mode:** All
`show snmp-server v3 group` Displays information about the group, including the security model, user name, and group name. To view a sample, see page 21. **Command mode:** All
`show snmp-server v3 community` Displays information about the community table information. To view a sample, see page 21. **Command mode:** All
`show snmp-server v3 target-address` Displays the Target Address table information. To view a sample, see page 22. **Command mode:** All
`show snmp-server v3 target-parameters` Displays the Target parameters table information. To view a sample, see page 23. **Command mode:** All

Table 9. SNMPv3 Information Options (continued)

Command Syntax and Usage
`show snmp-server v3 notify` Displays the Notify table information. To view a sample, see page 23. **Command mode:** All
`show snmp-server v3` Displays all the SNMPv3 information. To view a sample, see page 24. **Command mode:** All

SNMPv3 USM User Table Information

The User-based Security Model (USM) in SNMPv3 provides security services such as authentication and privacy of messages. This security model makes use of a defined set of user identities displayed in the USM user table. The following command displays SNMPv3 user information:

```
show snmp-server v3 user
```

Command mode: All

The USM user table contains the following information:

- the user name
- a security name in the form of a string whose format is independent of the Security Model
- an authentication protocol, which is an indication that the messages sent on behalf of the user can be authenticated
- the privacy protocol

```
usmUser Table:
User Name                         Protocol
-------------------------------- --------------------------------
adminmd5                          HMAC_MD5, DES PRIVACY
adminsha                          HMAC_SHA, DES PRIVACY
v1v2only                          NO AUTH,  NO PRIVACY
```

Table 10. USM User Table Information Parameters

Field	**Description**
User Name	A string representing the user name you can use to access the switch.
Protocol	Whether messages sent from this user are protected from disclosure using a privacy protocol. IBM N/OS supports DES algorithm for privacy and two authentication algorithms: MD5 and HMAC-SHA.

SNMPv3 View Table Information

The user can control and restrict the access allowed to a group to only a subset of the management information in the management domain that the group can access within each context by specifying the group’s rights in terms of a particular MIB view for security reasons.

The following command displays the SNMPv3 View Table:

```
show snmp-server v3 view
```

Command mode: All

```
View Name            Subtree                Mask           Type
-----------------    ------------------   --------------  --------
iso                  1.3                                   included
v1v2only             1.3                                   included
v1v2only             1.3.6.1.6.3.15                        excluded
v1v2only             1.3.6.1.6.3.16                        excluded
v1v2only             1.3.6.1.6.3.18                        excluded
```

Table 11. SNMPv3 View Table Information Parameters

Field	**Description**
View Name	Displays the name of the view.
Subtree	Displays the MIB subtree as an OID string. A view subtree is the set of all MIB object instances which have a common Object Identifier prefix to their names.
Mask	Displays the bit mask.
Type	Displays whether a family of `view subtrees` is included or excluded from the MIB view.

SNMPv3 Access Table Information

The access control subsystem provides authorization services.

The vacmAccessTable maps a group name, security information, a context, and a message type, which could be the read or write type of operation or notification into a MIB view.

The View-based Access Control Model defines a set of services that an application can use for checking access rights of a group. This group's access rights are determined by a read-view, a write-view and a notify-view. The read-view represents the set of object instances authorized for the group while reading the objects. The write-view represents the set of object instances authorized for the group when writing objects. The notify-view represents the set of object instances authorized for the group when sending a notification.

The following command displays SNMPv3 access information:

```
show snmp-server v3 access
```

Command mode: All

```
Group Name Model   Level        ReadV      WriteV     NotifyV
---------- ------- ------------ ---------- ---------- ----------
v1v2grp    snmpv1  noAuthNoPriv iso        iso        v1v2only
admingrp   usm     authPriv     iso        iso        iso
```

Table 12. SNMPv3 Access Table Information

Field	**Description**
Group Name	Displays the name of group.
Model	Displays the security model used, for example, SNMPv1, or SNMPv2 or USM.
Level	Displays the minimum level of security required to gain rights of access. For example, `noAuthNoPriv`, `authNoPriv`, or `authPriv.`
ReadV	Displays the MIB view to which this entry authorizes the read access.
WriteV	Displays the MIB view to which this entry authorizes the write access.
NotifyV	Displays the Notify view to which this entry authorizes the notify access.

SNMPv3 Group Table Information

A group is a combination of security model and security name that defines the access rights assigned to all the security names belonging to that group. The group is identified by a group name.

The following command displays SNMPv3 group information:

```
show snmp-server v3 group
```

Command mode: All

```
Sec Model    User Name                         Group Name
---------    ------------------------------    --------------------
snmpv1       v1v2only                          v1v2grp
usm          adminmd5                          admingrp
usm          adminsha                          admingrp
```

Table 13. SNMPv3 Group Table Information Parameters

Field	**Description**
Sec Model	Displays the security model used, which is any one of: USM, SNMPv1, SNMPv2, and SNMPv3.
User Name	Displays the name for the group.
Group Name	Displays the access name of the group.

SNMPv3 Community Table Information

The following command displays the SNMPv3 community table information stored in the SNMP engine:

```
show snmp-server v3 community
```

Command mode: All

```
Index      Name       User Name            Tag
---------- ---------- -------------------- ----------
trap1      public     v1v2only             v1v2trap
```

Table 14. SNMPv3 Community Table Information Parameters

Field	**Description**
Index	Displays the unique index value of a row in this table
Name	Displays the community string, which represents the configuration.
User Name	Displays the User Security Model (USM) user name.
Tag	Displays the community tag. This tag specifies a set of transport endpoints from which a command responder application accepts management requests and to which a command responder application sends an SNMP trap.

SNMPv3 Target Address Table Information

The following command displays SNMPv3 target address information stored in the SNMP engine:

```
show snmp-server v3 target-address
```

Command mode: All

```
Name       Transport Addr  Port Taglist    Params
---------- --------------- ---- ---------- ---------------
trap1      47.81.25.66     162  v1v2trap   v1v2param
```

Table 15. SNMPv3 Target Address Table Information Parameters

Field	Description
Name	Displays the locally arbitrary, but unique identifier associated with this `snmpTargetAddrEntry`.
Transport Addr	Displays the transport addresses.
Port	Displays the SNMP UDP port number.
Taglist	This column contains a list of tag values which are used to select target addresses for a particular SNMP message.
Params	The value of this object identifies an entry in the `snmpTargetParamsTable`. The identified entry contains SNMP parameters to be used when generating messages to be sent to this transport address.

SNMPv3 Target Parameters Table Information

The following command displays SNMPv3 target parameters information:

```
show snmp-server v3 target-parameters
```

Command mode: All

```
Name            MP Model   User Name         Sec Model  Sec Level
--------------- --------   --------------    ---------  ---------
v1v2param       snmpv2c    v1v2only          snmpv1     noAuthNoPriv
```

Table 16. SNMPv3 Target Parameters Table Information

Field	Description
Name	Displays the locally arbitrary, but unique identifier associated with this `snmpTargeParamsEntry`.
MP Model	Displays the Message Processing Model used when generating SNMP messages using this entry.
User Name	Displays the `securityName`, which identifies the entry on whose behalf SNMP messages will be generated using this entry.
Sec Model	Displays the security model used when generating SNMP messages using this entry. The system may choose to return an `inconsistentValue` error if an attempt is made to set this variable to a value for a security model the system does not support.
Sec Level	Displays the level of security used when generating SNMP messages using this entry.

SNMPv3 Notify Table Information

The following command displays the SNMPv3 Notify Table:

```
show snmp-server v3 notify
```

Command mode: All

```
Name                 Tag
-------------------- --------------------
v1v2trap             v1v2trap
```

Table 17. SNMPv3 Notify Table Information

Field	Description
Name	The locally arbitrary, but unique identifier associated with this `snmpNotifyEntry`.
Tag	This represents a single tag value which is used to select entries in the `snmpTargetAddrTable`. Any entry in the `snmpTargetAddrTable` that contains a tag value equal to the value of this entry, is selected. If this entry contains a value of zero length, no entries are selected.

SNMPv3 Dump Information

The following command displays SNMPv3 information:

```
show snmp-server v3
```

Command mode: All

```
usmUser Table:
User Name                        Protocol
-------------------------------- --------------------------------
adminmd5                         HMAC_MD5, DES PRIVACY
adminsha                         HMAC_SHA, DES PRIVACY
v1v2only                         NO AUTH,  NO PRIVACY

vacmAccess Table:
Group Name Model   Level        ReadV      WriteV     NotifyV
---------- ------- ------------ ---------- ---------- ----------
v1v2grp    snmpv1  noAuthNoPriv iso        iso        v1v2only
admingrp   usm     authPriv     iso        iso        iso

vacmViewTreeFamily Table:
View Name            Subtree           Mask            Type
-------------------- ---------------  ------------    --------------
iso                  1.3                              included
v1v2only             1.3                              included
v1v2only             1.3.6.1.6.3.15                   excluded
v1v2only             1.3.6.1.6.3.16                   excluded
v1v2only             1.3.6.1.6.3.18                   excluded

vacmSecurityToGroup Table:
Sec Model  User Name                        Group Name
---------- ------------------------------   -----------------------
snmpv1     v1v2only                         v1v2grp
usm        adminmd5                         admingrp
usm        adminsha                         admingrp

snmpCommunity Table:
Index      Name       User Name            Tag
---------- ---------- -------------------- ----------

snmpNotify Table:
Name                 Tag
-------------------- --------------------

snmpTargetAddr Table:
Name       Transport Addr  Port Taglist    Params
---------- --------------- ---- ---------- ---------------

snmpTargetParams Table:
Name                 MP Model User Name           Sec Model Sec Level
-------------------- -------- ------------------  --------- -------
```

General System Information

The following command displays system information:

```
show sys-info
```

Command mode: All

```
System Information at 13:41:04 Fri Jan 20, 2011
Time zone:  America/US/Pacific
Daylight Savings Time Status: Disabled

IBM Networking Operating System RackSwitch G8264

Switch has been up for 0 days, 17 hours, 10 minutes and 45 seconds.
Last boot: 20:41:01 Thu Jan 19, 2011 (power cycle)

MAC address: fc:cf:62:9d:2b:00    IP (If 1) address: 0.0.0.0
Management Port MAC Address: fc:cf:62:9d:2b:fe
Management Port IP Address (if 128): 203.203.21.2
Hardware Revision: 0
Hardware Part No:  BAC-000*a*00
Switch Serial No:  US7C45t78
Manufacturing date:

Software Version 6.6.0 (FLASH image1), active configuration.

Temperature Mother      Top: 34 C
Temperature Mother   Bottom: 38 C
Temperature Daughter    Top: 35 C
Temperature Daughter Bottom: 37 C

Warning at 70 C and Recover at 100 C

Fan 1 in Module 1: RPM=17647 PWM=255(100%) Front-To-Back
Fan 2 in Module 1: RPM= 9310 PWM=255(100%) Front-To-Back
Fan 3 in Module 2: RPM=17419 PWM=255(100%) Front-To-Back
Fan 4 in Module 2: RPM= 9326 PWM=255(100%) Front-To-Back
Fan 5 in Module 3: RPM=17197 PWM=255(100%) Front-To-Back
Fan 6 in Module 3: RPM= 9523 PWM=255(100%) Front-To-Back
Fan 7 in Module 4: RPM=17252 PWM=255(100%) Front-To-Back
Fan 8 in Module 4: RPM= 9490 PWM=255(100%) Front-To-Back

System Fan Airflow: Front-To-Back

Power Supply 1: Vin Fault
Power Supply 2: OK
```

Note: The display of temperature will come up only if the temperature of any of the sensors exceeds the temperature threshold. There will be a warning from the software if any of the sensors exceeds this temperature threshold. The switch will shut down if the power supply overheats.

System information includes:

- System date and time
- Switch model
- Switch name and location
- Time of last boot
- MAC address of the switch management processor
- Software image file and version number, and configuration name.
- IP address of the management interface
- Hardware version and part number
- Log-in banner, if one is configured
- Internal temperatures
- Fan status
- Power supply status

Show Specific System Information

commands used for displaying specific entries from the general system information screen

Show Recent Syslog Messages

The following command displays system log messages:

```
show logging messages [severity <0-7>] [reverse]
```

Command mode: All

```
Nov  2  5:49:53 172.25.254.19 INFO    console: System log cleared by user admin.
Nov  2  5:51:23 172.25.254.19 CRIT    system: Fan Mod 4 Removed
Nov  2  5:54:27 172.25.254.19 CRIT    system: **** MAX TEMPERATURE (61) ABOVE FAIL
THRESH ****
Nov  2  5:54:27 172.25.254.19 CRIT    system: **** PLATFORM THERMAL SHUTDOWN ****
Nov  2  6:02:06 0.0.0.0 NOTICE  system: link up on management port MGT
Nov  2  6:02:06 0.0.0.0 INFO    system: booted version 0.0.0 from FLASH image2,
active configuration
Nov  2  6:02:09 0.0.0.0 NOTICE  system: SR SFP+ inserted at port 63 is Approved
Nov  2  6:02:12 0.0.0.0 NOTICE  system: 1m DAC  inserted at port 64 is Accepted
Nov  2  6:02:12 0.0.0.0 NOTICE  system: link up on management port MGT
Nov  2  6:03:11 172.25.254.19 NOTICE  system: Received DHCP Offer
        IP: 172.25.254.19 Mask: 255.255.0.
        Broadcast 172.25.255.255 GW: 172.25.1.1
Nov  2  6:03:11 0.0.0.0 NOTICE  ip: MGT port default gateway 172.25.1.1 operational
Nov  2  6:22:54 172.25.254.19 NOTICE  mgmt: admin(admin) login on Console
Nov  2  6:33:00 172.25.254.19 NOTICE  mgmt: admin(admin) idle timeout from Console
```

Each syslog message has a severity level associated with it, included in text form as a prefix to the log message. One of eight different prefixes is used, depending on the condition that the administrator is being notified of, as shown here.

- `EMERG` Indicates the system is unusable
- `ALERT` Indicates action should be taken immediately
- `CRIT` Indicates critical conditions
- `ERR` Indicates error conditions or errored operations
- `WARNING` Indicates warning conditions
- `NOTICE` Indicates a normal but significant condition
- `INFO` Indicates an information message
- `DEBUG` Indicates a debug-level message

The `severity` option filters only syslog messages with a specific severity level between 0 and 7, from `EMERG` to `DEBUG` correspondingly.

The `reverse` option displays the output in reverse order, from the newest entry to the oldest.

User Status

The following command displays user status information:

```
show access user
```

Command mode: All except User EXEC

```
Usernames:
  user     - enabled - offline
  oper     - disabled - offline
  admin    - Always Enabled - online 1 session
Current User ID table:
  1: name paul   , dis, cos user    , password valid, offline
Current strong password settings:
  strong password status: disabled
```

This command displays the status of the configured usernames.

Layer 2 Information

Table 18. Layer 2 Information Commands

Command Syntax and Usage
`show vlag information` Displays vLAG Information. For details, see page 43. Command mode: All
`show dot1x information` Displays 802.1X Information. For details, see page 31. **Command mode:** All
`show spanning-tree` Displays Spanning Tree information, including the status (on or off), Spanning Tree mode (RSTP, PVRST, or MSTP), and VLAN membership. In addition to seeing if STG is enabled or disabled, you can view the following STG bridge information: – Priority – Hello interval – Maximum age value – Forwarding delay – Aging time You can also see the following port-specific STG information: – Port alias and priority – Cost – State **Command mode:** All
`show spanning-tree root` Displays the Spanning Tree configuration on the root bridge for each STP instance. **Command mode:** All For details, see page 48.
`show spanning-tree blockedports` Lists the ports blocked by each STP instance. **Command mode:** All
`show spanning-tree stp` *<1-128>* `information` Displays information about a specific Spanning Tree Group. **Command mode:** All For details, see page 44.

Table 18. Layer 2 Information Commands (continued)

Command Syntax and Usage
`show spanning-tree mst` *<0-32>* `information` Displays Common Internal Spanning Tree (CIST) information for the specified instance, including the MSTP digest and VLAN membership. CIST bridge information includes: – Priority – Hello interval – Maximum age value – Forwarding delay – Root bridge information (priority, MAC address, path cost, root port) CIST port information includes: – Port number and priority – Cost – State For details, see page 49. **Command mode:** All
`show spanning-tree mst configuration` Displays the current MSTP settings. **Command mode:** All
`show portchannel information` Displays the state of each port in the various trunk groups. For details, see page 52. **Command mode:** All
`show vlan` Displays VLAN configuration information for all configured VLANs, including: – VLAN Number – VLAN Name – Status – Port membership of the VLAN For details, see page 52. **Command mode:** All
`show failover trigger` *<trigger number>* Displays Layer 2 Failover information. For details, see page 37. **Command mode:** All
`show hotlinks information` Displays Hot Links information. For details, see page 38. **Command mode:** All

Table 18. Layer 2 Information Commands (continued)

Command Syntax and Usage
`show lldp information` Displays Link Layer Discovery Protocol (LLDP) information. For details, see page 38. **Command mode:** All
`show layer2 information` Dumps all Layer 2 switch information available (10K or more, depending on your configuration). If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump commands. **Command mode:** All

802.1X Information

The following command displays 802.1X information:

```
show dot1x information
```

Command mode: All

```
System capability : Authenticator
System status     : disabled
Protocol version  : 1
Guest VLAN status : disabled
Guest VLAN        : none
                                   Authenticator    Backend
Port    Auth Mode    Auth Status     PAE State     Auth State
-----  ------------  ------------  --------------  ----------
*1     force-auth    unauthorized  initialize      initialize
 2     force-auth    unauthorized  initialize      initialize
*3     force-auth    unauthorized  initialize      initialize
*4     force-auth    unauthorized  initialize      initialize
*5     force-auth    unauthorized  initialize      initialize
*6     force-auth    unauthorized  initialize      initialize
*7     force-auth    unauthorized  initialize      initialize
*8     force-auth    unauthorized  initialize      initialize
*9     force-auth    unauthorized  initialize      initialize
*10    force-auth    unauthorized  initialize      initialize
*11    force-auth    unauthorized  initialize      initialize
*12    force-auth    unauthorized  initialize      initialize
*13    force-auth    unauthorized  initialize      initialize
*14    force-auth    unauthorized  initialize      initialize
*15    force-auth    unauthorized  initialize      initialize
*16    force-auth    unauthorized  initialize      initialize
*17    force-auth    unauthorized  initialize      initialize
*18    force-auth    unauthorized  initialize      initialize
*19    force-auth    unauthorized  initialize      initialize
*20    force-auth    unauthorized  initialize      initialize
...
------------------------------------------------------------------
* - Port down or disabled
```

The following table describes the IEEE 802.1X parameters.

Table 19. 802.1X Parameter Descriptions

Parameter	**Description**
Port	Displays each port’s alias.
Auth Mode	Displays the Access Control authorization mode for the port. The Authorization mode can be one of the following: – force-unauth – auto – force-auth
Auth Status	Displays the current authorization status of the port, either authorized or unauthorized.

Table 19. 802.1X Parameter Descriptions (continued)

Parameter	**Description**
Authenticator PAE State	Displays the Authenticator Port Access Entity State. The PAE state can be one of the following: – initialize – disconnected – connecting – authenticating – authenticated – aborting – held – forceAuth
Backend Auth State	Displays the Backend Authorization State. The Backend Authorization state can be one of the following: – initialize – request – response – success – fail – timeout – idle

FDB Information

The forwarding database (FDB) contains information that maps the media access control (MAC) address of each known device to the switch port where the device address was learned. The FDB also shows which other ports have seen frames destined for a particular MAC address.

Note: The master forwarding database supports up to 128K MAC address entries on the MP per switch.

Table 20. FDB Information Options

Command Syntax and Usage
`show mac-address-table address` *<MAC address>* Displays a single database entry by its MAC address. You are prompted to enter the MAC address of the device. Enter the MAC address using the format, `xx:xx:xx:xx:xx:xx`. For example, `08:00:20:12:34:56` You can also enter the MAC address using the format, `xxxxxxxxxxxx`. For example, `080020123456` **Command mode:** All
`show mac-address-table interface port` *<port alias or number>* Displays all FDB entries for a particular port. **Command mode:** All
`show mac-address-table portchannel` *<trunk group number>* Displays all FDB entries for a particular trunk group (portchannel). **Command mode:** All
`show mac-address-table vlan` *<VLAN number>* Displays all FDB entries on a single VLAN. **Command mode:** All
`show mac-address-table state {unknown|forward|trunk}` Displays all FDB entries for a particular state. **Command mode:** All
`show mac-address-table multicast` Displays all Multicast MAC entries in the FDB. **Command mode:** All
`show mac-address-table static` Displays all static MAC entries in the FDB. **Command mode:** All
`show mac-address-table configured-static` Displays all configured static MAC entries in the FDB. **Command mode:** All

Table 20. FDB Information Options (continued)

Command Syntax and Usage
`show mac-address-table counters` Displays all forwarding database statistics. **Command mode:** All
`show mac-address-table` Displays all entries in the Forwarding Database. **Command mode:** All

FDB Multicast Information

The following commands display FDB multicast information.

Table 21. Multicast FDB Information Options

Command Syntax and Usage
`show mac-address-table multicast address` *<MAC address>* [*<VLAN>*] Displays a single multicast entry by its MAC address. You are prompted to enter the MAC address of the device. Enter the MAC address using the format, `xx:xx:xx:xx:xx:xx`. For example, `08:00:20:12:34:56` You can also enter the MAC address using the format, `xxxxxxxxxxxx`. For example, `080020123456`
`show mac-address-table multicast interface` *<port number>* Displays all multicast entries for a particular port.
`show mac-address-table multicast vlan` *<VLAN number>* Displays all multicast entries on a single VLAN.
`show mac-address-table multicast` Displays all Multicast MAC entries in the FDB. **Command mode:** All

Show All FDB Information

The following command displays Forwarding Database information:

```
show mac-address-table
```

Command mode: All

```
     MAC address      VLAN  Port  Trnk  State  Permanent
  -----------------  ----  ----  ----  -----  ---------
  00:04:38:90:54:18     1  4             FWD
  00:09:6b:9b:01:5f     1  13            FWD
  00:09:6b:ca:26:ef  4095  1             FWD
  00:0f:06:ec:3b:00  4095  1             FWD
  00:11:43:c4:79:83     1  4             FWD       P
```

An address that is in the forwarding (FWD) state, means that it has been learned by the switch. When in the trunking (TRK) state, the port field represents the trunk group number. If the state for the port is listed as unknown (UNK), the MAC address has not yet been learned by the switch, but has only been seen as a destination address.

When an address is in the unknown state, no outbound port is indicated, although ports which reference the address as a destination are listed under “Reference ports.”

Clearing Entries from the Forwarding Database

To clear the entire FDB, refer to “Forwarding Database Maintenance” on page 523.

Link Aggregation Control Protocol Information

Use these commands to display LACP status information about each port on the G8264.

Table 22. LACP Information Options

Command Syntax and Usage
`show lacp aggregator` *<aggregator ID>* Displays detailed information about the LACP aggregator. **Command mode:** All
`show interface port` *<port alias or number>* `lacp information` Displays LACP information about the selected port. **Command mode:** All
`show lacp information` Displays a summary of LACP information. For details, see page 36. **Command mode:** All

Link Aggregation Control Protocol

The following command displays LACP information:

```
show lacp information
```

Command mode: All

```
port    mode    adminkey  operkey  selected   prio  aggr  trunk  status  minlinks
----------------------------------------------------------------------------------
1       off            1        1     no     32768     --     --    --          1
2       off            2        2     no     32768     --     --    --          1
3       off            3        3     no     32768     --     --    --          1
4       off            4        4     no     32768     --     --    --          1
...
```

LACP dump includes the following information for each port in the G8264:

- `mode` Displays the port’s LACP mode (active, passive, or off).
- `adminkey` Displays the value of the port’s *adminkey*.
- `operkey` Shows the value of the port’s operational key.
- `selected` Indicates whether the port has been selected to be part of a Link Aggregation Group.
- `prio` Shows the value of the port priority.
- `aggr` Displays the aggregator associated with each port.
- `trunk` This value represents the LACP trunk group number.
- `status` Displays the status of LACP on the port (up or down).
- `minlinks` Displays the minimum number of active links in the LACP trunk.

Layer 2 Failover Information

Table 23. Layer 2 Failover Information Options

Command Syntax and Usage
`show failover trigger` *<trigger number>* Displays detailed information about the selected Layer 2 Failover trigger. **Command mode:** All
`show failover trigger` Displays a summary of Layer 2 Failover information. For details, see page 37. **Command mode:** All

Layer 2 Failover Information

The following command displays Layer 2 Failover information:

```
show failover trigger
```

Command mode: All

```
Trigger 1 Auto Monitor: Enabled
Trigger 1 limit: 0
Monitor State: Up
Member      Status
---------   -----------
trunk 1
 2          Operational
 3          Operational

Control State: Auto Disabled
Member      Status
---------   -----------
 1          Operational
 2          Operational
 3          Operational
...
```

A monitor port's Failover status is `Operational` only if all the following conditions hold true:

- Port link is up.
- If Spanning-Tree is enabled, the port is in the `Forwarding` state.
- If the port is a member of an LACP trunk group, the port is aggregated.

If any of these conditions are not true, the monitor port is considered to be failed.

A control port is considered to be operational if the monitor trigger state is `Up`. Even if a port's link status is `Down`, Spanning-Tree status is `Blocking`, and the LACP status is `Not Aggregated`, from a teaming perspective the port status is `Operational`, since the trigger is `Up`.

A control port's status is displayed as `Failed` only if the monitor trigger state is `Down`.

Hot Links Information

The following command displays Hot Links information:

```
show hotlinks information
```

Command mode: All

```
Hot Links Info: Trigger

Current global Hot Links setting: ON
bpdu disabled
sndfdb disabled

Current Trigger 1 setting: enabled
name "Trigger 1", preempt enabled, fdelay 1 sec

Active state: None

Master settings:
port 1
Backup settings:
port 2
```

Hot Links information includes the following:

- Hot Links status (on or off)
- Status of BPDU flood option
- Status of FDB send option
- Status and configuration of each Hot Links trigger

LLDP Information

The following commands display LLDP information.

Table 24. LLDP Information Options

Command Syntax and Usage
`show lldp port` Displays Link Layer Discovery Protocol (LLDP) port information. **Command mode:** All
`show lldp transmit` Displays information about the LLDP transmit state machine. **Command mode:** All
`show lldp receive` Displays information about the LLDP receive state machine. **Command mode:** All
`show lldp remote-device [<`*1-256*`>|detail]` Displays information received from LLDP-capable devices. For more information, see page 39. **Command mode:** All

Table 24. LLDP Information Options

Command Syntax and Usage
`show lldp port` *<1-16>* `tlv evb` Displays Edge Virtual Bridge (EVB) type-length-value (TLV) information. **Command mode:** All
`show lldp information` Displays all LLDP information. **Command mode:** All

LLDP Remote Device Information

The following command displays LLDP remote device information:

`show lldp remote-device [`*<1-256>*`|detail]`

Command mode: All

```
LLDP Remote Devices Information

LocalPort | Index | Remote Chassis ID | RemotePort | Remote System Name
----------|-------|-------------------|------------|---------------------------
      2   | 210   | 00 16 ca ff 7e 00 | 15         | BNT Gb Ethernet Switch...
      4   | 12    | 00 16 60 f9 3b 00 | 20         | BNT Gb Ethernet Switch...
```

LLDP remote device information provides a summary of information about remote devices connected to the switch. To view detailed information about a device, as shown below, follow the command with the index number of the remote device. To view detailed information about all devices, use the `detail` option.

```
Local Port Alias: 1
        Remote Device Index     : 15
        Remote Device TTL       : 99
        Remote Device RxChanges : false
        Chassis Type            : Mac Address
        Chassis Id              : 00-18-b1-33-1d-00
        Port Type               : Locally Assigned
        Port Id                 : 23
        Port Description        : 23

        System Name        :
        System Description : IBM Networking Operating System RackSwitch G8264, IBM
Networking OS: version 7.4.0,13 Boot image: version 7.4.0.13
        System Capabilities Supported : bridge, router
        System Capabilities Enabled   : bridge, router

        Remote Management Address:
                Subtype             : IPv4
                Address             : 10.100.120.181
                Interface Subtype   : ifIndex
                Interface Number    : 128
                Object Identifier   :
```

Unidirectional Link Detection Information

Table 25. UDLD Information Options

Command Syntax and Usage
`show interface port` *<port alias or number>* `udld` Displays UDLD information about the selected port. **Command mode:** All
`show udld` Displays all UDLD information. **Command mode:** All

UDLD Port Information

The following command displays UDLD information for the selected port:

`show interface port` *<port alias or number>* `udld`

Command mode: All

```
UDLD information on port 1
Port enable administrative configuration setting: Enabled
Port administrative mode: normal
Port enable operational state: link up
Port operational state: advertisement
Port bidirectional status: bidirectional
Message interval: 15
Time out interval: 5
Neighbor cache: 1 neighbor detected

   Entry #1
   Expiration time: 31 seconds
   Device Name:
   Device ID: 00:da:c0:00:04:00
   Port ID: 1
```

UDLD information includes the following:

- Status (enabled or disabled)
- Mode (normal or aggressive)
- Port state (link up or link down)
- Bi-directional status (unknown, unidirectional, bidirectional, TX-RX loop, neighbor mismatch)

802.1x Discovery Information

Table 26. 802.1x Discovery Information Options

Command Syntax and Usage
`show interface port` *<port alias or number>* `dot1x` Displays 802.1x information about the selected port. **Command mode:** All
`show dot1x` Displays all 802.1x information. **Command mode:** All

802.1x Port Information

The following command displays 802.1x information for the selected port:

`show interface port` *<port alias or number>* `dot1x`

Command mode: All

```
                   Quiet     Tx    Max   Supp    Server   ReAuth  ReAuth  VLAN
Port   Auth Mode   Period  Period  Req  Timeout  Timeout  Status  Period Assign
----- ------------ ------  ------  ---  -------  -------  ------  ------ ------
  G   force-auth       60      30    2      30       30     off     3600  off
1     force-auth       60      30    2      30       30     off     3600  off
--------------------------------------------------------------------------------
G - Global port configuration
```

OAM port display shows information about the selected port and the peer to which the link is connected.

OAM Discovery Information

Table 27. OAM Discovery Information Options

Command Syntax and Usage
`show interface port` *<port alias or number>* `oam` Displays OAM information about the selected port. **Command mode:** All
`show oam` Displays all OAM information. **Command mode:** All

OAM Port Information

The following command displays OAM information for the selected port:

```
show interface port <port alias or number> oam
```

Command mode: All

```
OAM information on port 1
State enabled
Mode active
Link up
Satisfied Yes
Evaluating No

Remote port information:
Mode active
MAC address 00:da:c0:00:04:00
Stable Yes
State valid Yes
Evaluating No
```

OAM port display shows information about the selected port and the peer to which the link is connected.

vLAG Information

Table 28. vLAG Information Options

Command Syntax and Usage
`show vlag adminkey` *<1-65535>* Displays vLAG LACP information.
`show vlag portchannel` *<trunk group number>* Displays vLAG static trunk group information.
`show vlag isl` Displays vLAG Inter-Switch Link (ISL) information. **Command mode:** All
`show vlag information` Displays all vLAG information.

vLAG Trunk Information

The following command displays vLAG information for the trunk group:

`show vlag portchannel` *<trunk group number>*

Command mode: All

```
vLAG is enabled on trunk 13
Protocol - Static
Current settings: enabled
    ports:  13
Current L2 trunk hash settings:
    smac dmac
Current L3 trunk hash settings:
    sip dip
Current ingress port hash: disabled
Current L4 port hash: disabled
```

Spanning Tree Information

The following command displays Spanning Tree information:

```
show spanning-tree stp <1-128> information
```

Command mode: All

```
Spanning Tree Group 1: On (RSTP)
VLANs:  1 10 4095

Current Root:            Path-Cost  Port Hello MaxAge FwdDel
 8000 00:25:03:49:29:00        0       0    2     20    15

Parameters:  Priority  Hello  MaxAge  FwdDel  Aging
              32768      2      20      15     300

   Port    Prio   Cost     State  Role Designated Bridge      Des Port     Type
---------- ---- ---------- -----  ---- ---------------------- -------- ------------
1    (pc12)  128      490!+  FWD   DESG 8000-00:25:03:49:29:00     8026 P2P
2    (pc12)  128      490!+  FWD   DESG 8000-00:25:03:49:29:00     8026 P2P
3    (pc12)  128      490!+  FWD   DESG 8000-00:25:03:49:29:00     8026 P2P
4    (pc12)  128      490!+  FWD   DESG 8000-00:25:03:49:29:00     8026 P2P
MGT            0        0    FWD *
* = STP turned off for this port.
! = Automatic path cost.
+ = Portchannel cost, not the individual port cost.
```

The switch software uses the Per VLAN Rapid Spanning Tree Protocol (PVRST) spanning tree mode, with IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) or IEEE 802.1s Multiple Spanning Tree Protocol (MSTP), as alternatives. For details see “RSTP/MSTP/PVRST Information” on page 46.

When STP is used, in addition to seeing if STG is enabled or disabled, you can view the following STG bridge information:

Table 29. PVRST/RSTP/MSTP Bridge Parameter Descriptions

Parameter	**Description**
Current Root	The Current Root shows information about the root bridge for the Spanning Tree. Information includes the priority (in hexadecimal notation) and the MAC address of the root.
Priority (bridge)	The Bridge Priority parameter controls which bridge on the network will become the STG root bridge.
Hello	The Hello Time parameter specifies, in seconds, how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value.
MaxAge	The Maximum Age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigure the STG network.
FwdDel	The Forward Delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from DISC state to LRN state and from LRN state to FWD state.

Table 29. PVRST/RSTP/MSTP Bridge Parameter Descriptions (continued)

Parameter	Description
Aging	The Aging Time parameter specifies, in seconds, the amount of time the bridge waits without receiving a packet from a station before removing the station from the Forwarding Database.
Topology Change Count	The Topology Change Count shows the number of Topology Changes detected since the last initialization of the Spanning Tree Group (either by reboot or by Spanning Tree mode change).

The following port-specific information is also displayed:

Table 30. PVRST/RSTP/MSTP Port Parameter Descriptions

Parameter	Description
Priority (port)	The Port Priority parameter helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment.
Cost	The Port Path cost parameter is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. A setting of 0 indicates that the cost will be set to the appropriate default after the link speed has been auto negotiated.
State	The State field shows the current state of the port. The State field can be one of the following: Discarding (DISC), Learning (LRN), or Forwarding (FWD).
Role	The Role field shows the current role of this port in the Spanning Tree. The port role can be one of the following: Designated (`DESG`), Root (`ROOT`), Alternate (`ALTN`), Backup (`BKUP`).
Designated Bridge	The Designated Bridge shows information about the bridge connected to each port, if applicable. Information includes the priority (in hexadecimal notation) and MAC address of the Designated Bridge.
Designated Port	The Designated Port field shows the port on the Designated Bridge to which this port is connected.
Type	Type of link connected to the port, and whether the port is an edge port. Link type values are AUTO, P2P, or SHARED.

RSTP/MSTP/PVRST Information

The following command displays RSTP/MSTP/PVRST information:

`show spanning-tree stp <`*`1-128`*`> information`

Command mode: All I

```
-----------------------------------------------------------------
upfast disabled, update 40
Pvst+ compatibility mode enabled
-----------------------------------------------------------------
Spanning Tree Group 1: On (RSTP)
VLANs:  1

Current Root:            Path-Cost  Port Hello MaxAge FwdDel
 0000 00:16:60:ba:6c:01     2026       1    2     20     15

Parameters:  Priority  Hello  MaxAge  FwdDel  Aging
             32768      2      20      15     300

Port  Prio  Cost     State  Role Designated Bridge      Des Port Type
----- ---- --------- -----  ---- --------------------- -------- ----
1      128     2000!  FWD   ROOT fffe-00:13:0a:4f:7d:d0     8013  P2P
23     128     2000!  FWD   DESG 8000-00:13:0a:4f:7e:10     8017  P2P
24     128     2000!  FWD   DESG 8000-00:13:0a:4f:7e:10     8018  P2P

-----------------------------------------------------------------
Spanning Tree Group 128: Off (RSTP), FDB aging timer 300
VLANs:  4095

Port  Prio  Cost     State  Role Designated Bridge      Des Port Type
----- ---- --------- -----  ---- --------------------- -------- ----
MGT      0        0   FWD *

* = STP turned off for this port.
! = Automatic path cost.
```

You can configure the switch software to use the IEEE 802.1w Rapid Spanning Tree Protocol (RSTP), the IEEE 802.1s Multiple Spanning Tree Protocol (MSTP), or Per VLAN Rapid Spanning Tree Protocol (PVRST).

If RSTP/MSTP/PVRST is turned on, you can view the following bridge information for the Spanning Tree Group:.

Table 31. RSTP/MSTP/PVRST Bridge Parameter Descriptions

Parameter	**Description**
Current Root	The Current Root shows information about the root bridge for the Spanning Tree. Information includes the priority (in hexadecimal notation) and the MAC address of the root.
Priority (bridge)	The Bridge Priority parameter controls which bridge on the network will become the STP root bridge.
Hello	The Hello Time parameter specifies, in seconds, how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value.

Table 31. RSTP/MSTP/PVRST Bridge Parameter Descriptions (continued)

Parameter	Description
MaxAge	The Maximum Age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the STP network.
FwdDel	The Forward Delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from listening to learning and from learning state to forwarding state.
Aging	The Aging Time parameter specifies, in seconds, the amount of time the bridge waits without receiving a packet from a station before removing the station from the Forwarding Database.

The following port-specific information is also displayed:

Table 32. RSTP/MSTP/PVRST Port Parameter Descriptions

Parameter	Description
Prio (port)	The Port Priority parameter helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment.
Cost	The port Path Cost parameter is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. A setting of 0 indicates that the cost will be set to the appropriate default after the link speed has been auto negotiated.
State	The State field shows the current state of the port. The State field in RSTP or MSTP mode can be one of the following: Discarding (`DISC`), Learning (`LRN`), Forwarding (`FWD`), or Disabled (`DSB`).
Role	The Role field shows the current role of this port in the Spanning Tree. The port role can be one of the following: Designated (`DESG`), Root (`ROOT`), Alternate (`ALTN`), Backup (`BKUP`), Disabled (`DSB`), Master (`MAST`).
Designated Bridge	The Designated Bridge shows information about the bridge connected to each port, if applicable. Information includes the priority (in hexadecimal notation) and MAC address of the Designated Bridge.
Designated Port	The port ID of the port on the Designated Bridge to which this port is connected.
Type	Type of link connected to the port, and whether the port is an edge port. Link type values are AUTO, P2P, or SHARED.

Spanning Tree Bridge Informaiton

The following command displays Spanning Tree bridge information:

```
show spanning-tree [vlan <VLAN ID>] bridge
```

Command mode: All

```
STG       Priority    Hello     MaxAge    FwdDel    Protocol          VLANs
------    --------    ------    ------    ------    --------    ------------------
CIST      32768       -         20        15        MSTP        1-2
1         32768       2         20        15        MSTP        1-2
2         32768       2         20        15        MSTP        4
```

Table 33. Bridge Parameter Descriptions

Parameter	Description
STG	Spanning Tree Group
Priority	The bridge priority parameter controls which bridge on the network will become the STP root bridge. The lower the value, the higher the priority.
Hello	The hello time parameter specifies, in seconds, how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value.
MaxAge	The maximum age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigure the STP network.
FwdDel	The forward delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from learning state to forwarding state.
Protocol	The STP protocol run by the Spanning Tree Group
VLANs	VLANs that are part of the Spanning Tree Group

Spanning Tree Root Informaiton

The following command displays information about the root switches in every STP group:

```
show spanning-tree root
```

Command mode: All

```
Instance           Root ID        Path-Cost Hello MaxAge FwdDel  Root Port
---------- --------------------- --------- ----- ------ ------  ------------
1          8001 08:17:f4:32:95:00 0         2     20     15           0
3          8003 08:17:f4:32:95:00 0         2     20     15           0
6          8001 08:17:f4:fb:d8:00 20000     2     20     15          27
17         8011 08:17:f4:32:95:00 0         2     20     15           0
```

Table 34. Bridge Parameter Descriptions

Parameter	**Description**
Instance	Spanning Tree instance
Root ID	Indicates the root switch MAC address and port number.
Path-Cost	The port path cost is used to help determine the designated port for a segment. Port path cost is based on the port speed.
Hello	The hello time parameter specifies, in seconds, how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value.
MaxAge	The maximum age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigure the STP network.
FwdDel	The forward delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from learning state to forwarding state.
Root Port	Port number allocated to the STP instance on the root switch.

Multiple Spanning Tree Information

The following command displays Multiple Spanning Tree (MSTP) information:

`show spanning-tree mst` *<0-32>* `information`

Command mode: All

```
Mstp Digest: 0xac36177f50283cd4b83821d8ab26de62

Common Internal Spanning Tree:

VLANs MAPPED:  1-4094
VLANs:  1 2 4095

Current Root:            Path-Cost  Port MaxAge FwdDel
 8000 00:11:58:ae:39:00      2026     0     20     15

Cist Regional Root:       Path-Cost
 8000 00:11:58:ae:39:00        0

Parameters:  Priority  MaxAge  FwdDel  Hops
              32768      20      15    20

Port  Prio  Cost      State  Role Designated Bridge      Des Port Hello Type
----- ---- --------- -----  ---- ---------------------- -------- ----- ----
1     128     2000!  FWD  ROOT fffe-00:13:0a:4f:7d:d0    8011   2   P2P#
23    128     2000!  DISC ALTN fffe-00:22:00:24:46:00    8012   2   P2P#
MGT     0        0   FWD *

* = STP turned off for this port.
! = Automatic path cost.
# = PVST Protection enabled for this port.
```

In addition to seeing if Common Internal Spanning Tree (CIST) is enabled or disabled, you can view the following CIST bridge information:

Table 35. CIST Parameter Descriptions

Parameter	**Description**
CIST Root	The CIST Root shows information about the root bridge for the Common Internal Spanning Tree (CIST). Values on this row of information refer to the CIST root.
CIST Regional Root	The CIST Regional Root shows information about the root bridge for this MSTP region. Values on this row of information refer to the regional root.
Priority (bridge)	The bridge priority parameter controls which bridge on the network will become the STP root bridge.
Hello	The hello time parameter specifies, in seconds, how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value.
MaxAge	The maximum age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigure the STP network.
FwdDel	The forward delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from learning state to forwarding state.
Hops	The maximum number of bridge hops a packet can traverse before it is dropped. The default value is 20.

The following port-specific CIST information is also displayed:

Table 36. CIST Parameter Descriptions

Parameter	**Description**
Prio (port)	The port priority parameter helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment.
Cost	The port path cost parameter is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. A setting of 0 indicates that the cost will be set to the appropriate default after the link speed has been auto negotiated.
State	The state field shows the current state of the port. The state field can be either Discarding (`DISC`), Learning (`LRN`), or Forwarding (`FWD`).

Table 36. CIST Parameter Descriptions (continued)

Parameter	**Description**
Role	The Role field shows the current role of this port in the Spanning Tree. The port role can be one of the following: Designated (`DESG`), Root (`ROOT`), Alternate (`ALTN`), Backup (`BKUP`), Disabled (`DSB`), Master (`MAST`), or Unknown (`UNK`).
Designated Bridge	The Designated Bridge shows information about the bridge connected to each port, if applicable. Information includes the priority (in hexadecimal notation) and MAC address of the Designated Bridge.
Designated Port	The port ID of the port on the Designated Bridge to which this port is connected.
Type	Type of link connected to the port, and whether the port is an edge port. Link type values are `AUTO`, `P2P`, or `SHARED`.

Trunk Group Information

The following command displays Trunk Group information:

```
show portchannel information
```

Command mode: All

```
Trunk group 1: Enabled
Protocol - Static
Port state:
  1: STG  1 forwarding
  2: STG  1 forwarding
```

When trunk groups are configured, you can view the state of each port in the various trunk groups.

Note: If Spanning Tree Protocol on any port in the trunk group is set to `forwarding`, the remaining ports in the trunk group will also be set to `forwarding`.

VLAN Information

Table 37. VLAN Information Options

Command Syntax and Usage
`show vlan` *<VLAN number>* Displays general VLAN information. **Command mode:** All
`show protocol-vlan` *<protocol number (1-8)>* Displays Protocol VLAN information. **Command mode:** All
`show vlan private-vlan` *<VLAN number>* Displays Private VLAN information. **Command mode:** All s
`show vlan information` Displays information about all VLANs, including: – VLAN number and name – Port membership – VLAN status (enabled or disabled) – Protocol VLAN status – Private VLAN status – Spanning Tree membership – VMAP configuration **Command mode:** All

The following command displays VLAN information:

```
show vlan
```

Command mode: All

```
VLAN                Name                Status           Ports
----  --------------------------------  ------  -----------------------
1     Default VLAN                      ena     1-20
2     VLAN 2                            dis     21-22

4095  Mgmt VLAN                         ena     MGT

Private-VLAN    Type      Mapped-To           Status       Ports
------------  ---------  ------------------  ---------- ---------------
100           primary    200 300             ena        2 3 10
200           community  100                 ena        12
300           isolated   100                 ena        14
```

This information display includes all configured VLANs and all member ports that have an active link state. Port membership is represented in slot/port format.

VLAN information includes:

- VLAN Number
- VLAN Name
- Status
- Port membership of the VLAN
- Protocol VLAN information (if available)
- Private VLAN information (if available)

Layer 3 Information

Table 38. Layer 3 Information Commands

Command Syntax and Usage
`show ip route` Displays all routes configured on the switch. For details, see page 58. **Command mode:** All
`show arp` Displays Address Resolution Protocol (ARP) information. For details, see page 59. **Command mode:** All
`show ip bgp information [IPv4 address] [IPv4 mask]` Displays Border Gateway Protocol (BGP) information. For details, see page 64. **Command mode**: All
`show ip ospf information` Displays the OSPF information. For details, see page 65. **Command mode**: All
`show ipv6 ospf information` Displays OSPFv3 information. For more OSPFv3 information options, see page 70. **Command mode**: All
`show ip rip interface` Displays RIP user's configuration. For details, see page 74. **Command mode**: All
`show ipv6 route` Displays IPv6 routing information. For more information options, see page 75. **Command mode**: All
`show ipv6 neighbors` Displays IPv6 Neighbor Discovery cache information. For more information options, see page 76. **Command mode**: All
`show ipv6 prefix` Displays IPv6 Neighbor Discovery prefix information. For details, see page 77. **Command mode**: All
`show ip ecmp` Displays ECMP static route information. For details, see page 77. **Command mode**: All

Table 38. Layer 3 Information Commands (continued)

Command Syntax and Usage
`show ip igmp groups` Displays IGMP Information. For more IGMP information options, see page 78. **Command mode**: All
`show ipv6 mld groups` Displays Multicast Listener Discovery (MLD) information. For more MLD information options, see page 82. **Command mode**: All
`show ip vrrp information` Displays VRRP information. For details, see page 84. **Command mode:** All
`show interface ip` Displays IP interface Information. For details, see page 85. **Command mode:** All
`show ipv6 interface` *<interface number>* Displays IPv6 interface information. For details, see page 86. **Command mode:** All
`show ipv6 pmtu [`*<destination IPv6 address>*`]` Displays IPv6 Path MTU information. For details, see page 87. **Command mode:** All
`show ip interface brief` Displays IP Information. For details, see page 88. IP information, includes: – IP interface information: Interface number, IP address, subnet mask, VLAN number, and operational status. – Default gateway information: Metric for selecting which configured gateway to use, gateway number, IP address, and health status – IP forwarding settings, network filter settings, route map settings **Command mode**: All
`show ikev2` Displays IKEv2 information. For more information options, see page 89. **Command mode:** All
`show ipsec manual-policy` Displays information about manual key management policy for IP security. For more information options, see page 91. **Command mode**: All

Table 38. Layer 3 Information Commands (continued)

Command Syntax and Usage
`show ip dhcp snooping binding` Displays DHCP Snooping information. For details, see page 93. **Command mode:** All
`show ip pim component [<1-2>]` Displays Protocol Independent Multicast (PIM) component information. For more PIM information options, see page 94. **Command mode:** All
`show layer3` Dumps all Layer 3 switch information available (10K or more, depending on your configuration). If you want to capture dump data to a file, set your communication software on your workstation to capture session data before issuing the dump commands. **Command mode:** All

IP Routing Information

Using the commands listed in the following table, you can display all or a portion of the IP routes currently held in the switch.

Table 39. Route Information Options

Command Syntax and Usage
show ip route address *<IP address>* Displays a single route by destination IP address. **Command mode:** All
show ip route gateway *<IP address>* Displays routes to a single gateway. **Command mode:** All
show ip route type {indirect|direct|local|broadcast|martian|multicast} Displays routes of a single type. For a description of IP routing types, see Table 40 on page 58. **Command mode:** All
show ip route tag {fixed|static|addr|rip|ospf|bgp|broadcast|martian|multicast} Displays routes of a single tag. For a description of IP routing tags, see Table 41 on page 58. **Command mode:** All
show ip route interface *<interface number>* Displays routes on a single interface. **Command mode:** All
show ip route ecmphash Displays the current ECMP hashing mechanism. **Command mode:** All
show ip route static Displays static routes configured on the switch. **Command mode:** All
show ip route Displays all routes configured in the switch. **Command mode:** All For more information, see page 58.

Show All IP Route Information

The following command displays IP route information:

```
show ip route
```

Command mode: All

```
Status code: * - best
    Destination         Mask          Gateway        Type      Tag    Metr If
  --------------- --------------- --------------- --------- --------- ---- --
* 0.0.0.0         0.0.0.0         172.31.1.1      indirect  static          1
* 12.0.0.0        255.0.0.0       0.0.0.0         martian   martian
* 12.31.0.0       255.255.0.0     172.31.36.139   direct    fixed           1
* 12.31.36.139    255.255.255.255 172.31.36.139   local     addr            1
* 12.31.255.255   255.255.255.255 172.31.255.255  broadcast broadcast       1
* 224.0.0.0       224.0.0.0       0.0.0.0         martian   martian
* 224.0.0.0       240.0.0.0       0.0.0.0         multicast addr
* 255.255.255.255 255.255.255.255 255.255.255.255 broadcast broadcast
```

The following table describes the `Type` parameters.

Table 40. IP Routing Type Parameters

Parameter	Description
indirect	The next hop to the host or subnet destination will be forwarded through a router at the `Gateway` address.
direct	Packets will be delivered to a destination host or subnet attached to the switch.
local	Indicates a route to one of the switch's IP interfaces.
broadcast	Indicates a broadcast route.
martian	The destination belongs to a host or subnet which is filtered out. Packets to this destination are discarded.
multicast	Indicates a multicast route.

The following table describes the `Tag` parameters.

Table 41. IP Routing Tag Parameters

Parameter	Description
fixed	The address belongs to a host or subnet attached to the switch.
static	The address is a static route which has been configured on the RackSwitch G8264.
addr	The address belongs to one of the switch's IP interfaces.
rip	The address was learned by the Routing Information Protocol (RIP).
ospf	The address was learned by Open Shortest Path First (OSPF).
bgp	The address was learned via Border Gateway Protocol (BGP)

Table 41. IP Routing Tag Parameters (continued)

Parameter	Description
broadcast	Indicates a broadcast address.
martian	The address belongs to a filtered group.
multicast	Indicates a multicast address.

ARP Information

The ARP information includes IP address and MAC address of each entry, address status flags (see Table 43 on page 60), VLAN and port for the address, and port referencing information.

Table 42. ARP Information Options

Command Syntax and Usage
`show arp find` *<IP address>* Displays a single ARP entry by IP address. **Command mode:** All
`show arp interface port` *<port alias or number>* Displays the ARP entries on a single port. **Command mode:** All
`show arp vlan` *<VLAN number>* Displays the ARP entries on a single VLAN. **Command mode:** All
`show arp` Displays all ARP entries. including: – IP address and MAC address of each entry – Address status flag – The VLAN and port to which the address belongs – The ports which have referenced the address (empty if no port has routed traffic to the IP address shown) For more information, see page 60. **Command mode:** All
`show arp reply` Displays the ARP address list: IP address, IP mask, MAC address, and VLAN flags. **Command mode:** All

ARP Address List Information

The following command displays owned ARP address list information:

```
show arp reply
```

Command mode: All

```
  IP address        IP mask        MAC address     VLAN Pass-Up
--------------- --------------- -----------------  ---- -----
12.31.36.139    255.255.255.255  00:13:0a:4f:7e:30    1
205.178.50.1    255.255.255.255  00:70:cf:03:20:06    1
205.178.18.64   255.255.255.255  00:70:cf:03:20:05    1
```

Show All ARP Entry Information

The following command displays ARP information:

```
show arp
```

Command mode: All

```
  IP address    Flags    MAC address    VLAN  Age Port
--------------- ----- ----------------- ----  --- ----
10.100.130.1          00:0e:40:99:cc:5d    1  276 19
10.100.130.12    P    00:22:00:d5:a8:00    1
```

The `Port` field shows the target port of the ARP entry.

The `Flags` field is interpreted as follows:

Table 43. ARP Flag Parameters

Flag	Description
P	Permanent entry created for switch IP interface.
R	Indirect route entry.
U	Unresolved ARP entry. The MAC address has not been learned.

BGP Information

Table 44. BGP Peer Information Options

Command Syntax and Usage
`show ip bgp neighbor information` Displays BGP peer information. See page 61 for a sample output. **Command mode:** All
`show ip bgp neighbor group` Displays BGP group information. See page 63 for a sample output. **Command mode:** All
`show ip bgp neighbor summary` Displays peer summary information such as AS, message received, message sent, up/down, state. See page 64 for a sample output. **Command mode:** All
`show ip bgp neighbor` *<neighbor number>* `redistribution` Displays BGP neighbor redistribution. **Command mode:** All
`show ip bgp neighbor` *<neighbor number>* `routes` Displays BGP peer routes. **Command mode:** All
`show ip bgp information` Displays the BGP routing table. See page 64 for a sample output. **Command mode:** All

BGP Peer information

Following is an example of the information provided by the following command:

```
show ip bgp neighbor information
```

Command mode: All

```
BGP Peer Information:

  3: 2.1.1.1         , version 4, TTL 225
    Remote AS: 100, Local AS: 100, Link type: IBGP
    Remote router ID: 3.3.3.3,    Local router ID: 1.1.201.5
    BGP status: idle, Old status: idle
    Total received packets: 0, Total sent packets: 0
    Received updates: 0, Sent updates: 0
    Keepalive: 60, Holdtime: 180, MinAdvTime: 60
    LastErrorCode: unknown(0), LastErrorSubcode: unspecified(0)
    Established state transitions: 1

  4: 2.1.1.4         , version 4, TTL 225
    Remote AS: 100, Local AS: 100, Link type: IBGP
    Remote router ID: 4.4.4.4,    Local router ID: 1.1.201.5
    BGP status: idle, Old status: idle
    Total received packets: 0, Total sent packets: 0
    Received updates: 0, Sent updates: 0
    Keepalive: 60, Holdtime: 180, MinAdvTime: 60
    LastErrorCode: unknown(0), LastErrorSubcode: unspecified(0)
    Established state transitions: 1
```

BGP Group information

Following is an example of the information provided by the following command:

```
show ip bgp neighbor group
```

Command mode: All

```
BGP Group Information:
Local router ID: 1.1.1.2, Local AS: 100
Group 1:
    Name: toG82642007
    Addr: 192.168.128.0    Mask: 255.255.255.248
    Remote AS list: 200
    Dynamic Peers Limit: 8
    Dynamic Peers in established state: 1
 Dynamic Peers of this group:
 97: 192.168.128.4, Group: 1 (toG82642007), TTL 1
    Remote AS: 200, Local AS: 100, Link type: EBGP
    Remote router ID: 2.2.1.2, Local router ID: 1.1.1.2
    Configured Version: 4
    Negotiated Version: 4
    Total path attribute out: 0
    In Total Messages: 74
    Out Total Messages: 74
    In Updates: 0
    Out Updates: 0
    Established Time: 01:12:36
    MinAdvTime: 00:01:00
    Configured holdtime: 00:03:00
    Negotiated holdtime: 00:03:00
    Configured keepalive 00:01:00
    Negotiated keepalive 00:01:00
    In Update Last Time: 00:00:00
    Out Update Last Time: 00:14:32
    Last Send Time: 01:26:54
    Last Received Time: 01:26:54
    In-rmap list count: 0
    Out-rmap list count: 0
...
```

BGP Summary information

Following is an example of the information provided by the following command:

```
show ip bgp neighbor summary
```

Command mode: All

```
  BGP Peer Summary Information:
       Peer         V    AS     MsgRcvd  MsgSent Up/Down   State
    --------------- - -------- -------- -------- -------- ----------
 1: 205.178.23.142  4      142      113      121 00:00:28 established
 2: 205.178.15.148  0      148        0        0 never     connect
```

Dump BGP Information

Following is an example of the information provided by the following command:

`show ip bgp information` [*<IPv4 network> <IPv4 mask>*]

Command mode: All

```
Status codes: * valid, > best, i - internal
Origin codes: i - IGP, e - EGP, ? - incomplete
    Network         Mask            Next Hop        Metr LcPrf  Wght  Path
   --------------- --------------- --------------- ----- ----- ----- --------
*> 1.1.1.0         255.255.255.0   0.0.0.0                          0  ?
*> 10.100.100.0    255.255.255.0   0.0.0.0                          0  ?
*> 10.100.120.0    255.255.255.0   0.0.0.0                          0  ?

The 13.0.0.0 is filtered out by rrmap; or, a loop detected.
```

The IPv4 network and mask options restrict the output to a specific network in the BGP routing table.

OSPF Information

Table 45. OSPF Information Options

Command Syntax and Usage
`show ip ospf general-information` Displays general OSPF information. See page 66 for a sample output. **Command mode:** All
`show ip ospf area information` Displays area information for all areas. **Command mode:** All
`show ip ospf area` <*area index*> Displays area information for a particular area index. **Command mode:** All
`show interface ip` {<*interface number*>} `ospf` Displays interface information for a particular interface. If no parameter is supplied, it displays information for all the interfaces. See page 67 for a sample output. **Command mode:** All
`show interface loopback` {<*interface number*>} Displays loopback information for a particular interface. If no parameter is supplied, it displays loopback information for all the interfaces. See page 67 for a sample output. **Command mode:** All
`show ip ospf area-virtual-link information` Displays information about all the configured virtual links. **Command mode:** All
`show ip ospf neighbor` Displays the status of all the current neighbors. **Command mode:** All
`show ip ospf summary-range` <*area index*> Displays the list of summary ranges belonging to non-NSSA areas. **Command mode:** All
`show ip ospf summary-range-nssa` <*area index*> Displays the list of summary ranges belonging to NSSA areas. **Command mode:** All

Table 45. OSPF Information Options (continued)

Command Syntax and Usage
`show ip ospf routes` Displays OSPF routing table. See page 69 for a sample output. **Command mode:** All
`show ip ospf information` Displays the OSPF information. **Command mode:** All

OSPF General Information

The following command displays general OSPF information:

```
show ip ospf general-information
```

Command mode: All

```
OSPF Version 2
Router ID: 10.10.10.1
Started at 1663 and the process uptime is 4626
Area Border Router: yes, AS Boundary Router: no
LS types supported are 6
External LSA count 0
External LSA checksum sum 0x0
Number of interfaces in this router is 2
Number of virtual links in this router is 1
16 new lsa received and 34 lsa originated from this router
Total number of entries in the LSDB 10
Database checksum sum 0x0
Total neighbors are 1, of which
                                  2 are >=INIT state,
                                  2 are >=EXCH state,
                                  2 are =FULL state
Number of areas is 2, of which 3-transit 0-nssa
        Area Id : 0.0.0.0
        Authentication : none
        Import ASExtern : yes
        Number of times SPF ran : 8
        Area Border Router count : 2
        AS Boundary Router count : 0
        LSA count : 5
        LSA Checksum sum : 0x2237B
        Summary : noSummary
```

OSPF Interface Information

The following command displays OSPF interface information:

`show ip ospf interface` *<interface number>*

Command mode: All

```
Ip Address 10.10.12.1, Area 0.0.0.1, Admin Status UP
   Router ID 10.10.10.1, State DR, Priority 1
   Designated Router (ID) 10.10.10.1, Ip Address 10.10.12.1
   Backup Designated Router (ID) 10.10.14.1, Ip Address 10.10.12.2
   Timer intervals, Hello 10, Dead 40, Wait 1663, Retransmit 5,
                Poll interval 0, Transit delay 1
   Neighbor count is 1   If Events 4, Authentication type none
```

OSPF Loopback Information

The following command displays loopback information for a particular interface. If no parameter is supplied, it displays loopback information for all the interfaces:

`show ip ospf interface loopback`

Command mode: All

```
Ip Address 123.123.123.1, Area 0.0.0.0, Passive interface, Admin Status UP
   Router ID 1.1.1.1, State Loopback, Priority 1
   Designated Router (ID) 0.0.0.0, Ip Address 0.0.0.0
   Backup Designated Router (ID) 0.0.0.0, Ip Address 0.0.0.0
   Timer intervals, Hello 10, Dead 40, Wait 40, Retransmit 5, Transit delay 1
   Neighbor count is 0   If Events 1, Authentication type none
```

OSPF Database Information

Table 46. OSPF Database Information Options

Command Syntax and Usage
`show ip ospf database advertising-router` *<router ID>* Takes advertising router as a parameter. Displays all the Link State Advertisements (LSAs) in the LS database that have the advertising router with the specified router ID, for example: 20.1.1.1. **Command mode:** All
`show ip ospf database asbr-summary` [`advertising-router` *<router ID>*|`link-state-id` *<A.B.C.D>*|`self`] Displays ASBR summary LSAs. The usage of this command is as follows: a. `asbr-summary advertising-router 20.1.1.1` displays ASBR summary LSAs having the advertising router 20.1.1.1. b. `asbr-summary link-state-id 10.1.1.1` displays ASBR summary LSAs having the link state ID 10.1.1.1. c. `asbr-summary self` displays the self advertised ASBR summary LSAs. d. `asbr-summary` with no parameters displays all the ASBR summary LSAs. **Command mode:** All
`show ip ospf database database-summary` Displays the following information about the LS database in a table format: a. Number of LSAs of each type in each area. b. Total number of LSAs for each area. c. Total number of LSAs for each LSA type for all areas combined. d. Total number of LSAs for all LSA types for all areas combined. No parameters are required. **Command mode:** All
`show ip ospf database external` [`advertising-router` *<router ID>*|`link-state-id` *<A.B.C.D>*|`self`] Displays the AS-external (type 5) LSAs with detailed information of each field of the LSAs. **Command mode:** All
`show ip ospf database network` [`advertising-router` *<router ID>*|`link-state-id` *<A.B.C.D>*|`self`] Displays the network (type 2) LSAs with detailed information of each field of the LSA.network LS database. **Command mode:** All
`show ip ospf database nssa` Displays the NSSA (type 7) LSAs with detailed information of each field of the LSAs. **Command mode:** All

Table 46. OSPF Database Information Options (continued)

Command Syntax and Usage
show ip ospf database router [advertising-router *<router ID>*|link-state-id *<A.B.C.D>*|self] Displays the router (type 1) LSAs with detailed information of each field of the LSAs. **Command mode:** All
show ip ospf database self Displays all the self-advertised LSAs. No parameters are required. **Command mode:** All
show ip ospf database summary [advertising-router *<router ID>*|link-state-id *<A.B.C.D>*|self] Displays the network summary (type 3) LSAs with detailed information of each field of the LSAs. **Command mode:** All
show ip ospf database Displays all the LSAs. **Command mode:** All

OSPF Information Route Codes

The following command displays OSPF route information:

```
show ip ospf routes
```

Command mode: All

```
Codes: 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
 IA 10.10.0.0/16 via 200.1.1.2
 IA 40.1.1.0/28 via 20.1.1.2
 IA 80.1.1.0/24 via 200.1.1.2
 IA 100.1.1.0/24 via 20.1.1.2
 IA 140.1.1.0/27 via 20.1.1.2
 IA 150.1.1.0/28 via 200.1.1.2
 E2 172.18.1.1/32 via 30.1.1.2
 E2 172.18.1.2/32 via 30.1.1.2
 E2 172.18.1.3/32 via 30.1.1.2
 E2 172.18.1.4/32 via 30.1.1.2
 E2 172.18.1.5/32 via 30.1.1.2
 E2 172.18.1.6/32 via 30.1.1.2
 E2 172.18.1.7/32 via 30.1.1.2
 E2 172.18.1.8/32 via 30.1.1.2
```

OSPFv3 Information

Table 47. OSPFv3 Information Options

Command Syntax and Usage
`show ipv6 ospf area` *<area index (0-2)>* Displays the area information
`show ipv6 ospf areas` Displays the OSPFv3 Area Table. **Command mode:** All
`show ipv6 ospf interface` *<interface number>* Displays interface information for a particular interface. If no parameter is supplied, it displays information for all the interfaces. To view a sample display, see page 72. **Command mode:** All
`show ipv6 ospf area-virtual-link information` Displays information about all the configured virtual links. **Command mode:** All
`show ipv6 ospf neighbor` *<nbr router-id (A.B.C.D)>* Displays the status of a neighbor with a particular router ID. If no router ID is supplied, it displays the information about all the current neighbors. **Command mode:** All
`show ipv6 ospf host information` Displays OSPFv3 host configuration information. **Command mode:** All
`show ipv6 ospf request-list` *<nbr router-id (A.B.C.D)>* Displays the OSPFv3 request list. If no router ID is supplied, it displays the information about all the current neighbors. **Command mode:** All
`show ipv6 ospf retrans-list` *<nbr router-id (A.B.C.D)>* Displays the OSPFv3 retransmission list. If no router ID is supplied, it displays the information about all the current neighbors. **Command mode:** All
`show ipv6 ospf summary-prefix` *<area index (0-2)>* Displays the OSPFv3 external summary-address configuration information. **Command mode:** All

Table 47. OSPFv3 Information Options (continued)

Command Syntax and Usage
`show ipv6 ospf redist-config information` Displays OSPFv3 redistribution information to be applied to routes learned from the route table. **Command mode:** All
`show ipv6 ospf area-range information` Displays OSPFv3 summary ranges. **Command mode:** All
`show ipv6 ospf routes` Displays OSPFv3 routing table. To view a sample display, see page 73. **Command mode:** All
`show ipv6 ospf border-routers` Displays OSPFv3 routes to an ABR or ASBR. **Command mode:** All
`show ipv6 ospf information` Displays all OSPFv3 information. To view a sample display, see page 71. **Command mode:** All

OSPFv3 Information Dump

```
Router Id: 1.0.0.1           ABR Type: Standard ABR
 SPF schedule delay: 5 secs  Hold time between two SPFs: 10 secs
 Exit Overflow Interval: 0   Ref BW: 100000       Ext Lsdb Limit: none
 Trace Value: 0x00008000     As Scope Lsa: 2      Checksum Sum: 0xfe16
 Passive Interface: Disable
 Nssa Asbr Default Route Translation: Disable
 Autonomous System Boundary Router
 Redistributing External Routes from connected, metric 10, metric type
 asExtType1, no tag set
 Number of Areas in this router  1
                         Area    0.0.0.0
     Number of interfaces in this area is 1
     Number of Area Scope Lsa: 7     Checksum Sum: 0x28512
     Number of Indication Lsa: 0     SPF algorithm executed: 2 times
```

OSPFv3 Interface Information

The following command displays OSPFv3 interface information:

```
show ipv6 ospf interface
```

Command mode: All

```
       Ospfv3 Interface Information

Interface Id: 1      Instance Id: 0      Area Id: 0.0.0.0
Local Address: fe80::222:ff:fe7d:5d00    Router Id: 1.0.0.1
Network Type: BROADCAST  Cost: 1         State: BACKUP

Designated Router Id: 2.0.0.2      local address:
fe80::218:b1ff:fea1:6c01

Backup Designated Router Id: 1.0.0.1      local address:
fe80::222:ff:fe7d:5d00

Transmit Delay: 1 sec    Priority: 1     IfOptions: 0x0
Timer intervals configured:
Hello: 10,  Dead: 40,  Retransmit: 5
Hello due in 6 sec
Neighbor Count is: 1,  Adjacent neighbor count is: 1
Adjacent with neighbor 2.0.0.2
```

OSPFv3 Database Information

Table 48. OSPFv3 Database Information Options

Command Syntax and Usage
`show ipv6 ospf database as-external [detail|hex]` Displays AS-External LSAs database information. If no parameter is supplied, it displays condensed information. **Command mode:** All
`show ipv6 ospf database inter-prefix [detail|hex]` Displays Inter-Area Prefix LSAs database information. If no parameter is supplied, it displays condensed information. **Command mode:** All
`show ipv6 ospf database inter-router [detail|hex]` Displays Inter-Area router LSAs database information. If no parameter is supplied, it displays condensed information. **Command mode:** All
`show ipv6 ospf database intra-prefix [detail|hex]` Displays Intra-Area Prefix LSAs database information. If no parameter is supplied, it displays condensed information. **Command mode:** All

Table 48. OSPFv3 Database Information Options (continued)

Command Syntax and Usage
`show ipv6 ospf database link [detail|hex]` Displays Link LSAs database information. If no parameter is supplied, it displays condensed information. **Command mode:** All
`show ipv6 ospf database network [detail|hex]` Displays Network LSAs database information. If no parameter is supplied, it displays condensed information. **Command mode:** All
`show ipv6 ospf database router [detail|hex]` Displays the Router LSAs with detailed information of each field of the LSAs. If no parameter is supplied, it displays condensed information. **Command mode:** All
`show ipv6 ospf database nssa [detail|hex]` Displays Type-7 (NSSA) LSA database information. If no parameter is supplied, it displays condensed information. **Command mode:** All
`show ipv6 ospf database [detail|hex]` Displays all the LSAs. **Command mode:** All

OSPFv3 Route Codes Information

The following command displays OSPFv3 route information:

```
show ipv6 ospf routes
```

Command mode: All

```
Dest/           NextHp/          Cost  Rt. Type     Area
Prefix-Length   IfIndex
3ffe::10:0:0:0  fe80::290:69ff    30   interArea    0.0.0.0
/80              fe90:b4bf /vlan1
3ffe::20:0:0:0  fe80::290:69ff    20   interArea    0.0.0.0
/80              fe90:b4bf /vlan1
3ffe::30:0:0:0  ::         /vlan2 10   intraArea    0.0.0.0
/80
3ffe::60:0:0:6  fe80::211:22ff    10   interArea    0.0.0.0
/128             fe33:4426 /vlan2
```

Routing Information Protocol

Table 49. Routing Information Protocol Options

Command Syntax and Usage
`show ip rip routes` Displays RIP routes. **Command mode:** All For more information, see page 74.
`show ip rip interface` *<interface number>* Displays RIP user’s configuration. **Command mode:** All For more information, see page 74.

RIP Routes Information

The following command displays RIP route information:

```
show ip rip routes
```

Command mode: All

```
>> IP Routing#

30.1.1.0/24 directly connected
3.0.0.0/8 via 30.1.1.11 metric 4
4.0.0.0/16 via 30.1.1.11 metric 16
10.0.0.0/8 via 30.1.1.2 metric 3
20.0.0.0/8 via 30.1.1.2 metric 2
```

This table contains all dynamic routes learned through RIP, including the routes that are undergoing garbage collection with metric = 16. This table does not contain locally configured static routes.

RIP Interface Information

The following command displays RIP user information:

`show ip rip interface` *<interface number>*

Command mode: All

```
RIP USER CONFIGURATION :
        RIP: ON, update 30
        RIP on Interface    49 : 101.1.1.10,      enabled
        version 2, listen enabled, supply enabled, default none
        poison disabled, split horizon enabled, trigg enabled, mcast enabled, metric 1
        auth none,key none
```

IPv6 Routing Information

Table 50 describes the IPv6 Routing information options.

Table 50. IPv6 Routing Information Options

Command Syntax and Usage
`show ipv6 route address` *<IPv6 address>* Displays a single route by destination IP address.
`show ipv6 route gateway` *<default gateway address>* Displays routes to a single gateway.
`show ipv6 route type {connected|static|ospf}` Displays routes of a single type. For a description of IP routing types, see Table 40 on page 58.
`show ipv6 route interface` *<interface number>* Displays routes on a single interface.
`show ipv6 route summary` Displays a summary of IPv6 routing information, including inactive routes.
`show ipv6 route` Displays all IPv6 routing information. For more information, see page 75.

IPv6 Routing Table Information

The following command displays IPv6 routing information:

```
show ipv6 route
```

Command mode: All

```
IPv6 Routing Table  -  3 entries
Codes : C - Connected, S - Static
        O - OSPF
        M - Management Gateway

S ::/0 [1/20]
via 2001:2:3:4::1, Interface 2

C 2001:2:3:4::/64 [1/1]
via ::, Interface 2

C fe80::20f:6aff:feec:f701/128 [1/1]
```

Note that the first number inside the brackets represents the metric and the second number represents the preference for the route.

IPv6 Neighbor Discovery Cache Information

Table 51. IPv6 Neighbor Discovery Cache Information Options

Command Syntax and Usage
`show ipv6 neighbors find` *<IPv6 address>* Displays a single IPv6 Neighbor Discovery cache entry by IP address. **Command mode:** All
`show ipv6 neighbors interface port` *<port alias or number>* Displays IPv6 Neighbor Discovery cache entries on a single port. **Command mode:** All
`show ipv6 neighbors vlan` *<VLAN number>* Displays IPv6 Neighbor Discovery cache entries on a single VLAN. **Command mode:** All
`show ipv6 neighbors static` Displays static IPv6 Neighbor Discovery cache entries. **Command mode:** All
`show ipv6 neighbors` Displays all IPv6 Neighbor Discovery cache entries. For more information, see page 76. **Command mode:** All

IPv6 Neighbor Discovery Cache Information

The following command displays a summary of IPv6 Neighbor Discovery cache information:

```
show ipv6 neighbors
```

Command mode: All

```
IPv6 Address              Age  Link-layer Addr   State     IF  VLAN Port
------------------------- ---- ----------------- --------- --- ---- ----
2001:2:3:4::1             10   00:50:bf:b7:76:b0 Reachable 2   1       1
fe80::250:bfff:feb7:76b0   0   00:50:bf:b7:76:b0 Stale     2   1       2
```

IPv6 Neighbor Discovery Prefix Information

The following command displays a summary of IPv6 Neighbor Discovery prefix information:

```
show ipv6 prefix
```

Command mode: All

```
Codes: A - Address ,  P - Prefix-Advertisement
         D - Default , N - Not Advertised
        [L] - On-link Flag is set
        [A] - Autonomous Flag is set

AD 10:: 64 [LA] Valid lifetime 2592000 , Preferred lifetime 604800
P 20:: 64 [LA] Valid lifetime 200 , Preferred lifetime 100
```

Neighbor Discovery prefix information includes information about all configured prefixes.

The following command displays IPv6 Neighbor Discovery prefix information for an interface:

show ipv6 prefix interface *<interface number>*

Command mode: All

ECMP Static Route Information

The following command displays Equal Cost Multi-Path (ECMP) route information:

```
show ip ecmp
```

Command mode: All

```
Current ecmp static routes:
Destination     Mask            Gateway         If    GW Status
--------------- --------------- --------------- ---- -----------
10.10.1.1       255.255.255.255 100.10.1.1        1    up
                                200.20.2.2        1    down

10.20.2.2       255.255.255.255 10.233.3.3        1    up
10.20.2.2       255.255.255.255 10.234.4.4        1    up
10.20.2.2       255.255.255.255 10.235.5.5        1    up

ECMP health-check ping interval: 1
ECMP health-check retries number: 3
ECMP Hash Mechanism: dipsip
```

ECMP route information shows the status of each ECMP route configured on the switch.

IGMP Multicast Group Information

Table 52. IGMP Multicast Group Information Commands

Command Syntax and Usage
`show ip igmp querier vlan` *<VLAN number>* Displays IGMP Querier information. For details, see page 79. **Command mode:** All
`show ip igmp snoop` Displays IGMP Snooping information. **Command mode:** All
`show ip igmp relay` Displays IGMP Relay information. **Command mode:** All
`show ip igmp mrouter information` Displays IGMP Multicast Router information. For details, see page 79. **Command mode:** All
`show ip igmp mrouter vlan` *<VLAN number>* Displays IGMP Multicast Router information for the specified VLAN. **Command mode:** All
`show ip igmp filtering` Displays current IGMP Filtering parameters. **Command mode:** All
`show ip igmp profile` *<1-16>* Displays information about the current IGMP filter. **Command mode:** All
`show ip igmp groups address` *<IP address>* Displays a single IGMP multicast group by its IP address. **Command mode:** All
`show ip igmp groups vlan` *<VLAN number>* Displays all IGMP multicast groups on a single VLAN. **Command mode:** All
`show ip igmp groups interface port` *<port alias or number>* Displays all IGMP multicast groups on a single port. **Command mode:** All
`show ip igmp groups portchannel` *<trunk number>* Displays all IGMP multicast groups on a single trunk group. **Command mode:** All

Table 52. IGMP Multicast Group Information Commands (continued)

Command Syntax and Usage
`show ip igmp groups detail` *<IP address>* Displays details about an IGMP multicast group, including source and timer information. **Command mode:** All
`show ip igmp groups` Displays information for all multicast groups. For details, see page 80. **Command mode:** All
`show ip igmp ipmcgrp` Displays information for all IPMC groups. For details, see page 81. **Command mode:** All

IGMP Querier Information

The following command displays IGMP Querier information:

`show ip igmp querier vlan` *<VLAN number>*

Command mode: All

```
Current IGMP Querier information:
 IGMP Querier information for vlan 1:
 Other IGMP querier - none
 Switch-querier enabled, current state: Querier
 Switch-querier type: Ipv4, address 0.0.0.0,
 Switch-querier general query interval: 125 secs,
 Switch-querier max-response interval: 100 'tenths of secs',
 Switch-querier startup interval: 31 secs, count: 2
 Switch-querier robustness: 2
 IGMP configured version is v3
 IGMP Operating version is v3
```

IGMP Querier information includes:

- VLAN number
- Querier status
  - Other IGMP querier—none
  - IGMP querier present, address: (IP or MAC address)
    Other IGMP querier present, interval (minutes:seconds)
- Querier election type (IPv4 or MAC) and address
- Query interval
- Querier startup interval
- Maximum query response interval
- Querier robustness value
- IGMP version number

IGMP Group Information

The following command displays IGMP Group information:

```
show ip igmp groups
```

Command mode: All

```
Note: Local groups (224.0.0.x) are not snooped/relayed and will not appear.
     Source         Group       VLAN    Port   Version   Mode  Expires  Fwd
 -------------- --------------- ------- ------ --------  ----- -------  ---
 10.1.1.1       232.1.1.1        2      4       V3       INC    4:16    Yes
 10.1.1.5       232.1.1.1        2      4       V3       INC    4:16    Yes
    *           232.1.1.1        2      4       V3       INC     -      No
 10.10.10.43    235.0.0.1        9      1       V3       INC    2:26    Yes
    *           236.0.0.1        9      1       V3       EXC      -     Yes
```

IGMP Group information includes:

- IGMP source address
- IGMP Group address
- VLAN and port
- IGMP version
- IGMPv3 filter mode
- Expiration timer value
- IGMP multicast forwarding state

IGMP Multicast Router Information

The following command displays Mrouter information:

```
show ip igmp mrouter information
```

Command mode: All

```
SrcIP                VLAN    Port       Version   Expires   MRT       QRV   QQIC

-------------------- ------- -------    --------- --------  -------   ----  ----
10.1.1.1              2       21         V3        4:09     128        2     125
10.1.1.5              2       23         V2        4:09     125        -       -
10.10.10.43           9       24         V2       static    unknown    -       -
```

IGMP Mrouter information includes:

- Source IP address
- VLAN and port where the Mrouter is connected
- IGMP version
- Mrouter expiration
- Maximum query response time
- Querier’s Robustness Variable (QRV)
- Querier’s Query Interval Code (QQIC)

IPMC Group Information

The following command displays IGMP IPMC group information:

```
show ip igmp ipmcgrp
```

Command mode: All

```
Total number of displayed ipmc groups: 4
Legend(possible values in Type column) :
SH - static host      DR - dynamic registered
SP - static primary   DU - dynamic unregistered
SB - static backup     M - mrouter
 O - other
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
     Source          Group      Vlan    Port      Type Timeleft
=============== =============== ==== ============
       *               232.0.0.1          1      -         DU     6 sec
       *               232.0.0.2          1      -         DU     6 sec
       *               232.0.0.3          1      -         DU     6 sec
       *               232.0.0.4          1      -         DU     6 sec
```

IGMP IPMC Group information includes:

- IGMP source address
- IGMP group address
- VLAN and port
- Type of IPMC group
- Expiration timer value

MLD information

Table 53 describes the commands used to view MLD information.

Table 53. MLD Information Commands

Command Syntax and Usage
`show ipv6 mld groups` Displays MLD multicast group information. **Command mode:** All
`show ipv6 mld groups address` <*IPv6 address*> Displays group information for the specified IPv6 address. **Command mode:** All
`show ipv6 mld groups interface port` <*port number*> Displays MLD groups on a single interface port. **Command mode:** All
`show ipv6 mld groups portchannel` <*trunk group number*> Displays groups on a single port channel. **Command mode:** All
`show ipv6 mld groups vlan` <*vlan number*> Displays groups on a single VLAN. **Command mode:** All
`show ipv6 mld mrouter` Displays all MLD Mrouter ports. See page 83 for sample output. **Command mode:** All

MLD Mrouter Information

The following command displays MLD Mrouter information:

```
show ipv6 mld mrouter
```

Command mode: All

```
Source: fe80:0:0:0:200:14ff:fea8:40c9
Port/Vlan: 26/4
Interface: 3
QRV: 2  QQIC:125
Maximum Response Delay: 1000
Version: MLDv2 Expires:1:02
```

The following table describes the MLD Mrouter information displayed in the output.

Table 54. MLD Mrouter

Statistic	**Description**
Source	Displays the link-local address of the reporter.
Port/Vlan	Displays the port/vlan on which the general query is received.
Interface	Displays the interface number on which the general query is received.
QRV	Displays the Querier’s robustness variable value.
QQIC	Displays the Querier’s query interval code.
Maximum Response Delay	Displays the configured maximum query response time.
Version	Displays the MLD version configured on the interface.
Expires	Displays the amount of time that must pass before the multicast router decides that there are no more listeners for a multicast address or a particular source on a link.

VRRP Information

Virtual Router Redundancy Protocol (VRRP) support on RackSwitch G8264 provides redundancy between routers in a LAN. This is accomplished by configuring the same virtual router IP address and ID number on each participating VRRP-capable routing device. One of the virtual routers is then elected as the master, based on a number of priority criteria, and assumes control of the shared virtual router IP address. If the master fails, one of the backup virtual routers will assume routing authority and take control of the virtual router IP address.

The following command displays VRRP information:

```
show ip vrrp information
```

Command mode: All

```
VRRP information:
  1: vrid 2, 205.178.18.210, if  1, renter, prio 100, master
  2: vrid 1, 205.178.18.202, if  1, renter, prio 100, backup
  3: vrid 3, 205.178.18.204, if  1, renter, prio 100, master
```

When virtual routers are configured, you can view the status of each virtual router using this command. VRRP information includes:

- Virtual router number
- Virtual router ID and IP address
- Interface number
- Ownership status
  - `owner` identifies the preferred master virtual router. A virtual router is the owner when the IP address of the virtual router and its IP interface are the same.
  - `renter` identifies virtual routers which are not owned by this device.
- Priority value. During the election process, the virtual router with the highest priority becomes master.
- Activity status
  - `master` identifies the elected master virtual router.
  - `backup` identifies that the virtual router is in backup mode.
  - `init` identifies that the virtual router is waiting for a startup event.
    For example, once it receives a startup event, it transitions to master if its priority is 255, (the IP address owner), or transitions to backup if it is not the IP address owner.

Interface Information

The following command displays interface information:

```
show interface ip
```

Command mode: All

```
Interface information:
  1: IP4 127.31.35.5     255.255.0.0  172.31.255.255,  vlan 1,   up
  2: IP6 2002:0:0:0:0:0:0:5/64 ,                       vlan 1,     up
         fe80::213:aff:fe4f:7c01
  3: IP6 3003:0:0:0:0:0:0:5/64 ,                       vlan 2,    up
         fe80::213:aff:fe4f:7c02

  127: IP6 10:90:90:0:0:0:0:97/64 ,                    vlan 4095, DOWN
  128: IP4 10.90.90.97   255.255.255.0  10.90.90.255,  vlan 4095, up
```

For each interface, the following information is displayed:

- IPv4 interface address and subnet mask
- IPv6 address and prefix
- VLAN assignment
- Status (up, DOWN, disabled)

Note: If routing is enabled using the "`no switchport`" command in Interface Port mode, this command also displays IP interfaces configured on physical ports as well as LACP and LAGs.

IPv6 Interface Information

The following command displays IPv6 interface information:

`show ipv6 interface` *<interface number>*

Command mode: All

```
Interface information:
  2: IP6 2001:0:0:0:225:3ff:febb:bb15/64             , vlan 1, up
         fe80::225:3ff:febb:bb15
    Link local address:
        fe80::225:3ff:febb:bb15
    Global unicast address(es):
        2001::225:3ff:febb:bb15/64
    Anycast address(es):
        Not Configured.
    Joined group address(es):
        ff02::1
        ff02::2
        ff02::1:ffbb:bb15
    MTU is 1500
    ICMP redirects are enabled
    ND DAD is enabled, Number of DAD attempts: 1
    ND router advertisement is disabled
```

For each interface, the following information is displayed:

- IPv6 interface address and prefix
- VLAN assignment
- Status (up, down, disabled)
- Path MTU size
- Status of ICMP redirects
- Status of Neighbor Discovery (ND) Duplicate Address Detection (DAD)
- Status of Neighbor Discovery router advertisements

IPv6 Path MTU Information

The following command displays IPv6 Path MTU information:

`show ipv6 pmtu [<`*`destination IPv6 address`*`>]`

Command mode: All

```
Path MTU Discovery info:

Max Cache Entry Number : 10
Current Cache Entry Number: 2
Cache  Timeout Interval : 10 minutes

Destination Address                     Since       PMTU
5000:1::3                               00:02:26    1400
FE80::203:A0FF:FED6:141D                00:06:55    1280
```

Path MTU Discovery information provides information about entries in the Path MTU cache. The PMTU field indicates the maximum packet size in octets that can successfully traverse the path from the switch to the destination node. It is equal to the minimum link MTU of all the links in the path to the destination node.

IP Information

The following command displays Layer 3 information:

```
show ip interface brief
```

Command mode: All

```
IP information:
Flood unregistered IPMC: ena

  AS number 0

Interface information:
  1: IP4 192.168.1.253   255.255.255.0   192.168.1.255,   vlan 100, up
 99: IP4 192.168.99.100  255.255.255.0   192.168.99.255,  vlan 99, DOWN
127: IP4 172.25.101.222  255.255.0.0     172.25.255.255,  vlan 4095, up

Loopback interface information:

Default gateway information: metric strict
  3: 172.25.1.1,      up  active

Default IP6 gateway information:

Current BOOTP relay settings: OFF
Global servers:
-------------------------
Server 1 address 0.0.0.0
Server 2 address 0.0.0.0
Server 3 address 0.0.0.0
Server 4 address 0.0.0.0
Server 5 address 0.0.0.0

Current BOOTP relay option-82 settings: OFF
Current BOOTP relay option-82 policy: Replace

Current DHCP Snooping settings: Off
DHCP Snooping is configured on the following VLANs:
 empty
Insertion of option 82 information is Disable
      Interface   Trusted    Rate limit (pps)
-----------------------------------
             1       No                none
             2       No                none
 ...
           MGT       No                none

Current IP forwarding settings: ON, dirbr disabled, ICMPv6 redirect disabled

Current network filter settings:
  none

Current route map settings:
RIP is disabled.

OSPF is disabled.

OSPFv3 is disabled.

BGP is disabled.
```

IP information includes:

- IP interface information: Interface number, IP address, subnet mask, broadcast address, VLAN number, and operational status.
- Default gateway information: Metric for selecting which configured gateway to use, gateway number, IP address, and health status
- BootP relay settings
- IP forwarding settings, including the forwarding status of directed broadcasts, and the status of ICMP re-directs
- Network filter settings, if applicable
- Route map settings, if applicable

IKEv2 Information

The following table lists commands that display information about IKEv2.

Table 55. IKEv2 Information Commands

Command Syntax and Usage
`show ikev2` Displays all IKEv2 information. See page 90 for sample output. **Command mode:** All
`show ikev2 ca-cert` Displays the CA certificate. **Command mode:** All
`show ikev2 host-cert` Displays the host certificate. **Command mode:** All
`show ikev2 identity` Displays IKEv2 identity information. **Command mode:** All
`show ikev2 preshare-key` Displays the IKEv2 preshare key. **Command mode:** All
`show ikev2 proposal` Displays the IKEv2 proposal. **Command mode:** All
`show ikev2 retransmit-interval` Displays the IKEv2 retransmit interval. **Command mode:** All
`show ikev2 sa` Displays the IKEv2 SA. **Command mode:** All

IKEv2 Information Dump

The following command displays IKEv2 information:

```
show ikev2
```

Command mode: All

```
IKEv2 retransmit time:       20

IKEv2 cookie notification:   disable

IKEv2 authentication method: Pre-shared key

IKEv2 proposal:
Cipher:                      3des
Authentication:              sha1
DH Group:                    dh-2

Local preshare key:          ibm123

IKEv2 choose IPv6 address as ID type
No SAD entries.
```

IKEv2 information includes:

- IKEv2 retransmit time, in seconds.
- Whether IKEv2 cookie notification is enabled.
- The IKEv2 proposal in force. This includes the encryption algorithm (cipher), the(the authentication algorithm type, and the Diffie-Hellman (DH) group, which determines the strength of the key used in the key exchange process. Higher DH group numbers are more secure but require additional time to compute the key.
- The local preshare key.
- Whether IKEv2 is using IPv4 or IPv6 addresses as the ID type.
- Security Association Database (SAD) entries, if applicable.

IP Security Information

The following table describes the commands used to display information about IP security.

Table 56. IPsec Information Commands

Command Syntax and Usage
`show ipsec sa` Displays all security association information. **Command mode:** All
`show ipsec spd` Displays all security policy information. **Command mode:** All
`show ipsec dynamic-policy` *<1-10>* Displays dynamic policy information. **Command mode:** All
`show ipsec manual-policy` *<1-10>* Displays manual policy information. See page 92 for sample output. **Command mode:** All
`show ipsec transform-set` *<1-10>* Displays IPsec transform set information. **Command mode:** All
`show ipsec traffic-selector` *<1-10>* Displays IPsec traffic selector information. **Command mode:** All
`[no] debug sec all` Enables or disables all IP security debug messages. **Command mode:** Global configuration
`[no] debug sec crypto` Enables or disables cryptographic debug messages. **Command mode:** Global configuration
`[no] debug sec ike` Enables or disables IKEv2 debug messages. **Command mode:** Global configuration
`[no] debug sec ipsec` Enables or disables IPsec debug messages. **Command mode:** Global configuration

IPsec Manual Policy Information

The following command displays IPsec manual key management policy information:

```
show ipsec manual-policy
```

Command mode: All

```
IPsec manual policy 1 --------------------------------
IP Address:                       2002:0:0:0:0:0:0:151
Associated transform ID:          1
Associated traffic selector ID:   1
IN-ESP SPI:                       9900
IN-ESP encryption KEY:            3456789abcdef012
IN-ESP authentication KEY:        23456789abcdef0123456789abcdef0123456789
OUT-ESP SPI:                      7700
OUT-ESP encryption KEY:           6789abcdef012345
OUT-ESP authentication KEY:       56789abcdef0123456789abcdef0123456789abc
Applied on interface:
interface 1
```

IPsec manual policy information includes:

- The IP address of the remote peer
- The transform set ID associated with this policy
- Traffic selector ID associated with this policy
- ESP inbound SPI
- ESP inbound encryption key
- ESP inbound authentication key
- ESP outbound SPI
- ESP outbound encryption key
- ESP outbound authentication key
- The interface to which this manual policy has been applied

DHCP Snooping Binding Table Information

The following command displays the DHCP binding table:

```
show ip dhcp snooping binding
```

Command mode: All

```
Mac Address        IP Address       Lease(seconds) Type     VLAN Interface
--------------------------------------------------------------------------
00:00:01:00:02:01  10.0.0.1         1600           dynamic  100  port 1
02:1c:5f:d1:18:9c  210.38.197.63    86337          Static   127   1
06:51:4d:e6:16:2d  194.116.155.190  86337          Static   105   1
08:69:0f:1d:ba:3d  40.90.17.26      86337          Static   150   1
08:a2:6d:00:36:56  40.194.18.213    86337          Static   108   1
0e:a7:f8:a2:74:2c  130.254.47.129   86337          Static   171   1
0e:b7:64:02:97:7c  35.92.27.110     86337          Static   249   1
0e:f7:5b:6a:74:d8  75.179.93.39     86337          Static   232   1

Total number of bindings: 8
```

The DHCP Snooping binding table displays information for each entry in the table. Each entry has a MAC address, an IP address, the lease time, the interface to which the entry applies, and the VLAN to which the interface belongs.

PIM Information

Table 57. PIM Information Options

Command Syntax and Usage
show ip pim bsr [<*component ID*>] Displays information about the PIM bootstrap router (BSR). **Command mode:** All
show ip pim component [<*component ID (1-2)*>] Displays PIM component information. For details, see page 95. **Command mode:** All
show ip pim counters Displays PIM statistics for all interfaces. **Command mode:** All
show ip pim interface [<*interface number*>|detail|loopback|port <*port number*>] Displays PIM interface information. To view sample output, see page 96. **Command mode:** All
show ip pim neighbor [<*interface number*>|port <*port number*>] Displays PIM neighbor information. To view sample output, see page 96. **Command mode:** All
show ip pim neighbor-filters Displays information about PIM neighbor filters. **Command mode:** All
show ip pim mroute [<*component ID*>|count|flags| group <*multicast group address*>| interface {<*interface number*>|port <*port number*>} source <*multicast source address*>] Displays information about PIM multicast routes. For more information about displaying PIM multicast route information, see page 97. **Command mode:** All
show ip pim rp-candidate [<*component ID*>] Displays a list of the candidate Rendezvous Points configured. **Command mode:** All
show ip pim rp-set [<*RP IP address*>] Displays a list of the Rendezvous Points learned. **Command mode:** All

Table 57. PIM Information Options (continued)

Command Syntax and Usage
`show ip pim rp-static [<`*component ID*`>]` Displays a list of the static Rendezvous Points configured. **Command mode:** All
`show ip pim elected-rp [group <`*multicast group address*`>]` Displays a list of the elected Rendezvous Points. **Command mode:** All

PIM Component Information

The following command displays Protocol Independent Multicast (PIM) component information:

`show ip pim component [<`*component ID*`>]`

Command mode: All

```
PIM Component Information
---------------------------
Component-Id: 1
  PIM Mode: sparse,   PIM Version: 2
  Elected BSR: 0.0.0.0
  Candidate RP Holdtime: 0
```

PIM component information includes the following:

- Component ID
- Mode (sparse, dense)
- PIM Version
- Elected Bootstrap Router (BSR) address
- Candidate Rendezvous Point (RP) hold time, in seconds

PIM Interface Information

The following command displays information about PIM interfaces:

```
show ip pim interface
```

Command mode: All

```
Address         IfName/IfId Ver/Mode  Nbr   Qry          DR-Address  DR-Prio
                                      Count Interval
-------         ----------- --------  ----- --------     ----------    -----
40.0.0.3         net4/4     2/Sparse  1     30           40.0.0.3         1
50.0.0.3         net5/5     2/Sparse  0     30           50.0.0.3         1
```

PIM interface information includes the following for each PIM interface:

- IP address
- Name and ID
- Version and mode
- Neighbor count
- Query interval
- Designated Router address
- Designated Router priority value

PIM Neighbor Information

The following command displays PIM neighbor information:

```
show ip pim neighbor
```

Command mode: All

```
Neighbour  IfName/Idx Uptime/Expiry Ver DRPri/Mode CompId Override   Lan
Address                                                   Interval   Delay
---------  ---------- ------------- --- ---------- ------ --------  ------
40.0.0.2    net4/4    00:00:37/79    v2     1/S         1        0       0
40.0.0.4    net1/160  00:03:41/92    v2    32/S        20        0       0
```

PIM neighbor information includes the following:

- Neighbor IP address, interface name, and interface ID
- Name and ID of interface used to reach the PIM neighbor
- Up time (the time since this neighbor became the neighbor of the local router)
- Expiry Time (the minimum time remaining before this PIM neighbor expires)
- Version number
- Designated Router priority and mode
- Component ID
- Override interval
- LAN delay interval

PIM Multicast Route Information Commands

Table 58. PIM Multicast Route Information Options

Command Syntax and Usage
`show ip pim mroute [`*<component ID>*`]` Displays PIM multicast routes for the selected component. **Command mode:** All
`show ip pim mroute flags [s] [r] [w]` Displays PIM multicast routes based on the selected entry flags. Enter flags in any combination: – `S`: Shortest Path Tree (SPT) bit – `R`: Rendezvous Point Tree (RPT) bit – `W`: Wildcard bit **Command mode:** All
`show ip pim mroute group` *<multicast group IP address>* Displays PIM multicast routes for the selected multicast group. **Command mode:** All
`show ip pim mroute interface {`*<interface number>*`|port` *<port number>*`}` Displays PIM multicast routes for the selected incoming IP interface. **Command mode:** All
`show ip pim mroute source` *<multicast source IP address>* Displays PIM multicast routes for the selected source IP address. **Command mode:** All
`show ip pim mroute count` Displays a count of PIM multicast routes of each type. **Command mode:** All
`show ip pim mroute` Displays information about all PIM multicast routes. **Command mode:** All

PIM Multicast Route Information

The following command displays PIM multicast route information:

```
show ip pim mroute
```

Command mode: All

```
IP Multicast Routing Table
--------------------------
Route Flags S: SPT Bit W: Wild Card Bit R: RPT Bit
Timers: Uptime/Expires

(8.8.8.111, 224.2.2.100) ,00:42:03/00:01:11
 Incoming Interface : net44 ,RPF nbr : 44.44.44.1 ,Route Flags : S
  Outgoing InterfaceList :
    net17, Forwarding/Sparse ,00:42:03/---

(*, 224.2.2.100) ,00:45:15/--- ,RP : 88.88.88.2
 Incoming Interface : net5 ,RPF nbr : 5.5.5.2 ,Route Flags : WR
  Outgoing InterfaceList :
    net17, Forwarding/Sparse ,00:45:15/---

Total number of (*,G) entries : 1
Total number of (S,G) entries : 1
```

Quality of Service Information

Table 59. QoS information Options

Command Syntax and Usage
`show qos transmit-queue` Displays mapping of 802.1p value to Class of Service queue number, and COS queue weight value. **Command mode:** All
`show qos transmit-queue information` Displays all 802.1p information. **Command mode:** All For details, see page 99.
`show qos random-detect` Displays WRED and ECN information. **Command mode:** All For details, see page 100.

802.1p Information

The following command displays 802.1p information:

```
show qos transmit-queue information
```

Command mode: All

```
Current priority to COS queue information:
Priority  COSq  Weight
--------  ----  ------
    0       0      1
    1       1      2
    2       2      3
    3       3      4
    4       4      5
    5       5      7
    6       6     15
    7       7      0

Current port priority information:
Port   Priority  COSq  Weight
-----  --------  ----  ------
1           0       0      1
2           0       0      1
3           0       0      1
4           0       0      1
5           0       0      1
6           0       0      1
7           0       0      1
8           0       0      1
9           0       0      1
10          0       0      1
...
```

The following table describes the IEEE 802.1p priority-to-COS queue information.

Table 60. 802.1p Priority-to-COS Queue Parameter Descriptions

Parameter	Description
Priority	Displays the 802.1p Priority level.
COSq	Displays the Class of Service queue.
Weight	Displays the scheduling weight of the COS queue.

The following table describes the IEEE 802.1p port priority information.

Table 61. 802.1p Port Priority Parameter Descriptions

Parameter	Description
Port	Displays the port alias.
Priority	Displays the 802.1p Priority level.
COSq	Displays the Class of Service queue.
Weight	Displays the scheduling weight.

WRED and ECN Information

The following command displays WRED and ECN information:

```
show qos random-detect
```

Command mode: All

```
Current wred and ecn configuration:
Global ECN:  Disable
Global WRED: Disable

--WRED--TcpMinThr--TcpMaxThr--TcpDrate--NonTcpMinThr--NonTcpMaxThr--NonTcpDrate--
        TQ0:   Dis       0           0          0          0             0
0
        TQ1:   Dis       0           0          0          0             0
0
        TQ2:   Dis       0           0          0          0             0
0
        TQ3:   Dis       0           0          0          0             0
0
        TQ4:   Dis       0           0          0          0             0
0
        TQ5:   Dis       0           0          0          0             0
0
        TQ6:   Dis       0           0          0          0             0
0
        TQ7:   Dis       0           0          0          0             0
0
```

Access Control List Information Commands

Table 62. ACL Information Options

Command Syntax and Usage
`show access-control list` *<ACL number>* Displays ACL list information. For details, see page 101. **Command mode:** All
`show access-control list6` *<ACL number>* Displays IPv6 ACL list information. **Command mode:** All
`show access-control group` *<ACL group number>* Displays ACL group information. **Command mode:** All
`show access-control vmap` *<VMAP number>* Displays VMAP information. **Command mode:** All

Access Control List Information

The following command displays Access Control List (ACL) information:

```
show access-control list <ACL number>
```

Command mode: All

```
Current ACL List information:
------------------------
Filter 1 profile:
   Ethernet
     - SMAC       : 00:00:aa:aa:01:fe/ff:ff:ff:ff:ff:ff
     - DMAC       : 00:0d:60:9c:ec:d5/ff:ff:ff:ff:ff:ff
     - VID        : 10/0xfff
     - Ethertype  : IP (0x0800)
     - Priority   : 3
   Meter
     - Set to disabled
     - Set committed rate : 64
     - Set max burst size : 32
   Re-Mark
     - Set use of TOS precedence to disabled
   Packet Format
     - Ethernet format : None
     - Tagging format  : Any
     - IP format       : None
   Actions        : Deny
   Statistics   : enabled

Mirror Target Configuration:
        Mirror target destination: port
        Egress port for mirror target: 4
```

If the ACL is being used with Policy-Based Routing (PBR), the output from this command is more like the following:

```
Filter 1 profile: route-map 16
   IPv4
     - Protocol   : 17
   Actions        : Permit
                  : dscp 22
   Statistics   : enabled
   Installed on Port 16
```

Access Control List (ACL) information includes configuration settings for each ACL.

Table 63. ACL List Parameter Descriptions

Parameter	Description
Filter x profile	Indicates the ACL number.
Ethernet	Displays the ACL Ethernet header parameters, if configured.
IPv4	Displays the ACL IPv4 header parameters, if configured.
TCP/UDP	Displays the ACL TCP/UDP header parameters, if configured.
Meter	Displays the ACL meter parameters.

Table 63. ACL List Parameter Descriptions (continued)

Parameter	**Description**
Re-Mark	Displays the ACL re-mark parameters.
Packet Format	Displays the ACL Packet Format parameters, if configured.
Actions	Displays the configured action for the ACL.
Statistics	Displays status of ACL statistics (enabled or disabled).
Mirror Target Configuration	Displays ACL port mirroring parameters.

OpenFlow Information

The following commands display OpenFlow information.

Table 64. OpenFlow Information Options

<table>
<tr><th>Command Syntax and Usage</th></tr>
<tr><td>show openflow [flow-allocation | information | statistics | table]
Displays the current OpenFlow configuration. For more information, see page 104.
– flow-allocation displays the configured, current and maximum number of flows for each OpenFlow instance. For more information, see page 104.
– information displays the configuration for each OpenFlow instance. For more information, see page 105.
– statistics displays traffic statistics for each OpenFlow instance. For more information see page 198.
– table displays the basic and emergency flow tables for each OpenFlow instance. For more information, see page 106
<b>Command mode</b>: All</td></tr>
<tr><td>show openflow instance &lt;<i>1-4</i>&gt; [information | statistics | table]
Displays OpenFlow information for the specified instance ID:
– information displays the instance configuration
– statistics displays traffic statistics
– table displays the basic and emergency flow tables
<b>Command mode:</b> All</td></tr>
</table>

OpenFlow Global Configuration Information

The following command displays the global OpenFlow configuration parameters for all instances:

```
show openflow
```

Command mode: All

```
Protocol Version: 1
Openflow State: Enabled
FDB Table Priority: 1000

Openflow Instance ID: 1
    state: enabled , buffering: disabled
    retry 4, emergency time-out 30
    echo req interval 30, echo reply time-out 15
    min-flow-timeout : 0, use controller provided values.
    max flows acl           : Maximum Available
    max flows unicast fdb   : Maximum Available
    max flows multicast fdb : Maximum Available
    emergency feature: enabled
    Controller Id: 1
        Not Active Controller
        IP Address: 10.10.10.10, port: 6633, Mgt-Port


Openflow instance 2 is currently disabled

Openflow instance 3 is currently disabled

Openflow instance 4 is currently disabled

Openflow Edge ports : None
Openflow Management ports : None
```

OpenFlow Flow Allocation Information

The following command displays the OpenFlow flow allocation for all instances:

```
show openflow flow-allocation
```

Comand mode: All

```
Flow Allocation Information


Instance 1

Maximum ACL Count Configured          : Maximum Available
Maximum Unicast FDB Count Configured  : Maximum Available
Maximum Multicast FDB Count Configured: Maximum Available

Basic Entries

Current ACL Count                     : 0
Current Unicast FDB Count             : 0
Current Multicast FDB Count           : 0

Emergency Entries

Current ACL Count                     : 0
Current Unicast FDB Count             : 0
Current Multicast FDB Count           : 0

Maximum Current Availability

Maximum Available ACL Count          : 750
Maximum Available Unicast FDB Count  : 123904
Maximum Available Multicast FDB Count: 4096

Instance 2
...
```

OpenFlow Configuration Information

The following command displays the OpenFlow configuration for all instances:

`show openflow information`

Command mode: All

```
Openflow Instance ID: 1
        State : Enabled
        DataPath ID: 0x00010817f4aeb500
        Max Retries per controller: 4
        Echo Request Interval: 30
        Echo Reply Timeout: 15
        Emergency Timeout: 30
        Min-flow-timeout : 0, use controller provided values.
        Max ACL Flows: Maximum Available
        Max Unicast FDB Flows: Maximum Available
        Max Multicast FDB Flows: Maximum Available
        Buffering: Disabled
        Operational Mode: Emergency
        Miss Send Len: 128
...
```

```
...
        Switch Support Capabilities:
                Flow Statistics             : enabled
                Table Statistics            : enabled
                Port Statistics             : enabled
                Spanning Tree               : disabled
                Reserved                    : disabled
                Reassemble IP Fragments     : disabled
                Queue Statistics            : disabled
                Match IP Addr in ARP Packets: disabled
        Switch Support action:
                Output to Switch Port    : enabled
                Set Vlan ID              : enabled
                Set Priority             : enabled
                Strip dot1q Header       : enabled
                Ethernet Source Addr     : enabled
                Ethernet Destination Addr: enabled
                IP Source Address        : disabled
                IP Destination Address   : disabled
                IP ToS                   : enabled
                TCP/UDP Source Port      : disabled
                TCP/UDP Destination Port : disabled
                Output to Queue          : disabled
                Vendor                   : disabled

PortList  Status  State  Config  Current  Advertised Supported  Peer

Number of Ports: 0
Configured Controllers:
        Openflow Controller 1:
                IP Address: 10.10.10.10
                Port: 6633
                State: Inactive
                Retry Count: 4
        Configured Controller Count 1

-----------------------------------------------------------
Openflow instance 2 is currently disabled
-----------------------------------------------------------
Openflow instance 3 is currently disabled
-----------------------------------------------------------
Openflow instance 4 is currently disabled
```

OpenFlow Table Information

The following command displays the basic and emergency flow tables for all instances:

```
show openflow table
```

Command mode: All

```
Openflow Instance Id: 1

BASIC FLOW TABLE

Flow:1 Filter Based, priority:32768, hard-time-out: 0, idle-time-out: 0
 cookie: 0xffffffffffff
 QUALIFIERS: ingress-port:15
 ACTION: set_nw_tos=28, output:4
 STATS: packets=0, bytes=0

Flow:2 Filter Based, priority:65535, hard-time-out: 0, idle-time-out: 0
 cookie: 0xffffffffff22
 QUALIFIERS: ingress-port:15, vlan-id: 20, ether-type:0x806
     src-mac:00-48-47-09-55-39, dst-mac:00-0d-fb-00-00-01, arp-type: 1
     src-ip:192.168.200.20/32
 ACTION: set-vlan-id=20, set_nw_tos=32, output:2, 3, 4, 5, 6, 7, 8
 STATS: packets=0, bytes=0

NEC Vendor Specific:
Flow:1
  Filter Based, priority:50000, hard-time-out: 0, idle-time-out: 0
  cookie: 0xffff34ffffff
  QUALIFIERS: ingress-port:17, vlan-id: 100, vlan-priority: 3, ether-type:0x800
     src-mac:11-22-33-44-55-66, src-mac-mask:00-00-00-00-00-01
dst-mac:66-55-44-33-22-11, dst-mac-mask:00-00-00-00-00-00
  ACTION: output:41
  STATS: packets=0, bytes=0

STATIC FLOWS

Flow:1 Index:1
  Filter Based, priority:65535
  QUALIFIERS: vlan-id:  100
     dst-mac:00-11-22-33-00-50
  ACTION:  output:34, 33
  STATS:   packets=0, bytes=0

EMERGENCY FLOW TABLE

Flow:1 Filter Based, priority:65535, hard-time-out: 0, idle-time-out: 0
  cookie: 0xff05ffffffff
  QUALIFIERS: ingress-port:31, vlan-id: 14, vlan-priority: 4, ether-type:0x806
     src-mac:00-00-00-00-12-13, dst-mac:00-00-00-00-14-16, arp-type:128,
     src-ip:1.2.3.4/32
  ACTION: set-vlan-id=20, set_nw_tos=32, output:2, 3, 4, 5, 6, 7, 8

Openflow Instance Id: 2

BASIC FLOW TABLE is Empty

STATIC FLOW TABLE is Empty

EMERGENCY FLOW TABLE is Empty

Openflow instance 3 is currently disabled

Openflow instance 4 is currently disabled
```

OpenFlow table information includes detailed configuration information for each entry in the flow table.

Note: Flow qualifiers used for matching packets are not listed in the display if the qualifier is set to `any`.

RMON Information Commands

The following table describes the Remote Monitoring (RMON) Information commands.

Table 65. RMON Information Options

Command Syntax and Usage
`show rmon history` Displays RMON History information. For details, see page 109. **Command mode:** All
`show rmon alarm` Displays RMON Alarm information. For details, see page 110. **Command mode:** All
`show rmon event` Displays RMON Event information. For details, see page 111. **Command mode:** All
`show rmon` Displays all RMON information. **Command mode:** All

RMON History Information

The following command displays RMON History information:

```
show rmon history
```

Command mode: All

```
RMON History group configuration:

Index IFOID                          Interval Rbnum Gbnum
----- ------------------------------ -------- ----- -----
   1  1.3.6.1.2.1.2.2.1.1.24               30     5     5
   2  1.3.6.1.2.1.2.2.1.1.22               30     5     5
   3  1.3.6.1.2.1.2.2.1.1.20               30     5     5
   4  1.3.6.1.2.1.2.2.1.1.19               30     5     5
   5  1.3.6.1.2.1.2.2.1.1.24             1800     5     5

Index                      Owner
-----  --------------------------------------------
    1  dan
```

The following table describes the RMON History Information parameters.

Table 66. RMON History Parameter Descriptions

Parameter	**Description**
Index	Displays the index number that identifies each history instance.
IFOID	Displays the MIB Object Identifier.
Interval	Displays the time interval for each sampling bucket.
Rbnum	Displays the number of requested buckets, which is the number of data slots into which data is to be saved.
Gbnum	Displays the number of granted buckets that may hold sampled data.
Owner	Displays the owner of the history instance.

RMON Alarm Information

The following command displays RMON alarm information:

```
show rmon alarm
```

Command mode: All

```
RMON Alarm group configuration:

Index  Interval  Sample   Type      rLimit       fLimit     last value
-----  --------  ------  -------  -----------  -----------  ----------
    1      1800     abs   either           0            0       7822

Index  rEvtIdx  fEvtIdx                    OID
-----  -------  -------  -------------------------------------------
    1        0        0  1.3.6.1.2.1.2.2.1.10.1

Index                       Owner
-----  ---------------------------------------------
    1  dan
```

The following table describes the RMON Alarm Information parameters.

Table 67. RMON Alarm Parameter Descriptions

Parameter	**Description**
Index	Displays the index number that identifies each alarm instance.
Interval	Displays the time interval over which data is sampled and compared with the rising and falling thresholds.
Sample	Displays the method of sampling the selected variable and calculating the value to be compared against the thresholds, as follows: – `abs`—absolute value, the value of the selected variable is compared directly with the thresholds at the end of the sampling interval. – `delta`—delta value, the value of the selected variable at the last sample is subtracted from the current value, and the difference compared with the thresholds.
Type	Displays the type of alarm, as follows: – `falling`—alarm is triggered when a falling threshold is crossed. – `rising`—alarm is triggered when a rising threshold is crossed. – `either`—alarm is triggered when either a rising or falling threshold is crossed.
rLimit	Displays the rising threshold for the sampled statistic.
fLimit	Displays the falling threshold for the sampled statistic.
Last value	Displays the last sampled value.

Table 67. RMON Alarm Parameter Descriptions (continued)

Parameter	Description
rEvtIdx	Displays the rising alarm event index that is triggered when a rising threshold is crossed.
fEvtIdx	Displays the falling alarm event index that is triggered when a falling threshold is crossed.
OID	Displays the MIB Object Identifier for each alarm index.
Owner	Displays the owner of the alarm instance.

RMON Event Information

The following command displays RMON event information:

```
show rmon event
```

Command mode: All

```
RMON Event group configuration:

Index Type    Last Sent              Description
----- ---- ---------------- ---------------------------------
   1  both   0D: 0H: 1M:20S  Event_1
   2  none   0D: 0H: 0M: 0S  Event_2
   3  log    0D: 0H: 0M: 0S  Event_3
   4  trap   0D: 0H: 0M: 0S  Event_4
   5  both   0D: 0H: 0M: 0S  Log and trap event for Link Down
  10  both   0D: 0H: 0M: 0S  Log and trap event for Link Up
  11  both   0D: 0H: 0M: 0S  Send log and trap for icmpInMsg
  15  both   0D: 0H: 0M: 0S  Send log and trap for icmpInEchos

Index                       Owner
-----  ---------------------------------------------
    1  dan
```

The following table describes the RMON Event Information parameters.

Table 68. RMON Event Parameter Descriptions

Parameter	Description
Index	Displays the index number that identifies each event instance.
Type	Displays the type of notification provided for this event, as follows: `none, log, trap, both`.
Last sent	Displays the time that passed since the last switch reboot, when the most recent event was triggered. This value is cleared when the switch reboots.
Description	Displays a text description of the event.
Owner	Displays the owner of the alarm instance.

Link Status Information

The following command displays link information:

`show interface status` *<port alias or number>*

Command mode: All

```
Alias   Port   Speed    Duplex     Flow Ctrl      Link
-----   ----   -----   --------  --TX-----RX--   ------
1          1   10000     full     yes    yes       up
2          2   10000     full     yes    yes       up
3          3   10000     full     yes    yes       up
4          4   10000     full     yes    yes       up
5          5   10000     full     yes    yes      down
6          6   10000     full     yes    yes       up
...
MGT     65      1000     full     yes    yes       up
```

Use this command to display link status information about each port on the G8264, including:

- Port alias and port number
- Port speed and Duplex mode (half, full, any)
- Flow control for transmit and receive (no, yes, or both)
- Link status (up, down, or disabled)

Port Information

The following command displays port information:

`show interface trunk` *<port alias or number>*

Command mode: All

```
Alias Port Tag RMON Lrn Fld PVID   DESCRIPTION   VLAN(s)
           Trk              NVLAN
----- ---- --- ---- --- --- ----- -------------- --------------------
1     1     n   d    e   e     1                 1
2     2     n   d    e   e     1                 1
3     3     n   d    e   e     1                 1
4     4     n   d    e   e     1                 1
5     5     n   d    e   e     1                 1
...
MGT   65    n   d    e   e  4095                 4095

* = PVID/Native-VLAN is tagged.
# = PVID is ingress tagged.
Trk  = Trunk mode
NVLAN = Native-VLAN
```

Port information includes:

- Port alias and number
- Whether the port uses VLAN tagging or not (`y` or `n`)
- Whether the port has Remote Monitoring (RMON) enabled
- Whether the port has FDB learning enabled (`Lrn`)
- Whether the port has Port Flooding enabled (`Fld`)
- Port VLAN ID (`PVID`)

- Port name
- VLAN membership

Port Transceiver Status

The following command displays the status of the transceiver module on each port:

```
show interface transceiver
```

Command mode: All

```
Name             TX  RXLos TXFlt Volts DegsC TXuW  RXuW  Media   Laser  Approval
---------------- --- ----- ----- ----- ----- ----- ----- ------- ------ ---------
 1 Q10G 1.A      Ena LINK  no     0.00  0.0   N/A   N/A  CX QSFP 0nm    Accepted
         Amphenol         Part:582410002        Date:100524 S/N:APF10200020040
 2 Q10G 1.B      Ena LINK  no     0.00  0.0   N/A   N/A  CX QSFP 0nm    Accepted
         Amphenol         Part:582410002        Date:100524 S/N:APF10200020040
 3 Q10G 1.C      Ena LINK  no     0.00  0.0   N/A   N/A  CX QSFP 0nm    Accepted
         Amphenol         Part:582410002        Date:100524 S/N:APF10200020040
 4 Q10G 1.D      Ena LINK  no     0.00  0.0   N/A   N/A  CX QSFP 0nm    Accepted
         Amphenol         Part:582410002        Date:100524 S/N:APF10200020040
 5 QSFP+ 2       Ena LINK  no     3.29 27.0   N/A   N/A  SR QSFP 0nm    Accepted
         Blade-Network    Part:BN-CKM-QP-SR4    Date:101102 S/N:BNTS10440U
 9 QSFP+ 3       Ena LINK  no     0.00  1.5   N/A   N/A  SR QSFP 0nm    Accepted
         Amphenol         Part:594090007        Date:101013 S/N:APF10410070003
13 Q10G 4.A      Ena LINK  no     0.00  0.0   N/A   N/A  CX QSFP 0nm    Accepted
         Amphenol         Part:582410003        Date:100524 S/N:APF10200030008
14 Q10G 4.B      Ena LINK  no     0.00  0.0   N/A   N/A  CX QSFP 0nm    Accepted
         Amphenol         Part:582410003        Date:100524 S/N:APF10200030008
15 Q10G 4.C      Ena LINK  no     0.00  0.0   N/A   N/A  CX QSFP 0nm    Accepted
         Amphenol         Part:582410003        Date:100524 S/N:APF10200030008
16 Q10G 4.D      Ena LINK  no     0.00  0.0   N/A   N/A  CX QSFP 0nm    Accepted
         Amphenol         Part:582410003        Date:100524 S/N:APF10200030008
17 SFP+  1       N/A LINK  -N/A-  -.-- --.-  ---.- ---.- 3m DAC  -N/A-  Approved
         BLADE NETWORKS   Part:BN-SP-CBL-3M     Date:100411 S/N:APF101400300EU
18 SFP+  2       < NO Device Installed >
19 SFP+  3       < NO Device Installed >
20 SFP+  4       < NO Device Installed >
21 SFP+  5       < NO Device Installed >
22 SFP+  6       N/A LINK  -N/A-  -.-- --.-  ---.- ---.- 3m DAC  -N/A-  Approved
         BLADE NETWORKS   Part:BN-SP-CBL-3M     Date:100413 S/N:APF1014003001M
23 SFP+  7       N/A LINK  -N/A-  -.-- --.-  ---.- ---.- 3m DAC  -N/A-  Approved
         BLADE NETWORKS   Part:BN-SP-CBL-3M     Date:100414 S/N:APF101500300HE
24 SFP+  8       N/A LINK  -N/A-  -.-- --.-  ---.- ---.- 3m DAC  -N/A-  Approved
         BLADE NETWORKS   Part:BN-SP-CBL-3M     Date:090821 S/N:APF09340030101
25 SFP+  9       N/A LINK  -N/A-  -.-- --.-  ---.- ---.- 3m DAC  -N/A-  Approved
         BLADE NETWORKS   Part:BN-SP-CBL-3M     Date:100413 S/N:APF1014003003N
26 SFP+ 10       N/A LINK  -N/A-  -.-- --.-  ---.- ---.- 3m DAC  -N/A-  Approved
         BLADE NETWORKS   Part:BN-SP-CBL-3M     Date:100503 S/N:APF101800303U1
...
```

This command displays information about the transceiver module on each port, as follows:

- Name identifies the port number and media type
- TX enable/disable
- RXlos: Receive Loss of Signal indicator
- TXFlt: Transmission Fault indicator
- Volts: Power usage, in volts
- DegsC: Temperature, in degrees centigrade
- TXuW: Transmit power, in micro-watts
- RXuW: Receive power, in micro-watts
- Media/Transceiver type (LX, LR, SX, SR)
- Laser wavelength, in nanometers
- Approval status

Virtual Machines Information

The following command display information about Virtual Machines (VMs).

Table 69. Virtual Machines Information Options

Command Syntax and Usage
`show virt port` *<port alias or number>* Displays Virtual Machine information for the selected port. **Command mode:** All
`show virt vm` Displays all Virtual Machine information. **Command mode:** All

VM Information

The following command displays VM information:

```
show virt vm
```

Command mode: All

```
IP Address       VMAC Address        Index Port    VM Group (Profile)
---------------- -----------------   ----- ------- ------------------
*127.31.46.50    00:50:56:4e:62:f5   4        3
*127.31.46.10    00:50:56:4f:f2:85   2        4
+127.31.46.51    00:50:56:72:ec:86   1        3
+127.31.46.11    00:50:56:7c:1c:ca   3        4
 127.31.46.25    00:50:56:9c:00:c8   5        4
 127.31.46.15    00:50:56:9c:21:2f   0        4
 127.31.46.35    00:50:56:9c:29:29   6        3

Number of entries: 8
* indicates VMware ESX Service Console Interface
+ indicates VMware ESX/ESXi VMKernel or Management Interface
```

VM information includes the following for each Virtual Machine (VM):

- IP address
- MAC address
- Index number assigned to the VM
- Server port on which the VM was detected
- VM group that contains the VM, if applicable
- State of the Virtual Machine (~ indicates the VM is inactive/idle)

VM Check Information

The following command displays VM Check information:

```
show virt vmcheck
```

Command mode: All

```
Action to take for spoofed VMs:
        Basic: Oper disable the link
        Advanced: Install ACL to drop traffic

Maximum number of acls that can be used for mac spoofing: 50
Trusted ports by configuration:  empty
```

VMware Information

Use these commands to display information about Virtual Machines (VMs) and VMware hosts in the data center. These commands require the presence of a configured Virtual Center.

Table 70. VMware Information Options

Command Syntax and Usage
`show virt vmware hosts` Displays a list of VMware hosts. **Command mode:** All
`show virt vmware showhost` *<host UUID>*|*<host IP address>*|*<host name>* Displays detailed information about a specific VMware host. **Command mode:** All
`show virt vmware showvm` *<VM UUID>*|*<VM IP address>*|*<VM name>* Displays detailed information about a specific Virtual Machine (VM). **Command mode:** All
`show virt vmware vms` Displays a the names of all VMware VMs. **Command mode:** All

VMware Host Information

The following command displays VM host information:

```
show virt vmware hosts
```

Command mode: All

```
UUID                                  Name(s), IP Address
        -----------------------------------------------------------------------
80a42681-d0e5-5910-a0bf-bd23bd3f7803  127.12.41.30
3c2e063c-153c-dd11-8b32-a78dd1909a69  127.12.46.10
64f1fe30-143c-dd11-84f2-a8ba2cd7ae40  127.12.44.50
c818938e-143c-dd11-9f7a-d8defa4b83bf  127.12.46.20
fc719af0-093c-dd11-95be-b0adac1bcf86  127.12.46.30
009a581a-143c-dd11-be4c-c9fb65ff04ec  127.12.46.40
```

VM host information includes the following:

- UUID associated with the VMware host.
- Name or IP address of the VMware host.

vNIC Information

The following commands display information about Virtual NICs (vNICs).

Table 71. vNIC Information Options

Command Syntax and Usage
`show vnic vnic` Displays information about each vNIC. **Command mode:** All
`show vnic vnicgroup` Displays information about each vNIC Group, including: – Status (enabled or disabled) – VLAN assigned to the vNIC Group – Uplink Failover status (enabled or disabled) – Link status for each vNIC (up, down, or disabled) – Port link status for each port associated with the vNIC Group (up, down, or disabled) **Command mode:** All
`show vnic information-dump` Displays all vNIC information. **Command mode:** All

Virtual NIC (vNIC) Information

The following command displays Virtual NIC (vNIC) information:

```
show vnic vnic
```

Command mode: All

```
vNIC    vNICGroup Vlan   MaxBandwidth  MACAddress              Link
------- --------- ------ ------------ ------------------        ------
1.1       10        10      25         none                      down
50.2       4        44      25         00 :00 :c9 :93 :d2 :07     up
53.1       #         *      10         none                     disabled
53.4       4        44      25         00 :00 :c9 :93 :d5 :03     up

# = Not added to any vNIC group
* = Not added to any vNIC group or no vlan set for its vNIC group
```

vNIC information includes the following for each vNIC:

- vNIC ID
- vNIC Group that contains the vNIC
- VLAN assigned to the vNIC Group
- Maximum bandwidth allocated to the vNIC
- MAC address of the vNIC, if applicable
- Link status (up, down, or disabled)

vNIC Group Information

The following command displays vNIC Group information:

```
show vnic vnicgroup
```

Command mode: All

```
vNIC Group  1: enabled
----------------------------------------------
VLAN         : 3001
Failover     : enabled

vNIC        Link
----------  ---------
1.1         up
7.1         up
8.1         down
9.1         up
10.1        up

Port        Link
----------  ---------
2           up

UplinkPort  Link
----------  ---------
10          up
```

vNIC Group information includes the following for each vNIC Group:

- Status (enabled or disabled)
- VLAN assigned to the vNIC Group
- Uplink Failover status (enabled or disabled)
- Link status for each vNIC (up, down, or disabled)
- Port link status for each port associated with the vNIC Group (up, down, or disabled)

EVB Information

The following commands display Edge Virtual Bridge (EVB) Virtual Station Interface (VDP) discovery and configuration information.

Table 72. EVB Information Options

Command Syntax and Usage
`show virt evb vdp vm` Displays all active Virtual Machines (VMs). **Command mode:** All
`show virt evb vdp tlv` Displays all active Virtual Station Interface (VSI) Discovery and Configuration Protocol (VDP) type-length-values (TLVs). **Command mode:** All
`show virt evb vsidb` *<VSI_database_number>* Displays Virtual Station Interface database information. **Command mode:** All

Converged Enhanced Ethernet Information

Table 73 describes the Converged Enhanced Ethernet (CEE) information options.

Table 73. CEE Information Options

Command Syntax and Usage
`show cee information` Displays all CEE information **Command mode:** All

DCBX Information

Table 74 describes the Data Center Bridging Capability Exchange (DCBX) protocol information options.

Table 74. DCBX Information Options

Command Syntax and Usage
`show cee information dcbx port` *<port alias or number>* `control` Displays information about the DCBX Control state machine for the specified port or range of ports. For details, see page 123. **Command mode:** All
`show cee information dcbx port` *<port alias or number>* `feature` Displays information about the DCBX Feature state machine for the specified port or range of ports. For details, see page 124. **Command mode:** All
`show cee information dcbx port` *<port alias or number>* `ets` Displays information about the DCBX ETS state machine for the specified port or range of ports. For details, see page 125. **Command mode:** All
`show cee information dcbx port` *<port alias or number>* `pfc` Displays information about the DCBX PFC state machine for the specified port or range of ports. For details, see page 126. **Command mode:** All
`show cee information dcbx port` *<port alias or number>* `app_proto` Displays information about the DCBX Application Protocol state machine on the specified port or range of ports. For details, see page 127. **Command mode:** All
`show cee information dcbx port` *<port alias or number>* Displays all DCBX information for the specified port or range of ports. **Command mode:** All

DCBX Control Information

The following command displays DCBX Control information:

```
show cee information dcbx port <port range> control
```

Command mode: All

```
Alias Port OperStatus OperVer MaxVer SeqNo AckNo
----- ---- ---------- ------- ------ ----- -----
   1  1     enabled    0       0      0     0
   2  2     enabled    0       0      4     2
   3  3     enabled    0       0      0     0
   4  4     enabled    0       0      1     1
...
   20 20    enabled    0       0      0     0
   21 21    enabled    0       0      0     0
   22 22    enabled    0       0      0     0
   23 23    enabled    0       0      0     0
   24 24    enabled    0       0      0     0
```

DCBX Control information includes the following:

- Port alias and number
- DCBX status (enabled or disabled)
- Operating version negotiated with the peer device
- Maximum operating version supported by the system
- Sequence number that changes each time a DCBX parameter in one or more DCB feature TLVs changes
- Sequence number of the most recent DCB feature TLV that has been acknowledged

DCBX Feature Information

The following command displays DCBX Feature information:

`show cee information dcbx port` *<port alias, number, or range>* `feature`

Command mode: All

```
DCBX Port Feature State-machine Info
====================================
Alias Port Type    AdmState Will Advrt OpVer MxVer PrWill SeqNo Err OperMode Syncd
----- ---- ------- -------- ---- ----- ----- ----- ------ ----- --- -------- ---
    1 1    ETS     enabled  No   Yes   0     0     No     0     No  disabled No
    2 2    ETS     enabled  No   Yes   0     0     Yes    4     No  enabled  Yes
    3 3    ETS     enabled  No   Yes   0     0     No     0     No  disabled No
    4 4    ETS     enabled  No   Yes   0     0     Yes    1     No  enabled  Yes
    5 5    ETS     enabled  No   Yes   0     0     Yes    1     No  enabled  Yes
    6 6    ETS     disabled No   Yes   0     0     No     0     No  disabled No
    7 7    ETS     disabled No   Yes   0     0     No     0     No  disabled No
    8 8    ETS     disabled No   Yes   0     0     No     0     No  disabled No
    9 9    ETS     disabled No   Yes   0     0     No     0     No  disabled No
   10 10   ETS     enabled  No   Yes   0     0     No     0     No  disabled No
...
```

The following table describes the DCBX Feature information.

Table 75. DCBX Feature Information Fields

Parameter	**Description**
Alias	Displays each port’s alias.
Port	Displays each port’s number.
Type	Feature type
AdmState	Feature status (Enabled or Disabled)
Will	Willing flag status (Yes/True or No/Untrue)
Advrt	Advertisement flag status (Yes/True or No/Untrue)
OpVer	Operating version negotiated with the peer device
MxVer	Maximum operating version supported by the system
PrWill	Peer’s Willing flag status (Yes/True or No/Untrue)
SeqNo	Sequence number that changes each time a DCBX parameter in one or more DCB feature TLVs changes
Err	Error condition flag (Yes or No). Yes indicates that an error occurred during the exchange of configuration data with the peer.
OperMode	Operating status negotiated with the peer device (enabled or disabled)
Syncd	Synchronization status between this port and the peer (Yes or No)

DCBX ETS Information

The following command displays DCBX ETS information:

show cee information dcbx port *<port alias or number>* ets

Command mode: All

```
DCBX Port Priority Group - Priority Allocation Table
====================================================
Alias Port Priority PgIdDes PgIdOper PgIdPeer
----- ---- -------- ------- -------- --------
   2  2    0        PGID0   PGID0    PGID0
   2  2    1        PGID0   PGID0    PGID0
   2  2    2        PGID0   PGID0    PGID0
   2  2    3        PGID1   PGID0    PGID0
   2  2    4        PGID2   PGID0    PGID0
   2  2    5        PGID2   PGID0    PGID0
   2  2    6        PGID2   PGID0    PGID0
   2  2    7        PGID2   PGID0    PGID0

DCBX Port Priority Group - Bandwidth Allocation Table
=====================================================
Alias Port PrioGrp BwDes BwOper BwPeer
----- ---- ------- ----- ------ ------
   2  2    0       10    10     50
   2  2    1       50    50     50
   2  2    2       40    40     0
```

The following table describes the DCBX ETS information.

Table 76. DCBX Feature Information Fields

Parameter	Description
DCBX Port Priority Group - Priority Allocation Table	
Alias	Displays each port’s alias
Port	Displays each port’s number
Priority	Displays each port’s priority
PgIdDes	Priority Group ID configured on this switch
PgIdOper	Priority Group negotiated with the peer (operating Priority Group).
PgIdPeer	Priority Group ID configured on the peer

Table 76. DCBX Feature Information Fields (continued)

Parameter	**Description**
DCBX Port Priority Group - Bandwidth Allocation Table	
Alias	Displays each port’s alias
Port	Displays each port’s number
PrioGrp	Displays each port’s priority group
BwDes	Bandwidth allocation configured on this switch
BwOper	Bandwidth allocation negotiated with the peer (operating bandwidth)
BwPeer	Bandwidth allocation configured on the peer

DCBX PFC Information

The following command displays DCBX Priority Flow Control (PFC) information:

`show cee information dcbx port` *<port alias or number>* `pfc`

Command mode: All

```
DCBX Port Priority Flow Control Table
=====================================
Alias Port Priority EnableDesr EnableOper EnablePeer
----- ---- -------- ---------- ---------- ----------
   2  2    0        disabled    disabled    disabled
   2  2    1        disabled    disabled    disabled
   2  2    2        disabled    disabled    disabled
   2  2    3        enabled     disabled    disabled
   2  2    4        disabled    disabled    disabled
   2  2    5        disabled    disabled    disabled
   2  2    6        disabled    disabled    disabled
   2  2    7        disabled    disabled    disabled
```

DCBX PFC information includes the following:

- Port alias and number
- 802.1p value
- **EnableDesr**: Status configured on this switch
- **EnableOper**: Status negotiated with the peer (operating status)
- **EnablePeer**: Status configured on the peer

DCBX Application Protocol Information

The following command displays DCBX Application Protocol information:

```
show cee information dcbx port <port alias or number> app-proto
```

Command mode: All

```
DCBX Application Protocol Table
===============================

FCoE Priority Information
=========================
Protocol ID              : 0x8906
Selector Field           : 0
Organizationally Unique ID: 0x1b21

Alias Port Priority EnableDesr EnableOper EnablePeer
----- ---- -------- ---------- ---------- ----------
   2  2    0        enabled     enabled     enabled
   2  2    1        disabled    disabled    disabled
   2  2    2        disabled    disabled    disabled
   2  2    3        enabled     enabled     enabled
   2  2    4        disabled    disabled    disabled
   2  2    5        disabled    disabled    disabled
   2  2    6        disabled    disabled    disabled
   2  2    7        disabled    disabled    disabled

FIP Snooping Priority Information
=================================
Protocol ID              : 0x8914
Selector Field           : 0
Organizationally Unique ID: 0x1b21

Alias Port Priority EnableDesr EnableOper EnablePeer
----- ---- -------- ---------- ---------- ----------
   2  2    0        enabled     enabled     enabled
   2  2    1        disabled    disabled    disabled
   2  2    2        disabled    disabled    disabled
   2  2    3        enabled     enabled     enabled
   2  2    4        disabled    disabled    disabled
   2  2    5        disabled    disabled    disabled
   2  2    6        disabled    disabled    disabled
   2  2    7        disabled    disabled    disabled
```

The following table describes the DCBX Application Protocol information.

Table 77. DCBX Application Protocol Information Fields

Parameter	**Description**
Protocol ID	Identifies the supported Application Protocol.
Selector Field	Specifies the Application Protocol type, as follows: • 0 = Ethernet Type • 1 = TCP socket ID
Organizationally Unique ID	DCBX TLV identifier
Alias	Port alias
Port	Port number
Priority	802.1p value
EnableDesr	Status configured on this switch
EnableOper	Status negotiated with the peer (operating status)
EnablePeer	Status configured on the peer

ETS Information

Table 78 describes the Enhanced Transmission Selection (ETS) information options

Table 78. ETS Information Options

Command Syntax and Usage
`show cee global ets information` Displays global ETS information. **Command mode:** All

The following command displays ETS information:

```
show cee global ets information
```

Command mode: All

```
Global ETS information:

Number of COSq: 8

Mapping of 802.1p Priority to Priority Groups:

Priority  PGID  COSq
--------  ----  ----
    0       0     0
    1       0     0
    2       0     0
    3       1     1
    4       2     2
    5       2     2
    6       2     2
    7       2     2

Bandwidth Allocation to Priority Groups:

PGID  PG%  Description
----  ---  -----------
  0    10
  1    50
  2    40
```

Enhanced Transmission Selection (ETS) information includes the following:

- Number of Class of Service queues (COSq) configured
- 802.1p mapping to Priority Groups and Class of Service queues
- Bandwidth allocated to each Priority Group

PFC Information

Table 79 describes the Priority Flow Control (PFC) information options.

Table 79. PFC Information Options

Command Syntax and Usage
`show cee port` *<port number or range of ports>* `pfc` Displays PFC information. **Command mode:** All
`show cee port` *<port number or range of ports>* `pfc priority` *<0-7>* Displays PFC information. **Command mode:** All
`show cee port` *<port number or range of ports>* `pfc information` Displays PFC information. **Command mode:** All

The following command displays PFC information:

`show cee port` *<port number or range of ports>* `pfc information`

Command mode: All

```
PFC information for Port 1:

PFC - ON

Priority   State   Description
--------   -----   -----------
   0        Dis
   1        Dis
   2        Dis
   3        Ena
   4        Dis
   5        Dis
   6        Dis
   7        Dis
------------------------------------------------------------------------
State - indicates whether PFC is Enabled/Disabled on a particular priority
```

FCoE Information

Table 80 describes the Fiber Channel over Ethernet (FCoE) information options.

Table 80. FCoE Information Options

Command Syntax and Usage
`show fcoe information` Displays all current FCoE information. **Command mode:** All

FIP Snooping Information

Table 81 describes the Fiber Channel Initialization Protocol (FIP) Snooping information options

Table 81. FIP Snooping Information Options

Command Syntax and Usage
`show fcoe fips port` *<port alias, number, or range>* `information` Displays FIP Snooping (FIPS) information for the specified port or ports, including a list of current FIPS ACLs. **Command mode:** All
`show fcoe fips fcf` Displays FCF learned (detected). **Command mode:** All
`show fcoe fips fcoe` Displays FCoE connections learned (detected). **Command mode:** All
`show fcoe fips information` Displays FIP Snooping information for all ports. **Command mode:** All

The following command displays FIP Snooping information for the selected port:

`show fcoe fips port` *<port alias or number>* `information`

Command mode: All

```
FIP Snooping on port INT2:
This port has been configured to automatically detect FCF.
 It has currently detected to have 0 FCF connecting to it.

FIPS ACLs configured on this port:
SMAC 00:c0:dd:13:9b:6f, action deny.
SMAC 00:c0:dd:13:9b:70, action deny.
SMAC 00:c0:dd:13:9b:6d, action deny.
SMAC 00:c0:dd:13:9b:6e, action deny.
DMAC 00:c0:dd:13:9b:6f, ethertype 0x8914, action permit.
DMAC 00:c0:dd:13:9b:70, ethertype 0x8914, action permit.
DMAC 00:c0:dd:13:9b:6d, ethertype 0x8914, action permit.
DMAC 00:c0:dd:13:9b:6e, ethertype 0x8914, action permit.
SMAC 0e:fc:00:01:0a:00, DMAC 00:c0:dd:13:9b:6d, ethertype 0x8906, vlan 1002, action 
permit.
DMAC 01:10:18:01:00:01, Ethertype 0x8914, action permit.
DMAC 01:10:18:01:00:02, Ethertype 0x8914, action permit.
Ethertype 0x8914, action deny.
Ethertype 0x8906, action deny.
SMAC 0e:fc:00:00:00:00, SMAC mask ff:ff:ff:00:00:00, action deny.
```

`show fcoe fips port information`

Command mode: All

```
    FCF MAC         Port    Vlan
-----------------------------------
00:05:73:ce:96:67    46      1002
   VN_PORT MAC           FCF MAC          Port    Vlan
------------------------------------------------------
0e:fc:00:44:04:03   00:05:73:ce:96:67     18      1002
0e:fc:00:44:04:02   00:05:73:ce:96:67     19      1002
0e:fc:00:44:04:04   00:05:73:ce:96:67     21      1002

FIP Snooping on port 1:
This port has been configured to automatically detect FCF.
 It has currently detected to have 0 FCF connecting to it.

FIPS ACLs configured on this port:
SMAC 00:05:73:ce:96:67, action deny.
DMAC 00:05:73:ce:96:67, ethertype 0x8914, action permit.
DMAC 01:10:18:01:00:01, Ethertype 0x8914, action permit.
DMAC 01:10:18:01:00:02, Ethertype 0x8914, action permit.
Ethertype 0x8914, action deny.
Ethertype 0x8906, action deny.
SMAC 0e:fc:00:00:00:00, SMAC mask ff:ff:ff:00:00:00, action deny.
```

FIP Snooping port information includes the following:

- Fiber Channel Forwarding (FCF) mode
- Number of FCF links connected to the port
- List of FIP Snooping ACLs assigned to the port

Fibre Channel over Ethernet Forwarder Information

The following command shows FCoE forwarder (FCF) information that has been learned (detected) by the switch:

```
show fcoe fips fcf
```

Command mode: All

```
Total number of FCFs detected: 0
```

Command mode: All

Information Dump

The following command dumps switch information:

```
show information-dump
```

Command mode: All

Use the dump command to dump all switch information available (10K or more, depending on your configuration). This data is useful for tuning and debugging switch performance.

If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump commands.

Chapter 3. Statistics Commands

You can use the Statistics Commands to view switch performance statistics in both the user and administrator command modes. This chapter discusses how to use the command line interface to display switch statistics.

Table 82. Statistics Commands

Command Syntax and Usage
`show layer3 counters` Displays Layer 3 statistics. **Command mode:** All
`show snmp-server counters` **Command mode:** All Displays SNMP statistics. See page 223 for sample output.
`show ntp counters` Displays Network Time Protocol (NTP) Statistics. **Command mode:** All See page 227 for a sample output and a description of NTP Statistics.
`show ptp counters` Displays Precision Time Protocol Statistics. **Command mode:** All See page 229 for a sample output and a description of PTP Statistics.
`clear mp-counters` Clears all MP-related statistics. **Command mode:** Privileged EXEC
`clear cpu` Clears all CPU utilization statistics. **Command mode:** Privileged EXEC
`clear interface port` *<port number>* `counters` Clears all statistics for the specified port. **Command mode:** All
`show counters` Dumps all switch statistics. Use this command to gather data for tuning and debugging switch performance. If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump command. **Command mode:** All For details, see page 230.

Port Statistics

These commands display traffic statistics on a port-by-port basis. Traffic statistics include SNMP Management Information Base (MIB) objects.

Table 83. Port Statistics Commands

Command Syntax and Usage
`show interface port` *<port alias or number>* `dot1x counters` Displays IEEE 802.1X statistics for the port. See page 139 for sample output. **Command mode:** All
`show ip bootp-relay counters interface` *<port alias or number>* Displays BOOTP relay statistics for the port. **Command mode:** All See page 142 for sample output.
`show interface port` *<port alias or number>* `bitrate-usage` Displays the traffic rate in kilobits per second. **Command mode:** All
`show interface port` *<port alias or number>* `bridging-counters` Displays bridging ("dot1") statistics for the port. **Command mode:** All See page 143 for sample output.
`show interface port` *<port alias or number>* `bridging-rate` Displays per-second bridging ("dot1") statistics for the port. **Command mode:** All
`show interface port` *<port alias or number>* `ethernet-counters` Displays Ethernet ("dot3") statistics for the port. **Command mode:** All See page 144 for sample output.
`show interface port` *<port alias or number>* `ethernet-rate` Displays per-second Ethernet ("dot3") statistics for the port. **Command mode:** All
`show interface port` *<port alias or number>* `interface-counters` Displays interface statistics for the port. See page 147 for sample output. **Command mode:** All
`show interface port` *<port alias or number>* `interface-rate` Displays per-second interface statistics for the port. **Command mode:** All

Table 83. Port Statistics Commands (continued)

Command Syntax and Usage
`show interface port` *<port alias or number>* `ip-counters` Displays IP statistics for the port. See page 150 for sample output. **Command mode:** All
`show interface port` *<port alias or number>* `ip-rate` Displays per-second IP statistics for the port. **Command mode:** All
`show interface port` *<port alias or number>* `link-counters` Displays link statistics for the port. See page 150 for sample output. **Command mode:** All
`show interface port` *<port alias or number>* `rmon-counters` Displays Remote Monitoring (RMON) statistics for the port. See page 151 for sample output. **Command mode:** All
`show interface port` *<port alias or number>* `oam counters` Displays Operation, Administrative, and Maintenance (OAM) protocol statistics for the port. **Command mode:** All
`show interface port` *<port aliases or numbers>* `egress-queue-counters [`*<queue_no>*`|drop]` Displays the total number of packets and bytes either successfully transmitted or dropped for each queue of the specified ports. – `queue_no` filters the output to the specified queue number – `drop` lists only the queues with dropped traffic (non-zero counters for dropped packets/bytes counters) See page 154 for sample output. **Command mode:** All
`show interface port` *<port aliases or numbers>* `egress-queue-rate [`*<queue_no>*`|drop]` Displays the number of packets and bytes per second either successfully transmitted or dropped for each queue of the specified ports. – `queue_no` filters the output to the specified queue number – `drop` lists only the queues with dropped traffic (non-zero rates for dropped packets/bytes) See page 155 for sample output. **Command mode:** All
`clear interface port` *<port aliases or numbers>* `egress-queue-counter` Clears all QoS egress counters for the specified ports for all queues. **Command mode:** Privileged EXEC

Table 83. Port Statistics Commands (continued)

Command Syntax and Usage
`show interface port` *<port alias or number>* `ptp-counters` Displays Precision Time Protocol statistics for the port. See page 229 for a sample output and a description of PTP Statistics. **Command mode:** All
`clear interfaces` Clears counters for all interfaces and queues. **Command mode:** Privileged EXEC
`clear interface port` *<port alias or number>* `counters` Clears all statistics for the port. **Command mode:** Privileged EXEC
`clear counters` Clears statistics for all ports. **Command mode:** Privileged EXEC

802.1X Authenticator Statistics

Use the following command to display the 802.1X authenticator statistics of the selected port:

```
show interface port <port alias or number> dot1x counters
```

Command mode: All

```
Authenticator Statistics:
  eapolFramesRx          = 925
  eapolFramesTx          = 3201
  eapolStartFramesRx     = 2
  eapolLogoffFramesRx    = 0
  eapolRespIdFramesRx    = 463
  eapolRespFramesRx      = 460
  eapolReqIdFramesTx     = 1820
  eapolReqFramesTx       = 1381
  invalidEapolFramesRx   = 0
  eapLengthErrorFramesRx = 0
  lastEapolFrameVersion  = 1
  lastEapolFrameSource   = 00:01:02:45:ac:51
```

Table 84. 802.1X Authenticator Statistics of a Port

Statistics	**Description**
eapolFramesRx	Total number of EAPOL frames received
eapolFramesTx	Total number of EAPOL frames transmitted
eapolStartFramesRx	Total number of EAPOL Start frames received
eapolLogoffFramesRx	Total number of EAPOL Logoff frames received
eapolRespIdFramesRx	Total number of EAPOL Response Identity frames received
eapolRespFramesRx	Total number of Response frames received
eapolReqIdFramesTx	Total number of Request Identity frames transmitted
eapolReqFramesTx	Total number of Request frames transmitted
invalidEapolFramesRx	Total number of invalid EAPOL frames received
eapLengthErrorFramesRx	Total number of EAP length error frames received
lastEapolFrameVersion	The protocol version number carried in the most recently received EAPOL frame.
lastEapolFrameSource	The source MAC address carried in the most recently received EAPOL frame.

802.1X Authenticator Diagnostics

Use the following command to display the 802.1X authenticator diagnostics of the selected port:

`show interface port` *<port alias or number>* `dot1x counters`

Command mode: All

```
Authenticator Diagnostics:
  authEntersConnecting                 = 1820
  authEapLogoffsWhileConnecting        = 0
  authEntersAuthenticating             = 463
  authSuccessesWhileAuthenticating     = 5
  authTimeoutsWhileAuthenticating      = 0
  authFailWhileAuthenticating          = 458
  authReauthsWhileAuthenticating       = 0
  authEapStartsWhileAuthenticating     = 0
  authEapLogoffWhileAuthenticating     = 0
  authReauthsWhileAuthenticated        = 3
  authEapStartsWhileAuthenticated      = 0
  authEapLogoffWhileAuthenticated      = 0
  backendResponses                     = 923
  backendAccessChallenges              = 460
  backendOtherRequestsToSupplicant     = 460
  backendNonNakResponsesFromSupplicant = 460
  backendAuthSuccesses                 = 5
  backendAuthFails                     = 458
```

Table 85. 802.1X Authenticator Diagnostics of a Port

Statistics	Description
authEntersConnecting	Total number of times that the state machine transitions to the CONNECTING state from any other state.
authEapLogoffsWhileConnecting	Total number of times that the state machine transitions from CONNECTING to DISCONNECTED as a result of receiving an EAPOL-Logoff message.
authEntersAuthenticating	Total number of times that the state machine transitions from CONNECTING to AUTHENTICATING, as a result of an EAP-Response/Identity message being received from the Supplicant.
authSuccessesWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to AUTHENTICATED, as a result of the Backend Authentication state machine indicating successful authentication of the Supplicant.
authTimeoutsWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to ABORTING, as a result of the Backend Authentication state machine indicating authentication timeout.

Table 85. 802.1X Authenticator Diagnostics of a Port (continued)

Statistics	Description
authFailWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to HELD, as a result of the Backend Authentication state machine indicating authentication failure.
authReauthsWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to ABORTING, as a result of a re-authentication request
authEapStartsWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to ABORTING, as a result of an EAPOL-Start message being received from the Supplicant.
authEapLogoffWhileAuthenticating	Total number of times that the state machine transitions from AUTHENTICATING to ABORTING, as a result of an EAPOL-Logoff message being received from the Supplicant.
authReauthsWhileAuthenticated	Total number of times that the state machine transitions from AUTHENTICATED to CONNECTING, as a result of a re-authentication request.
authEapStartsWhileAuthenticated	Total number of times that the state machine transitions from AUTHENTICATED to CONNECTING, as a result of an EAPOL-Start message being received from the Supplicant.
authEapLogoffWhileAuthenticated	Total number of times that the state machine transitions from AUTHENTICATED to DISCONNECTED, as a result of an EAPOL-Logoff message being received from the Supplicant.
backendResponses	Total number of times that the state machine sends an initial Access-Request packet to the Authentication server. Indicates that the Authenticator attempted communication with the Authentication Server.
backendAccessChallenges	Total number of times that the state machine receives an initial Access-Challenge packet from the Authentication server. Indicates that the Authentication Server has communication with the Authenticator.

Table 85. 802.1X Authenticator Diagnostics of a Port (continued)

Statistics	**Description**
backendOtherRequestsToSupplicant	Total number of times that the state machine sends an EAP-Request packet (other than an Identity, Notification, Failure, or Success message) to the Supplicant. Indicates that the Authenticator chose an EAP-method.
backendNonNakResponsesFromSupplicant	Total number of times that the state machine receives a response from the Supplicant to an initial EAP-Request, and the response is something other than EAP-NAK. Indicates that the Supplicant can respond to the Authenticator.s chosen EAP-method.
backendAuthSuccesses	Total number of times that the state machine receives an Accept message from the Authentication Server. Indicates that the Supplicant has successfully authenticated to the Authentication Server.
backendAuthFails	Total number of times that the state machine receives a Reject message from the Authentication Server. Indicates that the Supplicant has not authenticated to the Authentication Server.

BootStrap Protocol Relay Statistics

Use the following command to display the BOOTP Relay statistics of the selected port:

`show ip bootp-relay counters interface` *<port alias or number>*

Command mode: All

```
------------------------------------------------------------------
BOOTP Relay statistics for port 1:

Requests received from client:        0
Requests relayed to server:           0
Requests relayed with option 82:      0
Requests dropped due to ...
  - relay not allowed:                0
  - no server or unreachable server:  0
  - packet or processing errors:      0
Replies received from server:         0
Replies relayed to client:            0
Replies dropped due to ...
  - packet or processing errors:      0
```

Bridging Statistics

Use the following command to display the bridging statistics of the selected port:

show interface port *<port alias or number>* bridging-counters

Command mode: All

```
Bridging statistics for port 1:
dot1PortInFrames:                   63242584
dot1PortOutFrames:                  63277826
dot1PortInDiscards:                        0
dot1TpLearnedEntryDiscards:                0
dot1StpPortForwardTransitions:             0
```

Table 86. Bridging Statistics of a Port

Statistics	**Description**
dot1PortInFrames	The number of frames that have been received by this port from its segment. A frame received on the interface corresponding to this port is only counted by this object if and only if it is for a protocol being processed by the local bridging function, including bridge management frames.
dot1PortOutFrames	The number of frames that have been transmitted by this port to its segment. Note that a frame transmitted on the interface corresponding to this port is only counted by this object if and only if it is for a protocol being processed by the local bridging function, including bridge management frames.
dot1PortInDiscards	Count of valid frames received which were discarded (that is, filtered) by the Forwarding Process.
dot1TpLearnedEntry Discards	The total number of Forwarding Database entries, which have been or would have been learnt, but have been discarded due to a lack of space to store them in the Forwarding Database. If this counter is increasing, it indicates that the Forwarding Database is regularly becoming full (a condition which has unpleasant performance effects on the subnetwork). If this counter has a significant value but is not presently increasing, it indicates that the problem has been occurring but is not persistent.
dot1StpPortForward Transitions	The number of times this port has transitioned from the Learning state to the Forwarding state.

Ethernet Statistics

Use the following command to display the ethernet statistics of the selected port:

`show interface port` *<port alias or number>* `ethernet-counters`

Command mode: All

```
Ethernet statistics for port 1:
dot3StatsAlignmentErrors:                   0
dot3StatsFCSErrors:                         0
dot3StatsSingleCollisionFrames:             0
dot3StatsMultipleCollisionFrames:           0
dot3StatsLateCollisions:                    0
dot3StatsExcessiveCollisions:               0
dot3StatsInternalMacTransmitErrors:        NA
dot3StatsFrameTooLongs:                     0
dot3StatsInternalMacReceiveErrors:          0
```

Table 87. Ethernet Statistics of a Port

Statistics	Description
dot3StatsAlignment Errors	A count of frames received on a particular interface that are not an integral number of octets in length and do not pass the Frame Check Sequence (FCS) check. The count represented by an instance of this object is incremented when the `alignmentError` status is returned by the MAC service to the Logical Link Control (LLC) (or other MAC user). Received frames for which multiple error conditions obtained are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
dot3StatsFCSErrors	A count of frames received on a particular interface that are an integral number of octets in length but do not pass the Frame Check Sequence (FCS) check. The count represented by an instance of this object is incremented when the `frameCheckError` status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions obtained are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.

Table 87. Ethernet Statistics of a Port (continued)

Statistics	**Description**
dot3StatsSingleCollision Frames	A count of successfully transmitted frames on a particular interface for which transmission is inhibited by exactly one collision. A frame that is counted by an instance of this object is also counted by the corresponding instance of either the `ifOutUcastPkts`, `ifOutMulticastPkts`, or `ifOutBroadcastPkts`, and is not counted by the corresponding instance of the `dot3StatsMultipleCollisionFrame` object.
dot3StatsMultipleCollision Frames	A count of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision. A frame that is counted by an instance of this object is also counted by the corresponding instance of either the `ifOutUcastPkts`, `ifOutMulticastPkts`, or `ifOutBroadcastPkts`, and is not counted by the corresponding instance of the `dot3StatsSingleCollisionFrames` object.
dot3StatsLateCollisions	The number of times that a collision is detected on a particular interface later than 512 bit-times into the transmission of a packet. Five hundred and twelve bit-times corresponds to 51.2 microseconds on a 10 Mbit/s system. A (late) collision included in a count represented by an instance of this object is also considered as a (generic) collision for purposes of other collision-related statistics.
dot3StatsExcessive Collisions	A count of frames for which transmission on a particular interface fails due to excessive collisions.
dot3StatsInternalMac TransmitErrors	A count of frames for which transmission on a particular interface fails due to an internal MAC sub layer transmit error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of either the `dot3StatsLateCollisions` object, the `dot3StatsExcessiveCollisions` object, or the `dot3StatsCarrierSenseErrors` object. The precise meaning of the count represented by an instance of this object is implementation-specific. In particular, an instance of this object may represent a count of transmission errors on a particular interface that are not otherwise counted.

Table 87. Ethernet Statistics of a Port (continued)

Statistics	Description
dot3StatsFrameTooLongs	A count of frames received on a particular interface that exceed the maximum permitted frame size. The count represented by an instance of this object is incremented when the `frameTooLong` status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions obtained are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
dot3StatsInternalMac ReceiveErrors	A count of frames for which reception on a particular interface fails due to an internal MAC sub layer receive error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of either the `dot3StatsFrameTooLongs` object, the `dot3StatsAlignmentErrors` object, or the `dot3StatsFCSErrors` object. The precise meaning of the count represented by an instance of this object is implementation-specific. In particular, an instance of this object may represent a count of received errors on a particular interface that are not otherwise counted.

Interface Statistics

Use the following command to display the interface statistics of the selected port:

show interface port *<port alias or number>* interface-counters

Command mode: All.

```
Interface statistics for port 1:
                     ifHCIn Counters       ifHCOut Counters
Octets:                  51697080313            51721056808
UcastPkts:                  65356399               65385714
BroadcastPkts:                     0                   6516
MulticastPkts:                     0                      0
FlowCtrlPkts:                      0                      0
PriFlowCtrlPkts:                   0                      0
Discards:                          0                      0
Errors:                            0                  21187


Ingress Discard reasons:                   Egress Discard reasons:

VLAN Discards:                     0       HOL-blocking Discards:              0
Filter Discards:                   0       MMU Discards:                       0
Policy Discards:                   0       Cell Error Discards:                0
Non-Forwarding State:              0       MMU Aging Discards:                 0
IBP/CBP Discards:                  0       Other Discards:                     0

Empty Egress Portmap:           3085 *
* Check for "HOL-blocking" discards on associated egress ports
```

Table 88. Interface Statistics of a Port

Statistics	Description
ifInOctets	The total number of octets received on the interface, including framing characters.
ifInUcastPkts	The number of packets, delivered by this sub-layer to a higher sub- layer, which were not addressed to a multicast or broadcast address at this sub-layer.
ifInBroadcastPkts	The number of packets, delivered by this sub-layer to a higher sub- layer, which were addressed to a broadcast address at this sub-layer.
ifInMulticastPkts	The total number of packets that higher-level protocols requested to be transmitted, and which were addressed to a multicast address at this sub-layer, including those that were discarded or not sent. For a MAC layer protocol, this includes both Group and Functional addresses.
ifInFlowControlPkts	The total number of flow control `pause` packets received on the interface.
ifInPriFlowControlPkts	The total number of priority flow control `pause` packets received on the interface.

Table 88. Interface Statistics of a Port (continued)

Statistics	Description
ifInDiscards	The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being delivered to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.
ifInErrors	For packet-oriented interfaces, the number of inbound packets that contained errors preventing them from being delivered to a higher-layer protocol. For character-oriented or fixed-length interfaces, the number of inbound transmission units that contained errors preventing them from being deliverable to a higher-layer protocol.
ifOutOctets	The total number of octets transmitted out of the interface, including framing characters.
ifOutUcastPkts	The total number of packets that higher-level protocols requested to be transmitted, and which were not addressed to a multicast or broadcast address at this sub-layer, including those that were discarded or not sent.
ifOutBroadcastPkts	The total number of packets that higher-level protocols requested to be transmitted, and which were addressed toa broadcast address at this sub-layer, including those that were discarded or not sent. This object is a 64-bit version of `ifOutBroadcastPkts`.
ifOutMulticastPkts	The total number of packets that higher-level protocols requested to be transmitted, and which were addressed to a multicast address at this sub-layer, including those that were discarded or not sent. For a MAC layer protocol, this includes both Group and Functional addresses. This object is a 64-bit version of `ifOutMulticastPkts`.
ifOutFlowControlPkts	The total number of flow control `pause` packets transmitted out of the interface.
ifOutDiscards	The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free up buffer space.
ifOutErrors	For packet-oriented interfaces, the number of outbound packets that could not be transmitted because of errors. For character-oriented or fixed-length interfaces, the number of outbound transmission units that could not be transmitted because of errors.
VLAN Discards	Discarded because the packet was tagged with a VLAN to which this port is not a member.

Table 88. Interface Statistics of a Port (continued)

Statistics	**Description**
Filter Discards	Dropped by the Content Aware Engine (user-configured filter).
Policy Discards	Dropped due to policy setting. For example, due to a user-configured static entry.
Non-Forwarding State	Discarded because the ingress port is not in the forwarding state.
IBP/CBP Discards	Discarded because of Ingress Back Pressure (flow control), or because the Common Buffer Pool is full (for example, insufficient packet buffering).
HOL-blocking Discards	Discarded because of the Head Of Line (HOL) blocking mechanism. Low-priority packets are placed in a separate queue and can be discarded while applications or the TCP protocol determine whether a retransmission is necessary. HOL blocking forces transmission to stop until the overloaded egress port buffer can receive data again.
MMU Discards	Discarded because of the Memory Management Unit.
Cell Error Discards	
MMU Aging Discards	
Other Discards	Discarded packets not included in any category.

Interface Protocol Statistics

Use the following command to display the interface protocol statistics of the selected port:

show interface port *<port alias or number>* ip-counters

Command mode: All

```
GEA IP statistics for port 1:
ipInReceives   :         0
ipInHeaderError:         0
ipInDiscards   :         0
```

Table 89. Interface Protocol Statistics of a Port

Statistics	**Description**
ipInReceives	The total number of input datagrams received from interfaces, including those received in error.
ipInHeaderErrors	The number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity (the switch).
ipInDiscards	The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (for example, for lack of buffer space). Note that this counter does not include any datagrams discarded while awaiting re-assembly.

Link Statistics

Use the following command to display the link statistics of the selected port:

show interface port *<port alias or number>* link-counters

Command mode: All

```
Link statistics for port 1:
linkStateChange:             1
```

Table 90. Link Statistics of a Port

Statistics	**Description**
linkStateChange	The total number of link state changes.

RMON Statistics

Use the following command to display the Remote Monitoring (RMON) statistics of the selected port:

```
show interface port <port alias or number> rmon-counters
```

Command mode: All.

```
RMON statistics for port EXT2:

etherStatsDropEvents:                NA
etherStatsOctets:                     0
etherStatsPkts:                       0
etherStatsBroadcastPkts:              0
etherStatsMulticastPkts:              0
etherStatsCRCAlignErrors:             0
etherStatsUndersizePkts:              0
etherStatsOversizePkts:               0
etherStatsFragments:                 NA
etherStatsJabbers:                    0
etherStatsCollisions:                 0
etherStatsPkts64Octets:               0
etherStatsPkts65to127Octets:          0
etherStatsPkts128to255Octets:         0
etherStatsPkts256to511Octets:         0
etherStatsPkts512to1023Octets:        0
etherStatsPkts1024to1518Octets:       0
```

Table 91. RMON Statistics of a Port

Statistics	**Description**
etherStatsDropEvents	The total number of packets received that were dropped because of system resource constraints.
etherStatsOctets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).
etherStatsPkts	The total number of packets (including bad packets, broadcast packets, and multicast packets) received.
etherStatsBroadcastPkts	The total number of good packets received that were directed to the broadcast address.
etherStatsMulticastPkts	The total number of good packets received that were directed to a multicast address.
etherStatsCRCAlignErrors	The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).

Table 91. RMON Statistics of a Port (continued)

Statistics	Description
etherStatsUndersizePkts	The total number of packets received that were less than 64 octets long (excluding framing bits but including FCS octets) and were otherwise well formed.
etherStatsOversizePkts	The total number of packets received that were longer than 1518 octets (excluding framing bits but including FCS octets) and were otherwise well formed.
etherStatsFragments	The total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
etherStatsJabbers	The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Jabber is defined as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.
etherStatsCollisions	The best estimate of the total number of collisions on this Ethernet segment.
etherStatsPkts64Octets	The total number of packets (including bad packets) received that were less than or equal to 64 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts65to127Octets	The total number of packets (including bad packets) received that were greater than 64 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts128to255Octets	The total number of packets (including bad packets) received that were greater than 127 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts256to511Octets	The total number of packets (including bad packets) received that were greater than 255 octets in length (excluding framing bits but including FCS octets).

Table 91. RMON Statistics of a Port (continued)

Statistics	Description
etherStatsPkts512to1023 Octets	The total number of packets (including bad packets) received that were greater than 511 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts1024to1518 Octets	The total number of packets (including bad packets) received that were greater than 1023 octets in length (excluding framing bits but including FCS octets).

QoS Queue Counter-Based Statistics

Use the following command to display the counter-based QoS queue statistics of the selected port:

`show interface port` *<port alias or number>* `egress-queue-counters`

Command mode: All.

```
QoS statistics for port INTA14:
QoS Queue 0:
    Tx Packets:                          664872
    Dropped Packets:                          0
    Tx Bytes:                          46791050
    Dropped Bytes:                            0
QoS Queue 1:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 2:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 3:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 4:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 5:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 6:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 7:
    Tx Packets:                            9112
    Dropped Packets:                          0
    Tx Bytes:                           1463040
    Dropped Bytes:                            0
```

Table 92. QoS Queue Counter-Based Statistics of a Port

Statistics	**Description**
Tx Packets	Total number of successfully transmitted packets for the QoS queue
Dropped Packets	Total number of dropped packets for the QoS queue

Table 92. QoS Queue Counter-Based Statistics of a Port (continued)

Statistics	Description
Tx Bytes	Total number of successfully transmitted bytes for the QoS queue
Dropped Bytes	Total number of dropped bytes for the QoS queue

QoS Queue Rate-Based Statistics

Use the following command to display the rate-based QoS queue statistics of the selected port:

```
show interface port <port alias or number> egress-queue-rate
```

Command mode: All.

```
QoS Rate for port INTA14:
QoS Queue 0:
    Tx Packets:                               5
    Dropped Packets:                          0
    Tx Bytes:                               363
    Dropped Bytes:                            0
QoS Queue 1:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 2:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 3:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 4:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 5:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 6:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
QoS Queue 7:
    Tx Packets:                               0
    Dropped Packets:                          0
    Tx Bytes:                                 0
    Dropped Bytes:                            0
```

Table 93. QoS Queue Rate-Based Statistics of a Port

Statistics	Description
Tx Packets	Number of successfully transmitted packets per second for the QoS queue
Dropped Packets	Number of dropped packets per second for the QoS queue
Tx Bytes	Number of successfully transmitted bytes per second for the QoS queue
Dropped Bytes	Number of dropped bytes per second for the QoS queue

Trunk Group Statistics

Table 94. Trunk Group Statistics Commands

Command Syntax and Usage
`show interface portchannel` *<trunk group number>* `interface counters` Displays interface statistics for the trunk group. **Command mode:** All
`clear interface portchannel` *<trunk group number>* `counters` Clears all the statistics on the selected trunk group. **Command mode:** All except User EXEC

Layer 2 Statistics

Table 95. Layer 2 Statistics Commands

Command Syntax and Usage
`show mac-address-table counters` Displays FDB statistics. See page 158 for sample output. **Command mode:** All
`clear mac-address-table counters` Clears FDB statistics. **Command mode:** Privileged EXEC
`show interface port` *<port alias or number>* `lacp counters` Displays Link Aggregation Control Protocol (LACP) statistics. See page 158 for sample output. **Command mode:** All
`clear interface port` *<port alias or number>* `lacp counters` Clears Link Aggregation Control Protocol (LACP) statistics. **Command mode:** Privileged EXEC
`show hotlinks counters` Displays Hot Links statistics. See page 159 for sample output. **Command mode:** All
`clear hotlinks` Clears all Hot Links statistics. **Command mode:** Privileged EXEC
`show interface port` *<port alias or number>* `lldp counters` Displays LLDP statistics. See page 160 for sample output. **Command mode:** All
`show oam counters` Displays OAM statistics. See page 161 for sample output. **Command mode:** All
`show vlag statistics` Displays all vLAG statistics. See page 162 for sample output. **Command mode:** All

FDB Statistics

Use the following command to display statistics regarding the use of the forwarding database, including the number of new entries, finds, and unsuccessful searches:

```
show mac-address-table counters
```

Command mode: All

```
FDB statistics:
 current:            83   hiwat:              855
```

FDB statistics are described in the following table:

Table 96. Forwarding Database Statistics

Statistic	Description
current	Current number of entries in the Forwarding Database.
hiwat	Highest number of entries recorded at any given time in the Forwarding Database.

LACP Statistics

Use the following command to display Link Aggregation Control Protocol (LACP) statistics:

```
show interface port <port alias or number> lacp counters
```

Command mode: All

```
Port 1:
 --------------------------------------
 Valid LACPDUs received:         - 870
 Valid Marker PDUs received:     - 0
 Valid Marker Rsp PDUs received: - 0
 Unknown version/TLV type:       - 0
 Illegal subtype received:       - 0
 LACPDUs transmitted:            - 6031
 Marker PDUs transmitted:        - 0
 Marker Rsp PDUs transmitted:    - 0
```

Link Aggregation Control Protocol (LACP) statistics are described in the following table:

Table 97. LACP Statistics

Statistic	Description
Valid LACPDUs received	Total number of valid LACP data units received.
Valid Marker PDUs received	Total number of valid LACP marker data units received.
Valid Marker Rsp PDUs received	Total number of valid LACP marker response data units received.

Table 97. LACP Statistics

Statistic	Description
Unknown version/TLV type	Total number of LACP data units with an unknown version or type, length, and value (TLV) received.
Illegal subtype received	Total number of LACP data units with an illegal subtype received.
LACPDUs transmitted	Total number of LACP data units transmitted.
Marker PDUs transmitted	Total number of LACP marker data units transmitted.
Marker Rsp PDUs transmitted	Total number of LACP marker response data units transmitted.

Hotlinks Statistics

Use the following command to display Hot Links statistics:

```
show hotlinks counters
```

Command mode: All

```
Hot Links Trigger Stats:

Trigger 1 statistics:
    Trigger Name: Trigger 1
    Master active:          0
    Backup active:          0
    FDB update:             0   failed: 0
```

The following table describes the Hotlinks statistics:

Table 98. Hotlinks Statistics

Statistic	Description
Master active	Total number of times the Master interface transitioned to the Active state.
Backup active	Total number of times the Backup interface transitioned to the Active state.
FDB update	Total number of FDB update requests sent.
failed	Total number of FDB update requests that failed.

LLDP Port Statistics

Use the following command to display LLDP statistics:

```
show interface port <port alias or number> lldp counters
```

Command mode: All

```
LLDP Port 1 Statistics
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Frames Transmitted          : 0
Frames Received             : 0
Frames Received in Errors   : 0
Frames Discarded            : 0
TLVs Unrecognized           : 0
Neighbors Aged Out          : 0
...
```

The following table describes the LLDP port statistics:

Table 99. LLDP port Statistics

Statistic	**Description**
`Frames Transmitted`	Total number of LLDP frames transmitted.
`Frames Received`	Total number of LLDP frames received.
`Frames Received in Errors`	Total number of LLDP frames that had errors.
`Frames Discarded`	Total number of LLDP frames discarded.
`TLVs Unrecognized`	Total number of unrecognized TLV (Type, Length, and Value) fields received.
`Neighbors Aged Out`	Total number of neighbor devices that have had their LLDP information aged out.

OAM Statistics

Use the following command to display OAM statistics:

```
show oam counters
```

Command mode: All

```
OAM statistics on port 1
------------------------------------------
Information OAMPDU Tx :      0
Information OAMPDU Rx :      0
Unsupported OAMPDU Tx :      0
Unsupported OAMPDU Tx :      0

Local faults
-------------
    0 Link fault records
    0 Critical events
    0 Dying gasps

Remote faults
-------------
    0 Link fault records
    0 Critical events
    0 Dying gasps
```

OAM statistics include the following:

- Total number of OAM Protocol Data Units (OAMPDU) transmitted and received.
- Total number of unsupported OAM Protocol Data Units (OAMPDU) transmitted and received.
- Local faults detected
- Remote faults detected

vLAG Statistics

The following table describes the vLAG statistics commands:

Table 100. vLAG Statistics Options

Command Syntax and Usage
`show vlag isl-statistics` Displays vLAG ISL statistics for the selected port. See page 162 for sample output. **Command mode:** All
`clear vlag statistics` Clears all vLAG statistics. **Command mode:** Privileged EXEC
`show vlag statistics` Displays all vLAG statistics. See page 162 for sample output. **Command mode:** All

vLAG ISL Statistics

Use the following command to display vLAG statistics:

```
show vlag isl-statistics
```

Command mode: All

```
                                 In Counter        Out Counter
Octets:                           2755820              2288
Packets:                            21044                26
```

ISL statistics include the total number of octets received/transmitted, and the total number of packets received/transmitted over the Inter-Switch Link (ISL).

vLAG Statistics

Use the following command to display vLAG statistics:

```
show vlag statistics
```

Command mode: All

```
vLAG PDU sent:
Role Election:        10        System Info:           7
Peer Instance Enable: 624       Peer Instance Disable: 52
FDB Dynamic Add:      166079    FDB Dynamic Del:       33856
FDB Inactive Add:     0         FDB Inactive Del:      0
Health Check:         4665      ISL Hello:             2126
Other:                0         Unknown:               0


vLAG PDU received:
Role Election:        11        System Info:           6
Peer Instance Enable: 572       Peer Instance Disable: 52
FDB Dynamic Add:      122523    FDB Dynamic Del:       38991
FDB Inactive Add:     7200      FDB Inactive Del:      0
Health Check:         4656      ISL Hello:             2114
Other:                0         Unknown:               0


vLAG IGMP packets forwarded:
IGMP Reports:         0
IGMP Leaves:          0
Bingo-1#
```

The following table describes the vLAG statistics:

Table 101. VLAG Statistics

Statistic	Description
`Role Election`	Total number of vLAG PDUs sent for role elections.
`System Info`	Total number of vLAG PDUs sent for getting system information.
`Peer Instance Enable`	Total number of vLAG PDUs sent for enabling peer instance.

Table 101. VLAG Statistics (continued)

Statistic	Description
`Peer Instance Disable`	Total number of vLAG PDUs sent for disabling peer instance.
`FDB Dynamic Add`	Total number of vLAG PDUs sent for addition of FDB dynamic entry.
`FDB Dynamic Del`	Total number of vLAG PDUs sent for deletion of FDB dynamic entry.
`FDB Inactive Add`	Total number of vLAG PDUs sent for addition of FDB inactive entry.
`FDB Inactive Del`	Total number of vLAG PDUs sent for deletion of FDB inactive entry.
`Health Check`	Total number of vLAG PDUs sent for health checks.
`ISL Hello`	Total number of vLAG PDUs sent for ISL `hello`.
`Other`	Total number of vLAG PDUs sent for other reasons.
`Unknown`	Total number of vLAG PDUs sent for unknown operations.

Layer 3 Statistics

Table 102. Layer 3 Statistics Commands

Command Syntax and Usage
`show ip gea` `show ip gea bucket` *<IP address>* Displays Gigabit Ethernet Aggregators (GEA) statistics. GEA statistics are used by service and support personnel. **Command mode:** All
`show ip counters` Displays IP statistics. See page 168 for sample output. **Command mode:** All
`clear ip counters` Clears IPv4 statistics. Use this command with caution as it deletes all the IPv4 statistics. **Command mode:** Privileged EXEC
`show ipv6 counters` Displays IPv6 statistics. See page 170 for sample output. **Command mode:** All
`clear ipv6 counters` Clears IPv6 statistics. Use this command with caution as it deletes all the IPv6 statistics. **Command mode:** Privileged EXEC
`show ip route counters` Displays route statistics. See page 174 for sample output. **Command mode:** All
`show ip arp counters` Displays Address Resolution Protocol (ARP) statistics. See page 176 for sample output. **Command mode:** All
`show ip dns counters` Displays Domain Name System (DNS) statistics. See page 176 for sample output. **Command mode:** All
`show ip icmp counters` Displays ICMP statistics. See page 177 for sample output. **Command mode:** All

Table 102. Layer 3 Statistics Commands (continued)

Command Syntax and Usage
`show ip tcp counters` Displays TCP statistics. See page 179 for sample output. **Command mode:** All
`show ip udp counters` Displays UDP statistics. See page 180 for sample output. **Command mode:** All
`show ip ospf counters` Displays OSPF statistics. See page 187 for sample output. **Command mode:** All
`show ipv6 ospf counters` Displays OSPFv3 statistics. See page 190 for sample output. **Command mode:** All
`show ip igmp counters` Displays IGMP statistics. See page 181 for sample output. **Command mode:** All
`show ip igmp vlan` *<vlan number>* `counter` Displays IGMP statistics for a specific VLAN. See page 181 for sample output. **Command mode:** All
`show layer3 igmp-groups` Displays the total number of IGMP groups that are registered on the switch. **Command mode:** All
`show layer3 ipmc-groups` Displays the total number of current IP multicast groups that are registered on the switch. **Command mode:** All
`show ip vrrp counters` When virtual routers are configured, you can display the protocol statistics for VRRP. See page 195 for sample output. **Command mode:** All
`show ip pim counters` Displays PIM statistics for all configured PIM interfaces. See page 196 for sample output. **Command mode:** All
`show ip pim mroute count` Displays statistics of various multicast entry types. **Command mode:** All

Table 102. Layer 3 Statistics Commands (continued)

Command Syntax and Usage
`show ip pim interface` {<*interface number*>|`loopback`|`port` <*port number*>} `counters` Displays PIM statistics for the selected interface. **Command mode:** All
`show ip rip counters` Displays Routing Information Protocol (RIP) statistics. See page 197 for sample output. **Command mode:** All
`clear ip arp counters` Clears Address Resolution Protocol (ARP) statistics. **Command mode:** Privileged EXEC
`clear ip dns counters` Clears Domain Name System (DNS) statistics. **Command mode:** Privileged EXEC
`clear ip icmp counters` Clears Internet Control Message Protocol (ICMP) statistics. **Command mode:** Privileged EXEC
`clear ip tcp counters` Clears Transmission Control Protocol (TCP) statistics. **Command mode:** Privileged EXEC
`clear ip udp counters` Clears User Datagram Protocol (UDP) statistics. **Command mode:** Privileged EXEC
`clear ip igmp` [<*VLAN number*>] `counters` Clears IGMP statistics. **Command mode:** Privileged EXEC
`clear ip vrrp counters` Clears VRRP statistics. **Command mode:** Privileged EXEC
`clear ip pim counters` Clears PIM statistics for all interfaces. **Command mode:** Privileged EXEC
`clear ip pim interface` {<*interface number*>|`loopback`|`port` <*port number*>} `counters` Clears PIM statistics on the selected interface. **Command mode**: Privileged EXEC

Table 102. Layer 3 Statistics Commands (continued)

Command Syntax and Usage
`clear ip counters` Clears IP statistics. Use this command with caution as it will delete all the IP statistics. **Command mode:** Privileged EXEC
`clear ip rip counters` Clears Routing Information Protocol (RIP) statistics. **Command mode:** Privileged EXEC
`clear ip ospf counters` Clears Open Shortest Path First (OSPF) statistics. **Command mode:** Privileged EXEC
`clear ipv6 ospf counters` Clears Open Shortest Path First version 3 (OSPFv3) statistics. **Command mode:** Privileged EXEC
`show layer3 counters` Dumps all Layer 3 statistics. Use this command to gather data for tuning and debugging switch performance. If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump command. **Command mode:** All

IPv4 Statistics

The following command displays IPv4 statistics:

```
show ip counters
```

Command mode: All

```
IP statistics:
ipInReceives:              0   ipInHdrErrors:           0
ipInAddrErrors:            0
ipInUnknownProtos:         0   ipInDiscards:            0
ipInDelivers:              0   ipOutRequests:        1274
ipOutDiscards:             0
ipDefaultTTL:            255
```

Use the following command to clear IPv4 statistics:

```
clear ip counters
```

Table 103. IPv4 Statistics

Statistics	Description
ipInReceives	The total number of input datagrams received from interfaces, including those received in error.
ipInHdrErrors	The number of input datagrams discarded due to errors in their IP headers, including bad `checksums`, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, and so forth.
ipInAddrErrors	The number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity (the switch). This count includes invalid addresses (for example, 0.0.0.0) and addresses of unsupported Classes (for example, Class E). For entities which are not IP Gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.
ipInUnknownProtos	The number of locally addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.
ipInDiscards	The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (for example, for lack of buffer space). Note that this counter does not include any datagrams discarded while awaiting re-assembly.
ipInDelivers	The total number of input datagrams successfully delivered to IP user-protocols (including ICMP).

Table 103. IPv4 Statistics (continued)

Statistics	**Description**
ipOutRequests	The total number of IP datagrams which local IP user-protocols (including ICMP) supplied to IP in requests for transmission. Note that this counter does not include any datagrams counted in `ipForwDatagrams`.
ipOutDiscards	The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (for example, for lack of buffer space). Note that this counter would include datagrams counted in `ipForwDatagrams` if any such packets met this (discretionary) discard criterion.
ipDefaultTTL	The default value inserted into the `Time-To-Live` (TTL) field of the IP header of datagrams originated at this entity (the switch), whenever a TTL value is not supplied by the transport layer protocol.

IPv6 Statistics

The following command displays IPv6 statistics:

```
show ipv6 counters
```

Command mode: All

```
    IPv6 Statistics
    ***************
144  Rcvd          0    HdrErrors     0    TooBigErrors
0    AddrErrors    0    FwdDgrams     0    UnknownProtos
0    Discards      144  Delivers      130  OutRequests
0    OutDiscards   0    OutNoRoutes   0    ReasmReqds
0    ReasmOKs      0    ReasmFails
0    FragOKs       0    FragFails     0    FragCreates
7    RcvdMCastPkt  2    SentMcastPkts 0    TruncatedPkts
0    RcvdRedirects 0    SentRedirects
    ICMP Statistics
    ***************
    Received :
33  ICMPPkts     0 ICMPErrPkt      0 DestUnreach  0 TimeExcds
0   ParmProbs    0 PktTooBigMsg    9 ICMPEchoReq  10 ICMPEchoReps
0   RouterSols   0 RouterAdv       5 NeighSols    9 NeighAdv
0   Redirects    0 AdminProhib     0 ICMPBadCode
    Sent
19  ICMPMsgs     0 ICMPErrMsgs     0 DstUnReach   0 TimeExcds
0   ParmProbs    0 PktTooBigs      10 EchoReq     9 EchoReply
0   RouterSols   0 RouterAdv       11 NeighSols   5 NeighborAdv
0   RedirectMsgs 0 AdminProhibMsgs
    UDP statistics
    **************
    Received :
0 UDPDgrams     0 UDPNoPorts       0 UDPErrPkts
    Sent :
0 UDPDgrams
```

Use the following command to clear IPv6 statistics:

```
clear ipv6 counters
```

Table 104. describes the IPv6 statistics.

Table 104. IPv6 Statistics

Statistic	Description
Rcvd	Number of datagrams received from interfaces, including those received in error.
HdrErrors	Number of datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, and so forth.
TooBigErrors	The number of input datagrams that could not be forwarded because their size exceeded the link MTU of outgoing interface.

Table 104. IPv6 Statistics (continued)

Statistic	**Description**
AddrErrors	Number of datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity (the switch). This count includes invalid addresses. For entities which are not IP Gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.
FwdDgrams	Number of input datagrams for which this entity (the switch) was not their final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities which do not act as IP Gateways, this counter will include only those packets, which were Source-Routed via this entity (the switch), and the Source-Route option processing was successful.
UnknownProtos	Number of locally addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.
Discards	Number of IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (for example, for lack of buffer space). Note that this counter does not include any datagrams discarded while awaiting re-assembly.
Delivers	Number of datagrams successfully delivered to IP user-protocols (including ICMP).
OutRequests	Number of IP datagrams which local IP user-protocols (including ICMP) supplied to IP in requests for transmission.
OutDiscards	Number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (for example, for lack of buffer space).
OutNoRoutes	Number of IP datagrams discarded because no route could be found to transmit them to their destination. Note that this includes any datagrams which a host cannot route because all of its default gateways are down.
ReasmReqds	Number of IP fragments received which needed to be reassembled at this entity (the switch).
ReasmOKs	Number of IP datagrams successfully re- assembled.
ReasmFails	Number of failures detected by the IP re- assembly algorithm (for whatever reason: timed out, errors, and so forth). Note that this is not necessarily a count of discarded IP fragments since some algorithms (notably the algorithm in RFC 815) can lose track of the number of fragments by combining them as they are received.
FragOKs	Number of IP datagrams that have been successfully fragmented at this entity (the switch).

Table 104. IPv6 Statistics (continued)

Statistic	Description
FragFails	Number of IP datagrams that have been discarded because they needed to be fragmented at this entity (the switch) but could not be, for example, because their `Don't Fragment` flag was set.
FragCreates	Number of IP datagram fragments that have been generated as a result of fragmentation at this entity (the switch).
RcvdMCastPkt	The number of multicast packets received by the interface.
SentMcastPkts	The number of multicast packets transmitted by the interface.
TruncatedPkts	The number of input datagrams discarded because datagram frame didn't carry enough data.
RcvdRedirects	The number of Redirect messages received by the interface.
SentRedirects	The number of Redirect messages sent.

The following table describes the IPv6 ICMP statistics.

Table 105. ICMP Statistics

Statistic	Description
Received	
ICMPPkts	Number of ICMP messages which the entity (the switch) received.
ICMPErrPkt	Number of ICMP messages which the entity (the switch) received but determined as having ICMP-specific errors (bad ICMP `checksums`, bad length, and so forth).
DestUnreach	Number of ICMP Destination Unreachable messages received.
TimeExcds	Number of ICMP Time Exceeded messages received.
ParmProbs	Number of ICMP Parameter Problem messages received.
PktTooBigMsg	The number of ICMP Packet Too Big messages received by the interface.
ICMPEchoReq	Number of ICMP Echo (request) messages received.
ICMPEchoReps	Number of ICMP Echo Reply messages received.
RouterSols	Number of Router Solicitation messages received by the switch.
RouterAdv	Number of Router Advertisements received by the switch.
NeighSols	Number of Neighbor Solicitations received by the switch.
NeighAdv	Number of Neighbor Advertisements received by the switch.
Redirects	Number of ICMP Redirect messages received.
AdminProhib	The number of ICMP destination unreachable/communication administratively prohibited messages received by the interface.
ICMPBadCode	The number of ICMP Parameter Problem messages received by the interface.

Table 105. ICMP Statistics

Statistic	**Description**
Sent	
ICMPMsgs	Number of ICMP messages which this entity (the switch) attempted to send.
ICMPErrMsgs	Number of ICMP messages which this entity (the switch) did not send due to problems discovered within ICMP such as a lack of buffer. This value should not include errors discovered outside the ICMP layer such as the inability of IP to route the resultant datagram. In some implementations there may be no types of errors that contribute to this counter's value.
DstUnReach	Number of ICMP Destination Unreachable messages sent.
TimeExcds	Number of ICMP Time Exceeded messages sent.
ParmProbs	Number of ICMP Parameter Problem messages sent.
PktTooBigs	The number of ICMP Packet Too Big messages sent by the interface.
EchoReq	Number of ICMP Echo (request) messages sent.
EchoReply	Number of ICMP Echo Reply messages sent.
RouterSols	Number of Router Solicitation messages sent by the switch.
RouterAdv	Number of Router Advertisements sent by the switch.
NeighSols	Number of Neighbor Solicitations sent by the switch.
NeighAdv	Number of Neighbor Advertisements sent by the switch.
RedirectMsgs	Number of ICMP Redirect messages sent. For a host, this object will always be zero, since hosts do not send redirects.
AdminProhibMsgs	Number of ICMP destination unreachable/communication administratively prohibited messages sent.

Table 106. describes the UDP statistics.

Table 106. UDP Statistics

Statistic	**Description**
Received	
UDPDgrams	Number of UDP datagrams received by the switch.
UDPNoPorts	Number of received UDP datagrams for which there was no application at the destination port.
UDPErrPkts	Number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port.
Sent	
UDPDgrams	Number of UDP datagrams sent from this entity (the switch).

IPv4 Route Statistics

The following command displays IPv4 route statistics:

```
show ip route counters
```

Command mode: All

```
Route statistics:
----------------
Current total outstanding routes     :           1
Highest number ever recorded         :           1
Current static routes                :           0
Current RIP routes                   :           0
Current OSPF routes                  :           0
Current BGP routes                   :           0
Maximum supported routes             :        6144

ECMP statistics (active in ASIC):
--------------------------------
Maximum number of ECMP routes        :        6144
Maximum number of static ECMP routes :         128
Number of routes with ECMP paths     :           0
```

Table 107. Route Statistics

Statistics	Description
Current total outstanding routes	Total number of outstanding routes in the route table.
Highest number ever recorded	Highest number of routes ever recorded in the route table.
Current static routes	Total number of static routes in the route table.
Current RIP routes	Total number of Routing Information Protocol (RIP) routes in the route table.
Current OSPF routes	Total number of OSPF routes in the route table.
Current BGP routes	Total number of Border Gateway Protocol routes in the route table.
Maximum supported routes	Maximum number of routes that are supported.
Maximum number of ECMP routes	Maximum number of ECMP routes that are supported.
Maximum number of static ECMP routes	Maximum number of static ECMP routes that are supported.
Number of routes with ECMP paths	Current number of routes that contain ECMP paths.

IPv6 Route Statistics

The following command displays IPv6 route statistics:

```
show ipv6 route counters
```

Command mode: All

```
IPV6 Route statistics:
ipv6RoutesCur:              4  ipv6RoutesHighWater:        6
ipv6RoutesMax:           1156

ECMP statistics:
---------------
Maximum number of ECMP routes        :          600
Max ECMP paths allowed for one route :            5
Number of routes with ECMP paths     :            0
```

Table 108. IPv6 Route Statistics

Statistics	**Description**
ipv6RoutesCur	Total number of outstanding routes in the route table.
ipv6RoutesHighWater	Highest number of routes ever recorded in the route table.
ipv6RoutesMax	Maximum number of routes that are supported.
Maximum number of ECMP routes	Maximum number of ECMP routes supported.
Max ECMP paths allowed for one route	Maximum number of ECMP paths supported for each route.
Number of routes with ECMP paths	Current number of routes that contain ECMP paths.

Use the `clear` option to delete all IPv6 route statistics.

ARP statistics

The following command displays Address Resolution Protocol statistics.

```
show ip arp counters
```

Command mode: All

```
ARP statistics:
arpEntriesCur:              3  arpEntriesHighWater:          4
arpEntriesMax:           2048
```

Table 109. ARP Statistics

Statistic	Description
arpEntriesCur	The total number of outstanding ARP entries in the ARP table.
arpEntriesHighWater	The highest number of ARP entries ever recorded in the ARP table.
arpEntriesMax	The maximum number of ARP entries that are supported.

DNS Statistics

The following command displays Domain Name System statistics.

```
show ip dns counters
```

Command mode: All

```
DNS statistics:
dnsInRequests:              0
dnsOutRequests:             0
dnsBadRequests:             0
```

Table 110. DNS Statistics

Statistics	Description
dnsInRequests	The total number of DNS response packets that have been received.
dnsOutRequests	The total number of DNS response packets that have been transmitted.
dnsBadRequests	The total number of DNS request packets received that were dropped.

ICMP Statistics

The following command displays ICMP statistics:

```
show ip icmp counters
```

Command mode: All

```
ICMP statistics:
icmpInMsgs:              245802   icmpInErrors:              1393
icmpInDestUnreachs:          41   icmpInTimeExcds:              0
icmpInParmProbs:              0   icmpInSrcQuenchs:             0
icmpInRedirects:              0   icmpInEchos:                 18
icmpInEchoReps:          244350   icmpInTimestamps:             0
icmpInTimestampReps:          0   icmpInAddrMasks:              0
icmpInAddrMaskReps:           0   icmpOutMsgs:             253810
icmpOutErrors:                0   icmpOutDestUnreachs:         15
icmpOutTimeExcds:             0   icmpOutParmProbs:             0
icmpOutSrcQuenchs:            0   icmpOutRedirects:             0
icmpOutEchos:            253777   icmpOutEchoReps:             18
icmpOutTimestamps:            0   icmpOutTimestampReps:         0
icmpOutAddrMasks:             0   icmpOutAddrMaskReps:          0
```

Table 111. ICMP Statistics

Statistic	Description
icmpInMsgs	The total number of ICMP messages which the entity (the switch) received. Note that this counter includes all those counted by `icmpInErrors`.
icmpInErrors	The number of ICMP messages which the entity (the switch) received but determined as having ICMP-specific errors (bad ICMP `checksums`, bad length, and so forth).
icmpInDestUnreachs	The number of ICMP Destination Unreachable messages received.
icmpInTimeExcds	The number of ICMP Time Exceeded messages received.
icmpInParmProbs	The number of ICMP Parameter Problem messages received.
icmpInSrcQuenchs	The number of ICMP Source Quench (buffer almost full, stop sending data) messages received.
icmpInRedirects	The number of ICMP Redirect messages received.
icmpInEchos	The number of ICMP Echo (request) messages received.
icmpInEchoReps	The number of ICMP Echo Reply messages received.
icmpInTimestamps	The number of ICMP Timestamp (request) messages received.
icmpInTimestampReps	The number of ICMP Timestamp `Reply` messages received.

Table 111. ICMP Statistics (continued)

Statistic	**Description**
icmpInAddrMasks	The number of ICMP Address Mask Request messages received.
icmpInAddrMaskReps	The number of ICMP Address Mask Reply messages received.
icmpOutMsgs	The total number of ICMP messages which this entity (the switch) attempted to send. Note that this counter includes all those counted by `icmpOutErrors`.
icmpOutErrors	The number of ICMP messages which this entity (the switch) did not send due to problems discovered within ICMP such as a lack of buffer. This value should not include errors discovered outside the ICMP layer such as the inability of IP to route the resultant datagram. In some implementations there may be no types of errors that contribute to this counter's value.
icmpOutDestUnreachs	The number of ICMP Destination Unreachable messages sent.
icmpOutTimeExcds	The number of ICMP Time Exceeded messages sent.
icmpOutParmProbs	The number of ICMP Parameter Problem messages sent.
icmpOutSrcQuenchs	The number of ICMP Source Quench (buffer almost full, stop sending data) messages sent.
icmpOutRedirects	The number of ICMP Redirect messages sent. For a host, this object will always be zero, since hosts do not send redirects.
icmpOutEchos	The number of ICMP Echo (request) messages sent.
icmpOutEchoReps	The number of ICMP Echo Reply messages sent.
icmpOutTimestamps	The number of ICMP Timestamp (request) messages sent.
icmpOutTimestampReps	The number of ICMP Timestamp `Reply` messages sent.
icmpOutAddrMasks	The number of ICMP Address Mask Request messages sent.
icmpOutAddrMaskReps	The number of ICMP Address Mask Reply messages sent.

TCP Statistics

The following command displays TCP statistics:

```
show ip tcp counters
```

Command mode: All

```
TCP statistics:
tcpRtoAlgorithm:        4   tcpRtoMin:              0
tcpRtoMax:         240000   tcpMaxConn:           512
tcpActiveOpens:    252214   tcpPassiveOpens:        7
tcpAttemptFails:      528   tcpEstabResets:         4
tcpInSegs:         756401   tcpOutSegs:        756655
tcpRetransSegs:         0   tcpInErrs:              0
tcpCurrEstab:           0   tcpCurConn:             3
tcpOutRsts:           417
```

Table 112. TCP Statistics

Statistic	Description
tcpRtoAlgorithm	The algorithm used to determine the `timeout` value used for retransmitting unacknowledged octets.
tcpRtoMin	The minimum value permitted by a TCP implementation for the retransmission `timeout`, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission `timeout`. In particular, when the `timeout` algorithm is rsre(3), an object of this type has the semantics of the LBOUND quantity described in RFC 793.
tcpRtoMax	The maximum value permitted by a TCP implementation for the retransmission `timeout`, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission `timeout`. In particular, when the `timeout` algorithm is rsre(3), an object of this type has the semantics of the UBOUND quantity described in RFC 793.
tcpMaxConn	The limit on the total number of TCP connections the entity (the switch) can support. In entities where the maximum number of connections is dynamic, this object should contain the value -1.
tcpActiveOpens	The number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.
tcpPassiveOpens	The number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.
tcpAttemptFails	The number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state.

Table 112. TCP Statistics (continued)

Statistic	Description
tcpEstabResets	The number of times TCP connections have made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE-WAIT state.
tcpInSegs	The total number of segments received, including those received in error. This count includes segments received on currently established connections.
tcpOutSegs	The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.
tcpRetransSegs	The total number of segments retransmitted - that is, the number of TCP segments transmitted containing one or more previously transmitted octets.
tcpInErrs	The total number of segments received in error (for example, bad TCP `checksums`).
tcpCurrEstab	The total number of outstanding memory allocations from heap by TCP protocol stack.
tcpCurConn	The total number of outstanding TCP sessions that are currently opened.
tcpOutRsts	The number of TCP segments sent containing the RST flag.

UDP Statistics

The following command displays UDP statistics:

```
show ip udp counters
```

Command mode: All

```
UDP statistics:
udpInDatagrams:        54   udpOutDatagrams:        43
udpInErrors:            0   udpNoPorts:        1578077
```

Table 113. UDP Statistics

Statistic	Description
udpInDatagrams	The total number of UDP datagrams delivered to the switch.
udpOutDatagrams	The total number of UDP datagrams sent from this entity (the switch).
udpInErrors	The number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port.
udpNoPorts	The total number of received UDP datagrams for which there was no application at the destination port.

IGMP Statistics

The following command displays statistics about the use of the IGMP Multicast Groups:

```
show ip igmp counters
```

Command mode: All

```
IGMP vlan 2 statistics:
-----------------------------------------------------------------------
rxIgmpValidPkts:                0   rxIgmpInvalidPkts:                0
rxIgmpGenQueries:               0   rxIgmpGrpSpecificQueries:         0
rxIgmpGroupSrcSpecificQueries:  0   rxIgmpDiscardPkts:                0
rxIgmpLeaves:                   0   rxIgmpReports:                    0
txIgmpReports:                  0   txIgmpGrpSpecificQueries:         0
txIgmpLeaves:                   0   rxIgmpV3CurrentStateRecords:      0
rxIgmpV3SourceListChangeRecords:0   rxIgmpV3FilterChangeRecords:      0
txIgmpGenQueries:                    18
```

The following command displays statistics about the use of the IGMP Multicast Groups for a specific VLAN:

```
show ip igmp vlan <vlan number> counter
```

Command mode: All

```
IGMP vlan 147 statistics:
------------------------------------------------------------------
rxIgmpValidPkts:                0   rxIgmpInvalidPkts:                0
rxIgmpGenQueries:               0   rxIgmpGrpSpecificQueries:         0
rxIgmpGroupSrcSpecificQueries:  0   rxIgmpDiscardPkts:                0
rxIgmpLeaves:                   0   rxIgmpReports:                    0
txIgmpReports:                  0   txIgmpGrpSpecificQueries:         0
txIgmpLeaves:                   0   rxIgmpV3CurrentStateRecords:      0
rxIgmpV3SourceListChangeRecords:0   rxIgmpV3FilterChangeRecords:      0
txIgmpGenQueries:                    11
```

Table 114. IGMP Statistics

Statistic	Description
rxIgmpValidPkts	Total number of valid IGMP packets received
rxIgmpInvalidPkts	Total number of invalid packets received
rxIgmpGenQueries	Total number of General Membership Query packets received
rxIgmpGrpSpecificQueries	Total number of Membership Query packets received from specific groups
rxIgmpGroupSrcSpecificQueries	Total number of Group Source-Specific Queries (GSSQ) received
rxIgmpDiscardPkts	Total number of IGMP packets discarded
rxIgmpLeaves	Total number of Leave requests received

Table 114. IGMP Statistics (continued)

Statistic	**Description**
rxIgmpReports	Total number of Membership Reports received
txIgmpReports	Total number of Membership reports transmitted
txIgmpGrpSpecificQueries	Total number of Membership Query packets transmitted to specific groups
txIgmpLeaves	Total number of Leave messages transmitted
rxIgmpV3CurrentStateRecords	Total number of Current State records received
rxIgmpV3SourceListChangeRecords	Total number of Source List Change records received.
rxIgmpV3FilterChangeRecords	Total number of Filter Change records received.
txIgmpGenQueries	Total number of General Membership Query packets transmitted

MLD Statistics

Table 115 describes the commands used to view MLD statistics.

Table 115. MLD Statistics Commands

Command Syntax and Usage
`show ipv6 mld counters` Displays MLD statistics. See page 184 for sample output. **Command mode:** All
`show ipv6 mld groups counters` Displays total number of MLD entries. **Command mode:** All
`show ipv6 mld interface` Displays information for all MLD interfaces. **Command mode:** All
`show ipv6 mld interface` *<interface number>* Displays MLD interface statistics for the specified interface. **Command mode:** All
`show ipv6 mld interface` *<interface number>* `counters` Displays total number of MLD entries on the interface. **Command mode:** All
`show ipv6 mld interface counters` Displays total number of MLD entries. **Command mode:** All
`clear ipv6 mld counters` Clears MLD counters. **Command mode:** All except User Exec
`clear ipv6 mld dynamic` Clears all dynamic MLD tables. **Command mode:** All except User Exec
`clear ipv6 mld groups` Clears dynamic MLD registered group tables. **Command mode:** All except User Exec
`clear ipv6 mld mrouter` Clears dynamic MLD Mrouter group tables. **Command mode:** All except User Exec

MLD Global Statistics

The following command displays MLD global statistics for all MLD packets received on all interfaces:

```
show ipv6 mld counters
```

Command mode: All

```
MLD global statistics:
----------------------
Total L3 IPv6 (S, G, V) entries:  2
Total MLD groups:                 2
Bad Length:                       0
Bad Checksum:                     0
Bad Receive If:                   0
Receive non-local:                0
Invalid Packets:                  4

MLD packet statistics for interfaces:

MLD interface packet statistics for interface 1:
MLD msg type           Received               Sent               RxErrors
------------     -------------------- -------------------- --------------------
General Query                       0                 1067                    0
MAS Query                           0                    0                    0
MASSQ Query                         0                    0                    0
MLDv1 Report                        0                    0                    0
MLDv1 Done                          0                    0                    0
MLDv2 Report                     1069                 1084                    0
INC CSRs(v2)                        1                    0                    0
EXC CSRs(v2)                     2134                 1093                    0
TO_INC FMCRs(v2)                    1                    0                    0
TO_EXC FMCRs(v2)                    0                   15                    0
ALLOW SLCRs(v2)                     0                    0                    0
BLOCK SLCRs(v2)                     0                    0                    0

MLD interface packet statistics for interface 2:
MLD msg type           Received               Sent               RxErrors
------------     -------------------- -------------------- --------------------

MLD interface packet statistics for interface 3:
MLD msg type           Received               Sent               RxErrors
------------     -------------------- -------------------- --------------------
General Query                       0                 2467                    0
MAS Query                           0                    0                    0
MASSQ Query                         0                    0                    0
MLDv1 Report                        0                    0                    0
MLDv1 Done                          0                    0                    0
MLDv2 Report                        2                 2472                    0
INC CSRs(v2)                        1                    0                    0
EXC CSRs(v2)                        0                 2476                    0
TO_INC FMCRs(v2)                    0                    0                    0
TO_EXC FMCRs(v2)                    0                    8                    0
ALLOW SLCRs(v2)                     0                    0                    0
BLOCK SLCRs(v2)                     1                    0                    0
```

The following table describes the fields in the MLD global statistics output.

Table 116. MLD Global Statistics

Statistic	**Description**
Bad Length	Number of messages received with length errors.
Bad Checksum	Number of messages received with an invalid IP checksum.
Bad Receive If	Number of messages received on an interface not enabled for MLD.
Receive non-local	Number of messages received from non-local senders.
Invalid packets	Number of rejected packets.
General Query (v1/v2)	Number of general query packets.
MAS Query(v1/v2)	Number of multicast address specific query packets.
MASSQ Query (v2)	Number of multicast address and source specific query packets.
Listener Report(v1)	Number of packets sent by a multicast listener in response to MLDv1 query.
Listener Done(v1/v2)	Number of packets sent by a host when it wants to stop receiving multicast traffic.
Listener Report(v2)	Number of packets sent by a multicast listener in response to MLDv2 query.
MLDv2 INC mode CSRs	Number of current state records with include filter mode.
MLDv2 EXC mode CSRs	Number of current state records with exclude filter mode.
MLDv2 TO_INC FMCRs	Number of filter mode change records for which the filter mode has changed to include mode.
MLDv2 TO_EXC FMCRs	Number of filter mode change records for which the filter mode has changed to exclude mode.
MLDv2 ALLOW SLCRs	Number of source list change records for which the specified sources from where the data is to be received has changed.
MLDv2 BLOCK SLCRs	Number of source list change records for which the specified sources from where the data is to be received is to be blocked.

OSPF Statistics

Table 117. OSPF Statistics Commands

Command Syntax and Usage
`show ip ospf counters` Displays OSPF statistics. See page 187 for sample output. **Command mode:** All
`show ip ospf area counters` Displays OSPF area statistics. **Command mode:** All
`show ip ospf interface` [<*interface number*>] `counters` Displays OSPF interface statistics. **Command mode:** All

OSPF Global Statistics

The following command displays statistics about OSPF packets received on all OSPF areas and interfaces:

```
show ip ospf counters
```

Command mode: All

```
OSPF stats
----------
Rx/Tx Stats:          Rx            Tx
                   --------      --------
  Pkts                  0             0
  hello                23           518
  database              4            12
  ls requests           3             1
  ls acks               7             7
  ls updates            9             7

Nbr change stats:                 Intf change Stats:
  hello                   2            hello              4
  start                   0            down               2
  n2way                   2            loop               0
  adjoint ok              2            unloop             0
  negotiation done        2            wait timer         2
  exchange done           2            backup             0
  bad requests            0            nbr change         5
  bad sequence            0
  loading done            2
  n1way                   0
  rst_ad                  0
  down                    1

Timers kickoff
  hello                 514
  retransmit           1028
  lsa lock                0
  lsa ack                 0
  dbage                   0
  summary                 0
  ase export              0
```

Table 118. OSPF General Statistics

Statistic	Description
Rx/Tx Stats:	
Rx Pkts	The sum total of all OSPF packets received on all OSPF areas and interfaces.
Tx Pkts	The sum total of all OSPF packets transmitted on all OSPF areas and interfaces.
Rx Hello	The sum total of all Hello packets received on all OSPF areas and interfaces.
Tx Hello	The sum total of all Hello packets transmitted on all OSPF areas and interfaces.

Table 118. OSPF General Statistics (continued)

Statistic	**Description**
Rx Database	The sum total of all Database Description packets received on all OSPF areas and interfaces.
Tx Database	The sum total of all Database Description packets transmitted on all OSPF areas and interfaces.
Rx ls Requests	The sum total of all Link State Request packets received on all OSPF areas and interfaces.
Tx ls Requests	The sum total of all Link State Request packets transmitted on all OSPF areas and interfaces.
Rx ls Acks	The sum total of all Link State Acknowledgement packets received on all OSPF areas and interfaces.
Tx ls Acks	The sum total of all Link State Acknowledgement packets transmitted on all OSPF areas and interfaces.
Rx ls Updates	The sum total of all Link State Update packets received on all OSPF areas and interfaces.
Tx ls Updates	The sum total of all Link State Update packets transmitted on all OSPF areas and interfaces.
Nbr Change Stats:	
hello	The sum total of all Hello packets received from neighbors on all OSPF areas and interfaces.
Start	The sum total number of neighbors in this state (that is, an indication that Hello packets should now be sent to the neighbor at intervals of `HelloInterval` seconds.) across all OSPF areas and interfaces.
n2way	The sum total number of bidirectional communication establishment between this router and other neighboring routers.
adjoint ok	The sum total number of decisions to be made (again) as to whether an adjacency should be established/maintained with the neighbor across all OSPF areas and interfaces.
negotiation done	The sum total number of neighbors in this state wherein the Master/slave relationship has been negotiated, and sequence numbers have been exchanged, across all OSPF areas and interfaces.
exchange done	The sum total number of neighbors in this state (that is, in an adjacency's final state) having transmitted a full sequence of Database Description packets, across all OSPF areas and interfaces.
bad requests	The sum total number of Link State Requests which have been received for a link state advertisement not contained in the database across all interfaces and OSPF areas.

Table 118. OSPF General Statistics (continued)

Statistic	Description
bad sequence	The sum total number of Database Description packets which have been received that either: a. Has an unexpected DD sequence number b. Unexpectedly has the init bit set c. Has an options field differing from the last Options field received in a Database Description packet. Any of these conditions indicate that some error has occurred during adjacency establishment for all OSPF areas and interfaces.
loading done	The sum total number of link state updates received for all out-of-date portions of the database across all OSPF areas and interfaces.
n1way	The sum total number of Hello packets received from neighbors, in which this router is not mentioned across all OSPF interfaces and areas.
rst_ad	The sum total number of times the Neighbor adjacency has been reset across all OPSF areas and interfaces.
down	The total number of Neighboring routers down (that is, in the initial state of a neighbor conversation.) across all OSPF areas and interfaces.
Intf Change Stats:	
hello	The sum total number of Hello packets sent on all interfaces and areas.
down	The sum total number of interfaces down in all OSPF areas.
loop	The sum total of interfaces no longer connected to the attached network across all OSPF areas and interfaces.
unloop	The sum total number of interfaces, connected to the attached network in all OSPF areas.
wait timer	The sum total number of times the Wait Timer has been fired, indicating the end of the waiting period that is required before electing a (Backup) Designated Router across all OSPF areas and interfaces.
backup	The sum total number of Backup Designated Routers on the attached network for all OSPF areas and interfaces.
nbr change	The sum total number of changes in the set of bidirectional neighbors associated with any interface across all OSPF areas.

Table 118. OSPF General Statistics (continued)

Statistic	Description
Timers Kickoff:	
hello	The sum total number of times the Hello timer has been fired (which triggers the `send` of a Hello packet) across all OPSF areas and interfaces.
retransmit	The sum total number of times the Retransmit timer has been fired across all OPSF areas and interfaces.
lsa lock	The sum total number of times the Link State Advertisement (LSA) lock timer has been fired across all OSPF areas and interfaces.
lsa ack	The sum total number of times the LSA `Ack` timer has been fired across all OSPF areas and interfaces.
dbage	The total number of times the data base age (`Dbage`) has been fired.
summary	The total number of times the Summary timer has been fired.
ase export	The total number of times the Autonomous System Export (ASE) timer has been fired.

OSPFv3 Statistics

Table 119. OSPFv3 Statistics Commands

Command Syntax and Usage
`show ipv6 ospf counters` Displays OSPFv3 statistics. **Command mode:** All See page 187 for sample output.
`show ipv6 ospf area counters` Displays OSPFv3 area statistics. **Command mode:** All
`show ipv6 ospf interface` [<*interface number*>] `counters` Displays OSPFv3 interface statistics. **Command mode:** All

OSPFv3 Global Statistics

The following command displays statistics about OSPFv3 packets received on all OSPFv3 areas and interfaces:

```
show ipv6 ospf counters
```

Command mode: All

```
OSPFv3 stats
----------
Rx/Tx/Disd Stats:          Rx            Tx        Discarded
                        --------      --------      ---------
       Pkts               9695         95933              0
       hello              9097          8994              0
       database             39            51              6
       ls requests          16             8              0
       ls acks             172           360              0
       ls updates          371           180              0

Errors
  rx on pasv intf            0
  rx but ospf off            0
  rx on intf not up          0
  rx version mismatch        0
  rx rtr id is zero          0
  rx with our rtr id         0
  instance id mismatch       0
  area mismatch              0
  dest addr mismatch         0
  bad checksum               0
  no associated nbr          0
  bad packet type            0
  hello mismatch             0
  options mismatch           0
  dead mismatch              0
  bad nbma/ptomp nbr         0

Nbr change stats:                 Intf change Stats:
  down                    0            down              5
  attempt                 0            loop              0
  init                    1            waiting           6
  n2way                   1            ptop              0
  exstart                 1            dr                4
  exchange done           1            backup            6
  loading done            1            dr other          0
  full                    1            all events        33
  all events              6

Timers kickoff
  hello                   8988
  wait                    6
  poll                    0
  nbr probe               0
```

The OSPFv3 General Statistics contain the sum total of all OSPFv3 packets received on all OSPFv3 areas and interfaces.

Table 120. OSPFv3 General Statistics

Statistics	Description
Rx/Tx Stats:	
Rx Pkts	The sum total of all OSPFv3 packets received on all OSPFv3 interfaces.
Tx Pkts	The sum total of all OSPFv3 packets transmitted on all OSPFv3 interfaces.
Discarded Pkts	The sum total of all OSPFv3 packets discarded.
Rx hello	The sum total of all Hello packets received on all OSPFv3 interfaces.
Tx hello	The sum total of all Hello packets transmitted on all OSPFv3 interfaces.
Discarded hello	The sum total of all Hello packets discarded, including packets for which no associated interface has been found.
Rx database	The sum total of all Database Description packets received on all OSPFv3 interfaces.
Tx database	The sum total of all Database Description packets transmitted on all OSPFv3 interfaces.
Discarded database	The sum total of all Database Description packets discarded.
Rx ls requests	The sum total of all Link State Request packets received on all OSPFv3 interfaces.
Tx ls requests	The sum total of all Link State Request packets transmitted on all OSPFv3 interfaces.
Discarded ls requests	The sum total of all Link State Request packets discarded.
Rx ls acks	The sum total of all Link State Acknowledgement packets received on all OSPFv3 interfaces.
Tx ls acks	The sum total of all Link State Acknowledgement packets transmitted on all OSPFv3 interfaces.
Discarded ls acks	The sum total of all Link State Acknowledgement packets discarded.
Rx ls updates	The sum total of all Link State Update packets received on all OSPFv3 interfaces.
Tx ls updates	The sum total of all Link State Update packets transmitted on all OSPFv3 interfaces.
Discarded ls updates	The sum total of all Link State Update packets discarded.

Table 120. OSPFv3 General Statistics (continued)

Statistics	Description
Nbr Change Stats:	
down	The total number of Neighboring routers down (in the initial state of a neighbor conversation) across all OSPFv3 interfaces.
attempt	The total number of transitions into attempt state of neighboring routers across allOSPFv3 interfaces.
init	The total number of transitions into init state of neighboring routers across all OSPFv3 interfaces.
n2way	The total number of bidirectional communication establishment between this router and other neighboring routers.
exstart	The total number of transitions into exstart state of neighboring routers across all OSPFv3 interfaces
exchange done	The total number of neighbors in this state (that is, in an adjacency's final state) having transmitted a full sequence of Database Description packets, across all OSPFv3 interfaces.
loading done	The total number of link state updates received for all out-of-date portions of the database across all OSPFv3 interfaces.
full	The total number of transitions into full state of neighboring routers across all OSPFv3 interfaces.
all events	The total number of state transitions of neighboring routers across all OSPFv3 interfaces.
Intf Change Stats:	
down	The total number of transitions into down state of all OSPFv3 interfaces.
loop	The total number of transitions into loopback state of all OSPFv3 interfaces.
waiting	The total number of transitions into waiting state of all OSPFv3 interfaces.
ptop	The total number of transitions into point-to-point state of all OSPFv3 interfaces.
dr	The total number of transitions into Designated Router other state of all OSPFv3 interfaces.
backup	The total number of transitions into backup state of all OSPFv3 interfaces.
all events	The total number of changes associated with any OSPFv3 interface, including changes into internal states.

Table 120. OSPFv3 General Statistics (continued)

Statistics	Description
Timers Kickoff:	
hello	The total number of times the Hello timer has been fired (which triggers the `send` of a Hello packet) across all OSPFv3 interfaces.
wait	The total number of times the wait timer has been fired (which causes an interface to exit waiting state), across all OPSFv3 interfaces.
poll	The total number of times the timer whose firing causes hellos to be sent to inactive NBMA and Demand Circuit neighbors has been fired, across all OPSFv3 interfaces.
nbr probe	The total number of times the neighbor probe timer has been fired, across all OPSFv3 interfaces.
Number of LSAs:	
originated	The number of LSAs originated by this router.
rcvd newer originations	The number of LSAs received that have been determined to be newer originations.

VRRP Statistics

Virtual Router Redundancy Protocol (VRRP) support on the G8264 provides redundancy between routers in a LAN. This is accomplished by configuring the same virtual router IP address and ID number on each participating VRRP-capable routing device. One of the virtual routers is then elected as the master, based on a number of priority criteria, and assumes control of the shared virtual router IP address. If the master fails, one of the backup virtual routers will assume routing authority and take control of the virtual router IP address.

When virtual routers are configured, you can display the protocol statistics for VRRP. The following command displays VRRP statistics:

```
show ip vrrp counters
```

Command mode: All

```
VRRP statistics:
vrrpInAdvers:              0   vrrpBadAdvers:                0
vrrpOutAdvers:             0   vrrpOutGratuitousARPs:        0
vrrpBadVersion:            0   vrrpBadVrid:                  0
vrrpBadAddress:            0   vrrpBadData:                  0
vrrpBadPassword:           0   vrrpBadInterval:              0
```

Table 121. VRRP Statistics

Statistics	**Description**
vrrpInAdvers	The total number of valid VRRP advertisements that have been received.
vrrpBadAdvers	The total number of VRRP advertisements received that were dropped.
vrrpOutAdvers	The total number of VRRP advertisements that have been sent.
vrrpBadVersion	The total number of VRRP advertisements received that had a bad version number.
vrrpOut GratuitousARPs	The total number of VRRP gratuitous ARPs that have been sent.
vrrpBadVrid	The total number of VRRP advertisements received that had a bad virtual router ID.
vrrpBadAddress	The total number of VRRP advertisements received that had a bad address.
vrrpBadData	The total number of VRRP advertisements received that had bad data.
vrrpBadPassword	The total number of VRRP advertisements received that had a bad password.
vrrpBadInterval	The total number of VRRP advertisements received that had a bad interval.

PIM Statistics

The following command displays Protocol Independent Multicast (PIM) statistics:

```
show ip pim counters
```

Command mode: All

```
Hello Tx/Rx      : 2595/2596
Join/Prune Tx/Rx : 0/0
Assert Tx/Rx     : 0/0
Register Tx/Rx   : 0/0
Null-Reg Tx/Rx   : 0/0
RegStop Tx/Rx    : 0/0
CandRPAdv Tx/Rx  : 973/0
BSR Tx/Rx        : 0/1298
Graft Tx/Rx      : 0/0
Graft Ack Tx/Rx  : 0/0
Mcast data Tx/Rx : 0/0
MDP drop Tx/Rx   : 0/0
CTL drop Tx/Rx   : 0/0
Bad pkts         : 0
```

Table 122. PIM Statistics

Statistics	Description
Hello Tx/Rx	Number of Hello messages transmitted or received
Join/Prune Tx/Rx	Number of Join/Prune messages transmitted or received
Assert Tx/Rx	Number of Assert messages transmitted or received
Register Tx/Rx	Number of Register messages transmitted or received
Null-Reg Tx/Rx	Number of NULL-register messages received
RegStop Tx/Rx	Number of Register Stop messages transmitted or received
CandRPAdv Tx/Rx	Number of Candidate RP Advertisements transmitted or received
BSR Tx/Rx	Number of Bootstrap Router (BSR) messages transmitted or received
Graft Tx/Rx	Number of Graft messages transmitted or received
Graft Ack Tx/Rx	Number of Graft Acknowledgements transmitted or received
Mcast data Tx/Rx	Number of multicast datagrams transmitted or received
MDP drop Tx/Rx	Number of Multicast data packet Tx/Rx dropped
CTL drop Tx/Rx	Number of PIM control packet Tx/Rx dropped
Bad pkts	Number of bad PIM packets received

Routing Information Protocol Statistics

The following command displays RIP statistics:

```
show ip rip counters
```

Command mode: All

```
RIP ALL STATS INFORMATION:
        RIP packets received  = 12
        RIP packets sent      = 75
        RIP request received  = 0
        RIP response recevied = 12
        RIP request sent      = 3
        RIP reponse sent      = 72
        RIP route timeout     = 0
        RIP bad size packet received = 0
        RIP bad version received       = 0
        RIP bad zeros received         = 0
        RIP bad src port received      = 0
        RIP bad src IP received        = 0
        RIP packets from self received = 0
```

DHCP Statistics

Table 123. DHCP Statistics Options

Command Syntax and Usage
`show ip dhcp snooping counters` Displays DHCP Snooping statistics. **Command mode:** All
`clear ip dhcp snooping counters` Clears DHCP Snooping statistics. **Command mode:** Privileged EXEC

DHCP Snooping Statistics

The following command displays DHCP Snooping statistics:

```
show ip dhcp snooping counters
```

Command mode: All

```
DHCP Snooping statistics:
Received Request packets             2
Received Reply packets               2
Recevied Invalid packets             0
Dropped packets out of rate          0
Dropped packets other reason         0
```

DHCP Snooping Statistics count all DHCP packets processed by DHCP snooping.

OpenFlow Statistics

Table 124. OpenFlow Statistics Commands

Command Syntax and Usage
`show openflow statistics` Displays OpenFlow traffic statistics for each OpenFlow instance. **Command mode:** All
`show openflow instance` *<1-4>* `statistics` Displays OpenFlow traffic statistics for the specified instance ID. **Command mode:** All
`clear openflow statistics` Clears OpenFlow data for all instances. **Command mode:** Privileged EXEC
`clear openflow instance` *<1-4>* `statistics` Clears OpenFlow data for the specified instance ID. **Command mode:** Privileged EXEC

Use the following command to display OpenFlow traffic statistics for each OpenFlow instance:

```
show openflow statistics
```

Command mode: All

```
Openflow statistics for instance 1
Flow Count
        Basic Flows:     0       (ACL Based: 0, Unicast FDB Based: 0, Multicast FDB 
Based: 0)
        Emergency Flows: 0       (ACL Based: 0, Unicast FDB Based: 0, Multicast FDB 
Based: 0)

Buffering Count:
        Openflow Packets Buffered  : 0
        Openflow Packets Timed out : 0
        Openflow Packets Retrieved : 0
        Openflow Packets Retrieve attempts : 0

Message Count
Hello-Sent: 0                   Hello-Received: 0
Echo-Request-Sent: 0            Echo-Request-Received: 0
Echo-Reply-Sent: 0              Echo-Reply-Received: 0
Vendor: 0
Vendor Flow-Mod:
        Add: 0
        Modify: 0
        Modify-Strict: 0
        Delete: 0
        Delete-Strict: 0
Feature-Request: 0              Feature-Reply: 0
Get-Config-Request: 0           Get-Config-Reply: 0
Set-Config: 0
Packet-In
        No-Match: 0
        Action: 0
Flow-Removed:
        Idle-Timeout: 0
        Hard-Timeout: 0
        Delete: 0
Vendor-Flow-Removed:
        Idle-Timeout: 0
        Hard-Timeout: 0
        Delete: 0
Port-Status:
        Add: 0
        Delete: 0
        Modify: 0
Packet-Out: 0
Flow-Mod:
        Add: 0
        Modify: 0
        Modify-Strict: 0
        Delete: 0
        Delete-Strict: 0
Port-Mod: 0
...
```

```
...
Statistics-Request:
        Desc: 0
        Flow: 0
        Aggregate: 0
        Table: 0
        Port: 0
        Vendor: 0
                stats: 0
                stats-strict: 0
Statistics-Reply:
        Desc: 0
        Flow: 0
        Aggregate: 0
        Table: 0
        Port: 0
        Vendor: 0
                stats: 0
                stats-strict: 0
Barrier-Request: 0
Barrier-Reply: 0
Error Messages
Hello Failed Sent:
        Incompatible: 0
Hello Failed Recv:
        Incompatible: 0
Bad Request:
        Bad-Version: 0
        Bad-Type: 0
        Bad-Stat: 0
        Bad-Vendor: 0
        Bad-Subtype: 0
        Bad-Len: 0
        Buffer-Empty: 0
        Buffer-Unknown: 0
Bad Action:
        Bad-Type: 0
        Bad-Len: 0
        Bad-Out-Port: 0
        Bad-Argument: 0
        Too-many: 0
Flow-Mod-Failed:
        All-Table-Full: 0
        Overlap: 0
        Permission-Error: 0
        Emergency-Timeout: 0
        Bad-Command: 0
        Unsupported: 0
Port-Mod-Failed:
        Bad-Port: 0
        Bad-hw-addr: 0
-----------------------------------------------------------
Openflow instance 2 is currently disabled
-----------------------------------------------------------
Openflow instance 3 is currently disabled
-----------------------------------------------------------
Openflow instance 4 is currently disabled
```

Table 125. OpenFlow Table Statistics

Parameter	**Description**
Flow Count	
Basic Flows	Count of flows stored in the basic flow table, sorted by type: ACL, unicast FDB and multicast FDB.
Emergency Flows	Count of flows stored in the emergency flow table, sorted by type: ACL, unicast FDB and multicast FDB.
Buffering Count	
Openflow Packets Buffered	Count of packets buffered.
Openflow Packets Timed out	Count of buffered packets dropped due to time out.
Openflow Packets Retrieved	Count of packets retrieved.
Openflow Packets Retrieve attempts	Count of attempts made to retrieve the buffer.
Message Count	Count of messages exchanged between Controller and switch.
Hello-Sent	Count of `Hello` messages sent from the switch to Controller.
Hello-Received	Count of `Hello` messages received in the Controller from the switch.
Echo-Request-Sent	Count of `Echo Request` messages sent from switch to Controller.
Echo-Request-Received	Count of `Echo Request` messages received in switch from Controller.
Echo-Reply-Sent	Count of `Echo Reply` messages received in switch from Controller.
Echo-Reply-Received	Count of `Echo Reply` messages received in switch from Controller.
Vendor	Count of `Vendor` messages received in switch from controller.
Vendor Flow-Mod	
Add	Count of vendor-defined `add flow_mod` messages received in the switch.
Modify	Count of vendor-defined `modify flow_mod` messages received in the switch.
Modify-Strict	Count of vendor-defined `modify_strict flow_mod` messages received in the switch.

Parameter	Description
Delete	Count of vendor-defined `delete flow_mod` messages received in the switch.
Delete-Strict	Count of vendor-defined `delete-strict flow_mod` messages received in the switch.
Feature-Request	Count of `Feature Request` messages received from the Controller to the switch.
Feature-Reply	Count of `Feature Reply` messages sent from the switch to the Controller.
Get-Config-Request	Count of `Get Config Request` messages received from the Controller to the switch.
Get-Config-Reply	Count of `Get Config Reply` messages sent from the switch to the Controller.
Set-Config	Count of `Set Config` messages received from the Controller.
Packet-In	
No-Match	Count of `Packet-In` messages sent to Controller due to no matching flows.
Action	Count of `Packet-In` messages sent to Controller due to action explicitly asking to forward to Controller.
Flow-Removed	
Idle-Timeout	Count of flow entries removed due to idle-timeout expiration.
Hard-Timeout	Count of flow entries removed due to hard-timeout expiration.
Delete	Count of flow entries removed due to explicit deletion.
Vendor-Flow-Removed	
Idle-Timeout	Count of vendor-defined flow entries removed due to idle-timeout expiration.
Hard-Timeout	Count of vendor-defined flow entries removed due to hard-timeout expiration.
Delete	Count of vendor-defined flow entries removed due to explicit deletion.
Port-Status	
Add	Count of `port-status` messages sent triggered by adding a port to OpenFlow.
Delete	Count of `port-status` messages sent triggered by removing a port from OpenFlow.

Parameter	**Description**
Modify	Count of `port-status` messages sent triggered by a modification of a port belonging to OpenFlow (for example, up/down status).
Packet-Out	Count of `packet-out` messages received from the Controller.
Flow-Mod	
Add	Count of `add flow_mod` messages received in the switch.
Modify	Count of `modify flow_mod` messages received in the switch.
Modify-Strict	Count of `modify_strict flow_mod` messages received in the switch.
Delete	Count of `delete flow_mod` messages received in the switch.
Delete-Strict	Count of `delete-strict flow_mod` messages received in the switch.
Port-Mod	Count of `port_mod` messages received in the switch from the Controller.
Statistics-Request	
Desc	Count of Description statistics requests received from the Controller.
Flow	Count of Flow statistics requests received from the Controller.
Aggregate	Count of Aggregate statistics requests received from the Controller.
Table	Count of Table statistics requests received from the Controller.
Port	Count of Port statistics requests received from the Controller.
Vendor	
stats	Count of Vendor statistics requests received from the Controller.
stats-strict	Count of Vendor strict statistics requests received from the Controller.
Statistics-Reply	
Desc	Count of Description statistics requests sent to the Controller.
Flow	Count of Flow statistics requests sent to the Controller.

Parameter	**Description**
Aggregate	Count of Aggregate statistics requests sent to the Controller.
Table	Count of Table statistics requests sent to the Controller.
Port	Count of Port statistics requests sent to the Controller.
Vendor	
stats	Count of Vendor statistics requests sent to the Controller.
stats-strict	Count of Vendor strict statistics requests sent to the Controller.
Barrier-Request	Count of `barrier-request` messages received from the Controller.
Barrier-Reply	Count of `barrier-reply` messages sent to the Controller.
Error Messages	Count of error messages handled - sending/receiving error messages.
Hello Failed Sent	
Incompatible	Count of error messages sent by the switch if the version in the `Hello` message is incompatible with the version in the Controller.
Hello Failed Recv	
Incompatible	Count of error messages received in the switch if the version in the `Hello` message is incompatible with the version in the Controller.
Bad Request	
Bad-Version	Count of error messages sent due to `bad-version` in the request header.
Bad-Type	Count of error messages sent due to `bad-type` in the request header.
Bad-Stat	Count of error messages sent due to a specific statistics request that is not supported.
Bad-Vendor	Count of error messages sent due to vendor-specific message that is not supported.
Bad-Subtype	Count of error messages sent due to message subtype that is not supported.
Bad-Len	Count of error messages sent due to wrong request length for type of message received in the request header.
Buffer-Empty	Count of error messages sent when the specified buffer in the request does not exist.

Parameter	**Description**
Buffer-Unknown	Count of error messages sent when the specified buffer in the request does not exist.
Bad Action	
Bad-Type	Count of error messages sent due to due to unknown action type specified in `flow_mod` message.
Bad-Len	Count of error messages sent due to wrong action length for type of message received in the `flow_mod` message.
Bad-Out-Port	Count of error message sent due to invalid port in the action field specified `flow_mod` message.
Bad-Argument	Count of error message sent due to bad action argument in `flow_mod` message that is not supported.
Too-Many	Count of error message sent due to too many actions received in the `flow_mod` message that cannot be handled.
Flow-Mod-Failed	
All-Table-Full	Count of error messages due to table full when adding or updating `flow_mod` message.
Overlap	Count of error messages sent due to an attempt to add overlapping `flow_mod` messages.
Permission-Error	Count of error messages due to permissions not available to perform action received in the `flow_mod` message `Port_Mod_Failed`.
Emergency-Timeout	Count of error messages sent due to invalid emergency-timeout in the `flow-mod` message.
Bad-Command	Count of error messages sent due to unknown command.
Unsupported	Count of error messages sent due to unsupported action list.
Port-Mod-Failed	
Bad-Port	Count of error messages sent due to invalid port in `port_mod` message.
Bad-hw-addr	Count of error messages sent due to wrong hardware address specified in `port_mod` message.

Management Processor Statistics

Table 126. Management Processor Statistics Commands

Command Syntax and Usage
`show mp packet counters` Displays packet statistics, to check for leads and load. To view a sample output and a description of the stats, see page 208. **Command mode:** All
`show mp tcp-block` Displays all TCP control blocks that are in use. To view a sample output and a description of the stats, see page 215. **Command mode:** All
`show mp udp-block` Displays all UDP control blocks that are in use. To view a sample output, see page 216. **Command mode:** All
`show processes cpu` Displays CPU utilization for periods of up to 1, 4, and 64 seconds. To view a sample output and a description of the stats, see page 216. **Command mode:** All

MP Packet Statistics

Table 127. Packet Statistics Commands

Command Syntax and Usage
`show mp packet counters` Displays packet statistics, to check for leads and load. To view a sample output and a description of the stats, see page 208. **Command mode:** All
`show mp packet logs` Displays a log of all packets received by the CPU. **Command mode:** All
`show mp packet last` <*number of logs*> Displays a list of the most recent packets received by the CPU. **Command mode:** All

Table 127. *Packet Statistics Commands (continued)*

Command Syntax and Usage
`show mp packet parse rx|tx <parsing_option>` Displays a list of received or sent packets that fit the parsing option. For a list of parsing options, see page 211. **Command mode:** All
`show mp packet dump` Displays all packet statistics and logs. **Command mode:** All

MP Packet Statistics

The following command displays MP packet statistics:

```
show mp packet counters
```

Command mode: All

```
 CPU packet statistics at 16:57:24 Sat Apr  5, 2011

 Packets received by CPU:
 ------------------------
 Total packets:           7642 (7642 since bootup)
 BPDUs:                   5599
 Cisco packets:              0
 ARP packets:             1732
 IPv4 packets:             113
 IPv6 packets:               0
 LLDP PDUs:                198
 Other:                      0

Packet Buffer Statistics:
-------------------------
 allocs:         14311
 frees:          14311
 failures:           0
 dropped:            0

 small packet buffers:
 ----------------------
   current:                  0
   max:                   2048
   threshold:              512
   hi-watermark:             1
   hi-water time:   14:59:46 Sat Apr  5, 2011

 medium packet buffers:
 ----------------------
   current:                  0
   max:                   2048
   threshold:              512
   hi-watermark:             1
   hi-water time:   14:59:49 Sat Apr  5, 2011

 jumbo packet buffers:
 ----------------------
   current:                  0
   max:                      4
   hi-watermark:             0

 pkt_hdr statistics:
 ----------------------
 current          :           0
 max              :        3072
 hi-watermark     :         208
```

Table 128. Packet Statistics

Statistics	Description
Packets received by CPU	
Total packets	Total number of packets received
BPDUs	Total number of spanning-tree Bridge Protocol Data Units received.
Cisco packets	Total number of UniDirectional Link Detection (UDLD) packets and Cisco Discovery Protocol (CDP) packets received.
ARP packets	Total number of Address Resolution Protocol packets received.
IPv4 packets	Total number of IPv4 packets received.
IPv6 packets	Total number of IPv6 packets received.
LLDP PDUs	Total number of Link Layer Discovery Protocol data units received.
Other	Total number of other packets received.
Packet Buffer Statistics	
allocs	Total number of packet allocations from the packet buffer pool by the TCP/IP protocol stack.
frees	Total number of times the packet buffers are freed (released) to the packet buffer pool by the TCP/IP protocol stack.
failures	Total number of packet allocation failures from the packet buffer pool by the TCP/IP protocol stack.
small packet buffers	
current	Total number of packet allocations with size less than 128 bytes from the packet buffer pool by the TCP/IP protocol stack.
max	Maximum number of small packet allocations supported.
threshold	Threshold value for small packet allocations, beyond which only high-priority small packets are allowed.
hi-watermark	The highest number of packet allocation with size less than 128 bytes from the packet buffer pool by the TCP/IP protocol stack.
hi-water time	Time stamp that indicates when the hi-watermark was reached.

Table 128. Packet Statistics (continued)

Statistics	**Description**
medium packet buffers	
current	Total number of packet allocations with size between 128 to 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
max	Maximum number of medium packet allocations supported
threshold	Threshold value for medium packet allocations, beyond which only high-priority medium packets are allowed.
hi-watermark	The highest number of packet allocation with size between 128 to 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
hi-water time	Time stamp that indicates when the hi-watermark was reached.
jumbo packet buffers	
current	Total number of packet allocations with more than 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
max	Maximum number of jumbo packet allocations supported
hi-watermark	The highest number of packet allocation with more than 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
pkt_hdr statistics	
current	Total number of packet allocations with more than 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
max	Maximum number of packet allocations with more than 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
hi-watermark	The highest number of packet allocation with more than 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.

Logged Packet Statistics

The following command displays logged packets that have been received or sent, based on the specified filter:

`show mp packet parse rx|tx <parsing_option>`

The filter options are described in Table 129.

Table 129. Packet Log Parsing Options

Command Syntax and Usage
`show mp packet parse rx|tx arp` Displays only ARP packets logged. **Command mode:** All
`show mp packet parse rx|tx rarp` Displays only Reverse-ARP packets. **Command mode:** All
`show mp packet parse rx|tx bpdu` Displays only BPDUs logged **Command mode:** All
`show mp packet parse rx|tx cisco` Displays only Cisco packets (BPDU/CDP/UDLD) logged. **Command mode:** All
`show mp packet parse rx|tx lacp` Displays only LACP PDUs logged. **Command mode:** All
`show mp packet parse rx|tx fcoe` Displays only FCoE FIP PDUs logged. **Command mode:** All
`show mp packet parse rx|tx ipv4` Displays only IPv4 packets logged. **Command mode:** All
`show mp packet parse rx|tx igmp` Displays only IGMP packets logged. **Command mode:** All
`show mp packet parse rx|tx pim` Displays only PIM packets logged. **Command mode:** All

Table 129. Packet Log Parsing Options (continued)

Command Syntax and Usage
`show mp packet parse rx|tx icmp` Displays only ICMP packets logged. **Command mode:** All
`show mp packet parse rx|tx tcp` Displays only TCP packets logged. **Command mode:** All
`show mp packet parse rx|tx ftp` Displays only FTP packets logged. **Command mode:** All
`show mp packet parse rx|tx http` Displays only HTTP packets logged. **Command mode:** All
`show mp packet parse rx|tx ssh` Displays only SSH packets logged. **Command mode:** All
`show mp packet parse rx|tx tacacs` Displays only TACACS packets logged. **Command mode:** All
`show mp packet parse rx|tx telnet` Displays only TELNET packets logged. **Command mode:** All
`show mp packet parse rx|tx tcpother` Displays only TCP other-port packets logged. **Command mode:** All
`show mp packet parse rx|tx udp` Displays only UDP packets logged. **Command mode:** All
`show mp packet parse rx|tx dhcp` Displays only DHCP packets logged. **Command mode:** All
`show mp packet parse rx|tx ntp` Displays only NTP packets logged. **Command mode:** All

Table 129. Packet Log Parsing Options (continued)

<table>
<tr><th>Command Syntax and Usage</th></tr>
<tr><td>show mp packet parse rx|tx radius
Displays only RADIUS packets logged.
<b>Command mode:</b> All</td></tr>
<tr><td>show mp packet parse rx|tx snmp
Displays only SNMP packets logged.
<b>Command mode:</b> All</td></tr>
<tr><td>show mp packet parse rx|tx tftp
Displays only TFTP packets logged.
<b>Command mode:</b> All</td></tr>
<tr><td>show mp packet parse rx|tx udpother
Displays only UDP other-port packets logged.
<b>Command mode:</b> All</td></tr>
<tr><td>show mp packet parse rx|tx ipv6
Displays only IPv6 packets logged.
<b>Command mode:</b> All</td></tr>
<tr><td>show mp packet parse rx|tx rip
Displays only RIP packets logged.
<b>Command mode:</b> All</td></tr>
<tr><td>show mp packet parse rx|tx ospf
Displays only OSPF packets logged.
<b>Command mode:</b> All</td></tr>
<tr><td>show mp packet parse rx|tx bgp
Displays only BGP packets logged.
<b>Command mode:</b> All</td></tr>
<tr><td>show mp packet parse rx|tx lldp
Displays only LLDP PDUs logged.
<b>Command mode:</b> All</td></tr>
<tr><td>show mp packet parse rx|tx vlan <i><VLAN_number></i>
Displays only logged packets with the specified VLAN.
<b>Command mode:</b> All</td></tr>
<tr><td>show mp packet parse rx|tx port <i><port_number></i>
Displays only logged packets with the specified port.
<b>Command mode:</b> All</td></tr>
</table>

Table 129. Packet Log Parsing Options (continued)

Command Syntax and Usage
`show mp packet parse rx|tx mac` *<MAC_address>* Displays only logged packets with the specified MAC address. **Command mode:** All
`show mp packet parse rx|tx ip-addr` *<IPv4_address>* Displays only logged packets with the specified IPv4 address. **Command mode:** All
`show mp packet parse rx|tx other` Displays logs of all packets not explicitly selectable. **Command mode:** All
`show mp packet parse rx|tx raw` Displays raw packet buffer in addition to headers. **Command mode:** All
`show mp packet parse rx|tx mgmtsock` Displays only packets logged from management ports. **Command mode:** All

TCP Statistics

The following command displays TCP statistics:

```
show mp tcp-block
```

Command mode: All

```
Data Ports:
-----------------------------------------------------------------
All TCP allocated control blocks:
14835bd8:  0.0.0.0                                    0 <=>
           172.31.38.107                             80 listen MGT up
147c6eb8:  0:0:0:0:0:0:0:0                            0 <=>
           0:0:0:0:0:0:0:0                           80  listen
147c6d68:  0.0.0.0                                    0 <=>
           0.0.0.0                                   80  listen
14823918:  172.31.37.42                           55866 <=>
           172.31.38.107                             23 established 0 ??
11af2394:  0.0.0.0                                    0 <=>
           172.31.38.107                             23 listen MGT up
147e6808:  0.0.0.0                                    0 <=>
           0.0.0.0                                   23  listen
147e66b8:  0:0:0:0:0:0:0:0                            0 <=>
           0:0:0:0:0:0:0:0                           23  listen
147e6568:  0.0.0.0                                    0 <=>
           0.0.0.0                                   23  listen


Mgmt Ports:
-----------------------------------------------------------------
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address          Foreign Address         State
tcp        0      0 172.31.38.107:http      *:*                     LISTEN
tcp        0      0 172.31.38.107:telnet    *:*                     LISTEN
tcp        0      0 *:11000                 *:*                     LISTEN
tcp        0   1274 172.31.38.107:telnet    172.31.37.42:55866      ESTABLISHED
```

Table 130. MP Specified TCP Statistics

Statistics	Description
`14835bd8`	Memory
`0.0.0.0`	Destination IP address
`0`	Destination port
`172.31.38.107`	Source IP
`80`	Source port
`listen MGT1 up`	State

UDP Statistics

The following command displays UDP statistics:

```
show mp udp-block
```

Command mode: All

```
Data Ports:
-----------------------------------------------------------------
All UDP allocated control blocks:
   68:  listen
  161:  listen
  500:  listen


Mgmt Ports:
-----------------------------------------------------------------
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 172.31.38.107:snmp      *:*
udp        0      0 172.31.38.107:bootpc    *:*


172.31.35.1        67 <=> 172.31.38.107      68  accept  MGT  up

172.25.160.114  40391 <=> 172.31.38.107     161  accept  MGT  up
```

CPU Statistics

The following commands display CPU use statistics:

```
show mp cpu
```

Command mode: All

```
       CPU utilization           Highest     Thread                Time
------------------------------   -------   ----------    -------------------------
cpuUtil1Second:             3%      83%     58 (I2C )    12:02:14 Fri Oct 14, 2011
cpuUtil4Seconds:            5%
cpuUtil64Seconds:           5%
```

Table 131. CPU Statistics

Statistics	Description
cpuUtil1Second	The use of MP CPU over 1 second. It shows the percentage, highest rate, thread, and time the highest utilization occurred.
cpuUtil4Seconds	The use of MP CPU over 4 seconds. It shows the percentage.
cpuUtil64Seconds	The use of MP CPU over 64 seconds. It shows the percentage.
Highest	The highest percent of CPU use.

Table 131. CPU Statistics

Statistics	Description
Thread	The thread ID and name of the thread that caused the highest CPU use.
Time	The time when the highest CPU use was reached.

`show processes cpu`

Command mode: All

```
---------------------------------------------------------------------
Total CPU Utilization: For 1 second: 0.66%
                       For 5 second: 3.02%
                       For 1 minute: 3.73%
                       For 5 minute: 3.69%
Highest thread util  : 100% by  58 (I2C ) at 11:31:32 Sat Mar 10, 2012
---------------------------------------------------------------------
Thread  Thread                  Utilization                    Status
  ID     Name        1sec       5sec       1Min       5Min
---------------------------------------------------------------------
  1      STEM       0.00%      0.00%      0.00%      0.00%       idle
  2      STP        0.00%      0.00%      0.00%      0.00%       idle
  3      MFDB       0.00%      0.00%      0.00%      0.00%       idle
  4      TND        0.00%      0.00%      0.00%      0.00%       idle
  5      CONS       0.00%      0.01%      0.38%      0.08%    running
  6      TNET       0.00%      0.00%      0.00%      0.00%       idle
...
123      PBR        0.00%      0.00%      0.00%      0.00%       idle
124      HIST       0.00%      0.00%      0.00%      0.00%       idle
126      NORM       0.00%      0.00%      0.00%      0.00%       idle
127      DONE       0.00%      0.00%      0.00%      0.00%       idle
---------------------------------------------------------------------
```

Table 132. CPU Statistics

Statistics	Description
Thread ID	The thread ID number.
Thread Name	The name of the thread.
1sec	The percent of CPU use over 1 second.
5sec	The percent of CPU use over 5 seconds.
1Min	The percent of CPU use over 1 minute.
5Min	The percent of CPU use over 5 minutes.
Status	The status of the process.

CPU Statistics History

The following command displays a history of CPU use statistics:

```
show processes cpu history
```

Command mode: All

```
---------------------------------------------
CPU Utilization History
---------------------------------------------
 17 (IP  )  98% at  22:17:24 Mon Feb 20, 2012
 59 (LACP)   9% at  22:17:33 Mon Feb 20, 2012
110 (ETMR)  12% at  22:17:34 Mon Feb 20, 2012
110 (ETMR)  12% at  22:17:36 Mon Feb 20, 2012
110 (ETMR)  12% at  22:17:40 Mon Feb 20, 2012
110 (ETMR)  12% at  22:17:45 Mon Feb 20, 2012
110 (ETMR)  17% at  22:17:47 Mon Feb 20, 2012
110 (ETMR)  18% at  22:17:49 Mon Feb 20, 2012
110 (ETMR)  25% at  22:20:28 Mon Feb 20, 2012
110 (ETMR)  26% at  22:39:08 Mon Feb 20, 2012
 37 (SNMP)  28% at  22:46:20 Mon Feb 20, 2012
 94 (PROX)  57% at  23:29:36 Mon Feb 20, 2012
 94 (PROX)  63% at  23:29:37 Mon Feb 20, 2012
 94 (PROX)  63% at  23:29:39 Mon Feb 20, 2012
 58 (I2C )  64% at  16:21:54 Tue Feb 21, 2012
  5 (CONS)  86% at  18:41:54 Tue Feb 21, 2012
 58 (I2C )  88% at  18:41:55 Tue Feb 21, 2012
 58 (I2C )  88% at  21:29:41 Sat Feb 25, 2012
 58 (I2C )  98% at  12:04:59 Tue Feb 28, 2012
 58 (I2C ) 100% at  11:31:32 Sat Mar 10, 2012
---------------------------------------------
```

QoS Statistics

Table 133. QoS Statistics Commands

Command Syntax and Usage
`show qos protocol-packet-control protocol-counters` *<packet type>* Displays the total packet count of the selected packet type received by hardware. **Command mode:** All
`show qos protocol-packet-control queue-counters` Displays the total number of packets received by each queue. **Command mode:** All
`clear qos protocol-packet-control protocol-counters` *<packet type>* Clears packet queue statistics for the selected packet type. **Command mode:** All
`clear qos protocol-packet-control queue-counters` *<queue number>* Clears packet queue statistics for the selected queue. **Command mode:** All
`clear qos protocol-packet-control all` Clears all packet queue statistics. **Command mode:** All

Access Control List Statistics

Table 134. ACL Statistics Commands

Command Syntax and Usage
`show access-control list` *<ACL number>* `counters` Displays the Access Control List statistics for a specific ACL. **Command mode:** All
`show access-control list6` *<ACL number>* `counters` Displays the IPv6 ACL statistics for a specific ACL. **Command mode:** All
`show access-control macl` *<MACL number>* `counters` Displays the ACL statistics for a specific management ACL (MACL). **Command mode:** All
`show access-control counters` Displays all ACL statistics. **Command mode:** All
`show access-control vmap` {*<vmap number>*} `counters` Displays VLAN Map statistics for the selected VMAP. For a sample display, see page 221. **Command mode:** All
`clear access-control list` {*<ACL number>*|`all`} `counters` Clears ACL statistics. **Command mode:** Privileged EXEC
`clear access-control list6` {*<ACL number>*|`all`} `counters` Clears IPv6 ACL statistics. **Command mode:** Privileged EXEC
`clear access-control macl` {*<ACL number>*|`all`} `counters` Clears Management ACL (MACL) statistics. **Command mode:** Privileged EXEC
`clear access-control vmap` {*<VMAP number>*} `counters` Clears VLAN Map statistics. **Command mode:** Privileged EXEC

Table 134. ACL Statistics Commands (continued)

Command Syntax and Usage
`show access-control meter` <*meter number*> `counters` Displays ACL meter statistics. **Command mode:** All
`clear access-control meter` <*meter number*> `counters` Clears ACL meter statistics. **Command mode:** Privileged EXEC

ACL Statistics

This option displays ACL statistics.

`show access-control counters`

Command mode: All

```
Hits for ACL 1:                 26057515
Hits for ACL 2:                 26057497
```

VMAP Statistics

The following command displays VLAN Map statistics.

`show access-control vmap` {<*vmap number*>} `counters`

Command mode: All

```
Hits for VMAP 1:                     57515
```

Fiber Channel over Ethernet Statistics

The following command displays Fiber Channel over Ethernet (FCoE) statistics:

```
show fcoe counters
```

Command mode: All

```
FCOE statistics:
FCFAdded:                    5   FCFRemoved:                  1
FCOEAdded:                  81   FCOERemoved:                24
```

Fiber Channel over Ethernet (FCoE) statistics are described in the following table:

Table 135. FCoE Statistics (/stats/fcoe)

Statistic	**Description**
FCFAdded	Total number of FCoE Forwarders (FCF) added.
FCFRemoved	Total number of FCoE Forwarders (FCF) removed.
FCOEAdded	Total number of FCoE connections added.
FCOERemoved	Total number of FCoE connections removed.

The total can accumulate over several FCoE sessions, until the statistics are cleared.

The following command clears FCoE statistics:

```
clear fcoe counters
```

Command mode: Privileged EXEC

SNMP Statistics

The following command displays SNMP statistics:

```
show snmp-server counters
```

Command mode: All

```
SNMP statistics:
snmpInPkts:             150097   snmpInBadVersions:             0
snmpInBadC'tyNames:          0   snmpInBadC'tyUses:             0
snmpInASNParseErrs:          0   snmpEnableAuthTraps:           0
snmpOutPkts:            150097   snmpInBadTypes:                0
snmpInTooBigs:               0   snmpInNoSuchNames:             0
snmpInBadValues:             0   snmpInReadOnlys:               0
snmpInGenErrs:               0   snmpInTotalReqVars:       798464
snmpInTotalSetVars:       2731   snmpInGetRequests:         17593
snmpInGetNexts:         131389   snmpInSetRequests:           615
snmpInGetResponses:          0   snmpInTraps:                   0
snmpOutTooBigs:              0   snmpOutNoSuchNames:            1
snmpOutBadValues:            0   snmpOutReadOnlys:              0
snmpOutGenErrs:              1   snmpOutGetRequests:            0
snmpOutGetNexts:             0   snmpOutSetRequests:            0
snmpOutGetResponses:    150093   snmpOutTraps:                  4
snmpSilentDrops:             0   snmpProxyDrops:                0
```

Table 136. SNMP Statistics

Statistic	Description
snmpInPkts	The total number of Messages delivered to the SNMP entity from the transport service.
snmpInBadVersions	The total number of SNMP Messages, which were delivered to the SNMP protocol entity and were for an unsupported SNMP version.
snmpInBadC'tyNames	The total number of SNMP Messages delivered to the SNMP entity which used an SNMP community name not known to the said entity (the switch).
snmpInBadC'tyUses	The total number of SNMP Messages delivered to the SNMP protocol entity which represented an SNMP operation which was not allowed by the SNMP community named in the Message.

Table 136. SNMP Statistics (continued)

Statistic	**Description**
snmpInASNParseErrs	The total number of ASN.1 or BER errors encountered by the SNMP protocol entity when decoding SNMP Messages received. **Note:** OSI's method of specifying abstract objects is called ASN.1 (Abstract Syntax Notation One, defined in X.208), and one set of rules for representing such objects as strings of ones and zeros is called the BER (Basic Encoding Rules, defined in X.209). ASN.1 is a flexible notation that allows one to define a variety of data types, from simple types such as integers and bit strings to structured types such as sets and sequences. BER describes how to represent or encode values of each ASN.1 type as a string of eight-bit octets.
snmpEnableAuthTraps	An object to enable or disable the authentication traps generated by this entity (the switch).
snmpOutPkts	The total number of SNMP Messages which were passed from the SNMP protocol entity to the transport service.
snmpInBadTypes	The total number of SNMP Messages which failed ASN parsing.
snmpInTooBigs	The total number of SNMP Protocol Data Units (PDUs) which were delivered to the SNMP protocol entity and for which the value of the error-status field is *too big.*
snmpInNoSuchNames	The total number of SNMP Protocol Data Units (PDUs) which were delivered to the SNMP protocol entity and for which the value of the error-status field is `noSuchName`.
snmpInBadValues	The total number of SNMP Protocol Data Units (PDUs) which were delivered to the SNMP protocol entity and for which the value of the error-status field is `badValue.`
snmpInReadOnlys	The total number of valid SNMP Protocol Data Units (PDUs), which were delivered to the SNMP protocol entity and for which the value of the error-status field is `read-Only'. It should be noted that it is a protocol error to generate an SNMP PDU, which contains the value `read-Only' in the error-status field. As such, this object is provided as a means of detecting incorrect implementations of the SNMP.

Table 136. SNMP Statistics (continued)

Statistic	**Description**
snmpInGenErrs	The total number of SNMP Protocol Data Units (PDUs), which were delivered to the SNMP protocol entity and for which the value of the error-status field is `genErr`.
snmpInTotalReqVars	The total number of MIB objects which have been retrieved successfully by the SNMP protocol entity as a result of receiving valid SNMP Get-Request and Get-Next Protocol Data Units (PDUs).
snmpInTotalSetVars	The total number of MIB objects, which have been altered successfully by the SNMP protocol entity as a result of receiving valid SNMP Set-Request Protocol Data Units (PDUs).
snmpInGetRequests	The total number of SNMP Get-Request Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity.
snmpInGetNexts	The total number of SNMP Get-Next Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity.
snmpInSetRequests	The total number of SNMP Set-Request Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity.
snmpInGetResponses	The total number of SNMP Get-Response Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity.
snmpInTraps	The total number of SNMP Trap Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity.
snmpOutTooBigs	The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status field is *too big*.
snmpOutNoSuchNames	The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status is `noSuchName`.
snmpOutBadValues	The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status field is `badValue`.
snmpOutReadOnlys	Not in use.

Table 136. SNMP Statistics (continued)

Statistic	**Description**
snmpOutGenErrs	The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status field is `genErr`.
snmpOutGetRequests	The total number of SNMP Get-Request Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity.
snmpOutGetNexts	The total number of SNMP Get-Next Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity.
snmpOutSetRequests	The total number of SNMP Set-Request Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity.
snmpOutGetResponses	The total number of SNMP Get-Response Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity.
snmpOutTraps	The total number of SNMP Trap Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity.
snmpSilentDrops	The total number of `GetRequest`-PDUs, `GetNextRequest`-PDUs, `GetBulkRequest`-PDUs, `SetRequest`-PDUs, and `InformRequest`-PDUs delivered to the OSPFSNMPv2 entity which were silently dropped because the size of a reply containing an alternate Response-PDU with an empty variable bindings field was greater than either a local constraint or the maximum message size associated with the originator of the request.
snmpProxyDrops	The total number of `GetRequest`-PDUs, `GetNextRequest`-PDUs, `GetBulkRequest`-PDUs, `SetRequest`-PDUs, and `InformRequest`-PDUs delivered to the SNMP entity which were silently dropped because the transmission of the message to a proxy target failed in a manner such that no Response-PDU could be returned.

NTP Statistics

IBM N/OS uses NTP (Network Timing Protocol) version 3 to synchronize the switch's internal clock with an atomic time calibrated NTP server. With NTP enabled, the switch can accurately update its internal clock to be consistent with other devices on the network and generates accurate syslogs.

The following command displays NTP statistics:

```
show ntp counters
```

Command mode: All

```
NTP statistics:
        Primary Server:
                Requests Sent:             17
                Responses Received:        17
                Updates:                   1
        Secondary Server:
                Requests Sent:             0
                Responses Received:        0
                Updates:                   0
        Last update based on response from primary server.
        Last update time:     15:22:05 Wed Nov 28, 2012
        Current system time:   8:05:21 Thu Nov 29, 2012
```

Table 137. NTP Statistics

Field	Description
Primary Server	• **Requests Sent:** The total number of NTP requests the switch sent to the primary NTP server to synchronize time. • **Responses Received:** The total number of NTP responses received from the primary NTP server. • **Updates:** The total number of times the switch updated its time based on the NTP responses received from the primary NTP server.
Secondary Server	• **Requests Sent:** The total number of NTP requests the switch sent to the secondary NTP server to synchronize time. • **Responses Received:** The total number of NTP responses received from the secondary NTP server. • **Updates:** The total number of times the switch updated its time based on the NTP responses received from the secondary NTP server.
Last update based on response from primary server	Last update of time on the switch based on either primary or secondary NTP response received.

Table 137. NTP Statistics

Field	Description
Last update time	The time stamp showing the time when the switch was last updated.
Current system time	The switch system time when the following command was issued: `show ntp counters`

The following command displays information about NTP associated peers:

```
show ntp associations
```

Command mode: All

```
 address         ref clock          st    when(s)   offset(s)
*12.200.151.18   198.72.72.10       3     35316     -2
*synced, #unsynced
```

Table 138. NTP Associations

Field	Description
address	Peer address
ref clock	Peer reference clock address
st	Peer stratum
when(s)	Time in seconds since the latest NTP packet was received from the peer
offset(s)	Offset in seconds between the peer clock and local clock

PTP Statistics

Table 139. Precision Time Protocol Statistics Commands

Command Syntax and Usage
`show ptp counters` Displays Precision Time Protocol statistics. **Command mode:** All
`show interface port` *<port alias or number>* `ptp-counters` Displays Precision Time Protocol statistics for the port. **Command mode:** All
`clear ptp counters` Resets PTP packet counters. **Command mode**: Privileged EXEC

Use the following command to display Precision Time Protocol traffic statistics:

```
show ptp counters
```

Command mode: All

```
Precision time protocol counters:
+--------------------------------------------+
|Received Announce messages:                0|
|Received Sync messages:                    0|
|Received Follow-Up messages:               0|
|Received Delay-Request messages:           0|
|Received Delay-Response messages:          0|
+--------------------------------------------+
|Sent Announce messages:                    0|
|Sent Sync messages:                        0|
|Sent Follow-Up messages:                   0|
|Sent Delay-Request messages:               0|
|Sent Delay-Response messages:              0|
+--------------------------------------------+
```

PTP statistics include the following:

- Total number of Announce messages transmitted and received.
- Total number of Sync transmitted and received.
- Total number of Follow_Up messages transmitted and received
- Total number of Delay_Req messages transmitted and received
- Total number of Delay_Resp messages transmitted and received

Statistics Dump

The following command dumps switch statistics:

```
show counters
```

Use the dump command to dump all switch statistics (40K or more, depending on your configuration). This data can be used to tune or debug switch performance.

If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the `dump` command.

Chapter 4. Configuration Commands

This chapter discusses how to use the Command Line Interface (CLI) for making, viewing, and saving switch configuration changes. Many of the commands, although not new, display more or different information than in the previous version. Important differences are called out in the text.

Table 140. General Configuration Commands

Command Syntax and Usage
`show running-config` Dumps current configuration to a script file. For details, see page 488. **Command mode:** Privileged EXEC
`show running-config diff` Displays running configuration changes that have been applied but not saved to flash memory. **Command mode:** Privileged EXEC
`copy running-config backup-config` Copy the current (running) configuration from switch memory to the `backup-config` partition. For details, see page 489. **Command mode:** Privileged EXEC
`copy running-config startup-config` Copy the current (running) configuration from switch memory to the `startup-config` partition. **Command mode:** Privileged EXEC
`write memory` Copy the current (running) configuration from switch memory to the `active-config` partition. **Command mode:** Privileged EXEC
`copy running-config {ftp|tftp}` Backs up current configuration to a file on the selected FTP/TFTP server. **Command mode:** Privileged EXEC
`copy {ftp|tftp} running-config` Restores current configuration from a FTP/TFTP server. For details, see page 490. **Command mode:** Privileged EXEC

Viewing and Saving Changes

As you use the configuration commands to set switch parameters, the changes you make take effect immediately. You do not need to apply them. Configuration changes are lost the next time the switch boots, unless you save the changes.

You can view all running configuration changes that have been applied but not saved to flash memory using the `show running-config diff` command in Privileged EXEC mode.

Note: Some operations can override the settings of the Configuration commands. Therefore, settings you view using the Configuration commands (for example, port status) might differ from run-time information that you view using the Information commands. The Information commands display current run-time information of switch parameters.

Saving the Configuration

You must save configuration settings to flash memory, so the G8264 reloads the settings after a reset.

Note: If you do not save the changes, they will be lost the next time the system is rebooted.

To save the new configuration, enter the following command:

```
Router# copy running-config startup-config
```

When you save configuration changes, the changes are saved to the *active* configuration block. For instructions on selecting the configuration to run at the next system reset, see “Selecting a Configuration Block” on page 513.

System Configuration

These commands provide configuration of switch management parameters such as user and administrator privilege mode passwords, Web-based management settings, and management access lists.

Table 141. System Configuration Options

Command Syntax and Usage
`system date` *<yyyy> <mm> <dd>* Prompts the user for the system date. The date retains its value when the switch is reset. **Command mode:** Global configuration
`system time` *<hh>*`:`*<mm>*`:`*<ss>* Configures the system time using a 24-hour clock format. The time retains its value when the switch is reset. **Command mode:** Global configuration
`system timezone` Configures the time zone where the switch resides. You are prompted to select your location (continent, country, region) by the timezone wizard. Once a region is selected, the switch updates the time to reflect local changes to Daylight Savings Time, etc. **Command mode:** Global configuration
[no] `system daylight` Disables or enables daylight savings time in the system clock. When enabled, the switch will add an extra hour to the system clock so that it is consistent with the local clock. By default, this option is disabled. **Command mode:** Global configuration
`terminal-length` *<0-300>* Configures the number of lines per screen displayed in the CLI for the current session. A value of 0 disables paging. By default, it is set to the corresponding `line vty length` or `line console length` value in effect at login. **Command mode:** All
`line console length` *<0-300>* Configures the number of lines per screen displayed in the CLI by default for console sessions. Setting it to 0 disables paging. The default value is 28. **Command mode:** Global configuration
`no line console` Sets `line console length` to the default value of 28. **Command mode:** Global configuration
`line vty length` *<0-300>* Sets the default number of lines per screen displayed for Telnet and SSH sessions. A value of 0 disables paging. The default value is 28. **Command mode:** Global configuration

Table 141. System Configuration Options (continued)

Command Syntax and Usage
`no line vty` Sets `line vty length` to the default value of 28. **Command mode:** Global configuration
`system idle` *<0-60>* Sets the idle timeout for CLI sessions in minutes. The default value is 10 minutes. A value of 0 disables system idle. **Command mode:** Global configuration
`system linkscan` {`normal` | `fast` | `slow`} Configures the link scan interval used to poll the status of ports. **Command mode:** Global configuration
`system notice` *<maximum 1024 character multi-line login notice>* *<*`'.'` *to end>* Displays a login notice immediately before the “Enter password:” prompt. This notice can contain up to 1024 characters and new lines. **Command mode:** Global configuration
[`no`] `banner` *<1-80 characters>* Configures a login banner of up to 80 characters. When a user or administrator logs into the switch, the login banner is displayed. It is also displayed as part of the output from the `show sys-info` command. **Command mode:** Global configuration
[`no`] `hostname` *<character string>* Enables or disables displaying of the host name (system administrator’s name) in the Command Line Interface (CLI). **Command mode:** Global configuration
[`no`] `system bootp` Enables or disables the use of BOOTP. If you enable BOOTP, the switch will query its BOOTP server for all of the switch IP parameters. The default setting is `enabled`. **Command mode:** Global configuration
[`no`] `system dhcp` Enables or disables Dynamic Host Control Protocol for setting the IP address on interface 1. When enabled, the IP address obtained from the DHCP server overrides the static IP address. The default setting is `enabled`. **Command mode:** Global configuration

Table 141. System Configuration Options (continued)

Command Syntax and Usage
[no] `system reset-control` Enables or disables the reset control flag. When enabled, the switch continues to function after a crash of the main processor, using the last known Layer 2/3 information. **Command mode:** Global configuration
[no] `system packet-logging` Enables or disables logging of packets that come to the CPU. The default setting is `enabled`. **Command mode:** Global configuration
`system usb-eject` Allows you to safely remove a USB drive from the USB port, without corrupting files on the drive. **Command mode:** Global configuration
`[no] system service-led` Enables (on) or disables (off) the Service Required LED on the front panel of the switch unit. **Command mode:** Global configuration
`show system` Displays the current system parameters. **Command mode:** All

System Error Disable and Recovery Configuration

The Error Disable and Recovery feature allows the switch to automatically disable a port if an error condition is detected on the port. The port remains in the error-disabled state until it is re-enabled manually, or re-enabled automatically by the switch after a timeout period has elapsed. The error-disabled state of a port does not persist across a system reboot.

Table 142. Error Disable Configuration Options

Command Syntax and Usage
`errdisable timeout` *<30 - 86400>* Configures the error-recovery timeout, in seconds. After the timer expires, the switch attempts to re-enable the port. The default value is 300. **Note**: When you change the timeout value, all current error-recovery timers are reset. **Command mode:** Global configuration
`errdisable recovery` Globally enables automatic error-recovery for error-disabled ports. The default setting is `disabled`. **Note**: Each port must have error-recovery enabled to participate in automatic error recovery. **Command mode:** Global configuration
`no errdisable recovery` Globally disables error-recovery for error-disabled ports; `errdisable recovery` is disabled globally by default. **Command mode:** All
`show errdisable` Displays the current system Error Disable configuration. **Command mode:** All

Link Flap Dampening Configuration

The Link Flap Dampening feature allows the switch to automatically disable a port if too many link flaps (link up/link down) are detected on the port during a specified time interval. The port remains in the error-disabled state until it is re-enabled manually, or re-enabled automatically by the switch after a timeout period has elapsed.

Table 143. Link Flap Dampening Configuration Options

Command Syntax and Usage
`errdisable link-flap max-flaps` *<1-100>* Configures the maximum number of link flaps allowed in the configured time period. The default value is 5. **Command mode**: Global configuration
`errdisable link-flap time` *<5-500>* Configures the time period, in seconds. The default value is 30 seconds. **Command mode**: Global configuration
`errdisable link-flap enable` Enables Link Flap Dampening. **Command mode**: Global configuration
`no errdisable link-flap enable` Disables Link Flap Dampening. **Command mode**: Global configuration
`show errdisable link-flap` Displays the current Link Flap Dampening parameters. **Command mode**: All

System Host Log Configuration

Table 144. Host Log Configuration Options

Command Syntax and Usage
[no] `logging host` *<1-2>* `address` *<IP address>* Sets the IP address of the first or second syslog host. **Command mode:** Global configuration
`logging host` *<1-2>* `severity` *<0-7>* This option sets the severity level of the first or second syslog host displayed. The default is 7, which means log all severity levels. **Command mode:** Global configuration
`logging host` *<1-2>* `facility` *<0-7>* This option sets the facility level of the first or second syslog host displayed. The default is 0. **Command mode:** Global configuration
`logging source-interface` *<1-5>* Sets the loopback interface number for syslogs. **Command mode:** Global configuration
`logging console` Enables delivering syslog messages to the console. It is enabled by default. **Command mode:** Global configuration
`no logging console` Disables delivering syslog messages to the console. When necessary, disabling `console` ensures the switch is not affected by syslog messages. It is enabled by default. **Command mode:** Global configuration
`[no] logging synchronous [level` *<0-7>* | `all]` Enables or disables synchronous logging for unsolicited messages. When enabled, if unsolicited messages occur while solicited output display is in progress, the unsolicited messages are buffered and then output separately from the solicited messages. The buffer can store up to 20 unsolicited messages, after which unsolicited messages are discarded. When disabled, unsolicited and solicited messages are logged together. The `level` parameter sets a minimum severity level (lower or equal numeric values) for unsolicited messages to be displayed asynchronously; `all` displays all unsolicited messages asynchronously, regardless of severity level.The default setting is 2. **Command mode:** Global configuration

Table 144. Host Log Configuration Options (continued)

Command Syntax and Usage
`logging console severity` *<0-7>* This option sets the severity level of syslog messages delivered via the console, telnet, and SSH. The system displays only messages with the selected severity level and above. For example, if you set the console severity to 2, only messages with severity level of 1 and 2 are displayed. The default is 7, which means log all severity levels. **Command mode:** Global configuration
`no logging console severity` Disables delivering syslog messages to the console based on severity. **Command mode:** Global configuration
[`no`] `logging log` [*<feature>*] Displays a list of features for which syslog messages can be generated. You can choose to enable/disable specific features (such as `vlans`, `stg`, or `ssh`), or enable/disable syslog on all available features. **Command mode:** Global configuration
`logging buffer severity` *<0-7>* Sets the severity level of the syslog messages saved to flash memory. The default is 7, which means log all severity levels. **Command mode:** Global configuration
`show logging [severity` *<severity level>*`] [reverse]` Displays the current syslog settings, followed by the most recent 2000 syslog messages, as displayed by the `show logging messages` command. For details, see page 26. **Command mode:** All

SSH Server Configuration

For the RackSwitch G8264, these commands enable Secure Shell access from any SSH client.

Table 145. SSH Server Configuration Options

Command Syntax and Usage
`ssh scp-password` Set the administration password for SCP access. **Command mode:** Global configuration
`ssh generate-host-key` Generate the RSA host key. **Command mode:** Global configuration
`ssh port` *<TCP port number>* Sets the SSH server port number. **Command mode:** Global configuration
`ssh scp-enable` Enables the SCP apply and save. **Command mode:** Global configuration
`no ssh scp-enable` Disables the SCP apply and save. **Command mode:** Global configuration
`ssh enable` Enables the SSH server. **Command mode:** Global configuration
`no ssh enable` Disables the SSH server. **Command mode:** Global configuration
`show ssh` Displays the current SSH server configuration. **Command mode:** All

RADIUS Server Configuration

Table 146. RADIUS Server Configuration Options

Command Syntax and Usage
[no] `radius-server primary-host` *<IP address>* Sets the primary RADIUS server address. **Command mode:** Global configuration
[no] `radius-server secondary-host` *<IP address>* Sets the secondary RADIUS server address. **Command mode:** Global configuration
`radius-server primary-host` *<IP address>* `key` *<1-32 characters>* This is the primary shared secret between the switch and the RADIUS server(s). **Command mode:** Global configuration
`radius-server secondary-host` *<IP address>* `key` *<1-32 characters>* This is the secondary shared secret between the switch and the RADIUS server(s). **Command mode:** Global configuration
[`default`] `radius-server port` *<UDP port number>* Enter the number of the UDP port to be configured, between 1500 - 3000. The default is 1645. **Command mode:** Global configuration
`radius-server retransmit` *<1-3>* Sets the number of failed authentication requests before switching to a different RADIUS server. The default is 3 requests. **Command mode:** Global configuration
`radius-server timeout` *<1-10>* Sets the amount of time, in seconds, before a RADIUS server authentication attempt is considered to have failed. The default is 3 seconds. **Command mode:** Global configuration
`ip radius-server source-interface loopback` *<1-5>* Sets the RADIUS source loopback interface. **Command mode:** Global configuration

Table 146. RADIUS Server Configuration Options (continued)

Command Syntax and Usage
`[no] radius-server backdoor` Enables or disables the RADIUS backdoor for Telnet/SSH/HTTP/HTTPS. The default value is `disabled`. To obtain the RADIUS backdoor password for your switch, contact your Service and Support line. **Command mode:** Global configuration
`[no] radius-server secure-backdoor` Enables or disables the RADIUS back door using secure password for telnet/SSH/HTTP/HTTPS. This command does not apply when backdoor (`telnet`) is enabled. **Command mode:** Global configuration
`radius-server enable` Enables the RADIUS server. **Command mode:** Global configuration
`no radius-server enable` Disables the RADIUS server. **Command mode:** Global configuration
`show radius-server` Displays the current RADIUS server parameters. **Command mode:** All

TACACS+ Server Configuration

TACACS (Terminal Access Controller Access Control system) is an authentication protocol that allows a remote access server to forward a user's logon password to an authentication server to determine whether access can be allowed to a given system. TACACS is not an encryption protocol, and therefore less secure than TACACS+ and Remote Authentication Dial-In User Service (RADIUS) protocols. Both TACACS and TACACS+ are described in RFC 1492.

TACACS+ protocol is more reliable than RADIUS, as TACACS+ uses the Transmission Control Protocol (TCP) whereas RADIUS uses the User Datagram Protocol (UDP). Also, RADIUS combines authentication and authorization in a user profile, whereas TACACS+ separates the two operations.

TACACS+ offers the following advantages over RADIUS as the authentication device:

- TACACS+ is TCP-based, so it facilitates connection-oriented traffic.
- It supports full-packet encryption, as opposed to password-only in authentication requests.
- It supports de-coupled authentication, authorization, and accounting.

Table 147. TACACS+ Server Configuration Options

Command Syntax and Usage
[no] `tacacs-server primary-host` *<IP address>* Defines the primary TACACS+ server address. **Command mode:** Global configuration
[no] `tacacs-server secondary-host` *<IP address>* Defines the secondary TACACS+ server address. **Command mode:** Global configuration
[no] `tacacs-server primary-host` *<IP address>* `key` *<1-32 characters>* This is the primary shared secret between the switch and the TACACS+ server(s). **Command mode:** Global configuration
[no] `tacacs-server secondary-host` *<IP address>* `key` *<1-32 characters>* This is the secondary shared secret between the switch and the TACACS+ server(s). **Command mode:** Global configuration
[no] `tacacs-server primary-host [data-port|mgt-port]` Defines the primary interface port to use to send TACACS+ server requests. Select the port to use for data transfer. **Command mode:** Global configuration
[no] `tacacs-server secondary-host [data-port|mgt-port]` Defines the secondary interface port to use to send TACACS+ server requests. Select the port to use for data transfer. **Command mode:** Global configuration

Table 147. TACACS+ Server Configuration Options (continued)

Command Syntax and Usage
[no] `tacacs-server chpassp` *<1-32 characters>* Defines the password for the primary TACACS+ server. **Command mode:** Global configuration
[no] `tacacs-server chpasss` *<1-32 characters>* Defines the password for the secondary TACACS+ server. **Command mode:** Global configuration
[`default`] `tacacs-server port` *<TCP port number>* Enter the number of the TCP port to be configured, between 1 and 65000. The default is 49. **Command mode:** Global configuration
`tacacs-server retransmit` *<1-3>* Sets the number of failed authentication requests before switching to a different TACACS+ server. The default is 3 requests. **Command mode:** Global configuration
`tacacs-server attempts` *<1-10>* Sets the number of failed login attempts before disconnecting the user. The default is 2 attempts. **Command mode:** Global configuration
`tacacs-server timeout` *<4-15>* Sets the amount of time, in seconds, before a TACACS+ server authentication attempt is considered to have failed. The default is 5 seconds. **Command mode:** Global configuration
`ip tacacs-server source-interface loopback` *<1-5>* Sets the TACACS+ source loopback interface. **Command mode:** Global configuration
`[no] tacacs-server user-mapping` {*<0-15>* `user`|`oper`|`admin`} Maps a TACACS+ authorization level to a switch user level. Enter a TACACS+ authorization level (0-15), followed by the corresponding switch user level. **Command mode:** Global configuration

Table 147. TACACS+ Server Configuration Options (continued)

Command Syntax and Usage
[no] `tacacs-server backdoor` Enables or disables the TACACS+ back door for Telnet, SSH/SCP, or HTTP/HTTPS. Enabling this feature allows you to bypass the TACACS+ servers. It is recommended that you use Secure Backdoor to ensure the switch is secured, because Secure Backdoor disallows access through the back door when the TACACS+ servers are responding. The default setting is `disabled`. To obtain the TACACS+ backdoor password for your G8264, contact your Service and Support line. **Command mode:** Global configuration
[no] `tacacs-server secure-backdoor` Enables or disables TACACS+ secure back door access through Telnet, SSH/SCP, or HTTP/HTTPS only when the TACACS+ servers are not responding. This feature is recommended to permit access to the switch when the TACACS+ servers become unresponsive. If no back door is enabled, the only way to gain access when TACACS+ servers are unresponsive is to use the back door via the console port. The default is `disabled`. **Command mode:** Global configuration
[no] `tacacs-server privilege-mapping` Enables or disables TACACS+ privilege-level mapping. The default value is `disabled`. **Command mode:** Global configuration
[no] `tacacs-server password-change` Enables or disables TACACS+ password change. The default value is `disabled`. **Command mode:** Global configuration
`primary-password` Configures the password for the primary TACACS+ server. The CLI will prompt you for input. **Command mode:** Global configuration
`secondary-password` Configures the password for the secondary TACACS+ server. The CLI will prompt you for input. **Command mode:** Global configuration

Table 147. TACACS+ Server Configuration Options (continued)

Command Syntax and Usage
`[no] tacacs-server command-authorization` Enables or disables TACACS+ command authorization. **Command mode:** Global configuration
`[no] tacacs-server command-logging` Enables or disables TACACS+ command logging. **Command mode:** Global configuration
`[no] tacacs-server directed-request` Enables or disables TACACS+ directed request, which uses a specified TACACS+ server for authentication, authorization, accounting. When enabled, When directed-request is enabled, each user must add a configured TACACS+ server hostname to the username (for example, `username@hostname`) during login. This command allows the following options: – Restricted: Only the username is sent to the specified TACACS+ server. – No-truncate: The entire login string is sent to the TACACS+ server. **Command mode:** Global configuration
`[no] tacacs-server accounting-enable` Enables or disables TACACS+ accounting. **Command mode:** Global configuration
`[no] tacacs-server enable` Enables or disables the TACACS+ server. By default, the server is disabled. **Command mode:** Global configuration
`show tacacs-server` Displays current TACACS+ configuration parameters. **Command mode:** All

LDAP Server Configuration

LDAP (Lightweight Directory Access Protocol) is an authentication protocol that allows a remote access server to forward a user's logon password to an authentication server to determine whether access can be allowed to a given system.

Table 148. LDAP Server Configuration Options

Command Syntax and Usage
[no] `ldap-server primary-host` *<IP address>* `[data-port|mgt-port]` Sets the primary LDAP server address. **Command mode:** Global configuration
[no] `ldap-server secondary-host` *<IP address>* `[data-port|mgt-port]` Sets the secondary LDAP server address. **Command mode:** Global configuration
[`default`] `ldap-server port` *<UDP port number>* Enter the number of the UDP port to be configured, between 1 - 65000. The default is 389. **Command mode:** Global configuration
`ldap-server retransmit` *<1-3>* Sets the number of failed authentication requests before switching to a different LDAP server. The default is 3 requests. **Command mode:** Global configuration
`ldap-server timeout` *<4-15>* Sets the amount of time, in seconds, before a LDAP server authentication attempt is considered to have failed. The default is 5 seconds. **Command mode:** Global configuration
`ldap-server domain` [*<1-128 characters>*|`none`] Sets the domain name for the LDAP server. Enter the full path for your organization. For example: `ou=people,dc=mydomain,dc=com` **Command mode:** Global configuration
`[no] ldap-server backdoor` Enables or disables the LDAP back door for Telnet, SSH/SCP, or HTTP/HTTPS. The default setting is `disabled`. To obtain the LDAP back door password for your G8264, contact your Service and Support line. **Command mode:** Global configuration

Table 148. LDAP Server Configuration Options (continued)

Command Syntax and Usage
`ldap-server enable` Enables the LDAP server. **Command mode:** Global configuration
`no ldap-server enable` Disables the LDAP server. **Command mode:** Global configuration
`show ldap-server` Displays the current LDAP server parameters. **Command mode:** All

NTP Server Configuration

These commands allow you to synchronize the switch clock to a Network Time Protocol (NTP) server. By default, this option is disabled.

Table 149. NTP Server Configuration Options

Command Syntax and Usage
[no] `ntp primary-server` {<*host name*>|<*IP address*>} Prompts for the hostname or IP addresses of the primary NTP server to which you want to synchronize the switch clock. **Command mode:** Global configuration
[no] `ntp ipv6 primary-server` <*IPv6 address*> Prompts for the IPv6 addresses of the primary NTP server to which you want to synchronize the switch clock. **Note**: To delete the IPv6 primary server, use the following command: `no ntp primary-server` <*IP address*> **Command mode:** Global configuration
[no] `ntp ipv6 secondary-server` <*IPv6 address*> Prompts for the IPv6 addresses of the secondary NTP server to which you want to synchronize the switch clock. **Note**: To delete the IPv6 secondary server, use the following command: `no ntp secondary-server` <*IP address*> **Command mode:** Global configuration
[no] `ntp secondary-server` {<*host name*>|<*IP address*>} Prompts for the hostname or IP addresses of the secondary NTP server to which you want to synchronize the switch clock. **Command mode:** Global configuration
[no] `ntp sync-logs` Enables or disables informational logs for NTP synchronization failures. Default setting is enabled. **Command mode:** Global configuration
`ntp offset` <*0-86400*> Configures the minimum offset in seconds between the switch clock and the NTP server that triggers a system log message. The default value is 300. **Command mode:** Global configuration
`no ntp offset` Resets the NTP offset to the default 300 seconds value. **Command mode:** Global configuration

Table 149. NTP Server Configuration Options (continued)

Command Syntax and Usage
`ntp interval` *<5-44640>* Specifies the interval, that is, how often, in minutes, to re-synchronize the switch clock with the NTP server. **Command mode:** Global configuration
`ntp source loopback` *<1-5>* Sets the NTP source loopback interface. **Command mode:** Global configuration
`ntp enable` Enables the NTP synchronization service. **Command mode:** Global configuration
`no ntp enable` Disables the NTP synchronization service. **Command mode:** Global configuration
`show ntp` Displays the current NTP service settings. **Command mode:** All

System SNMP Configuration

IBM N/OS supports SNMP-based network management. In SNMP model of network management, a management station (client/manager) accesses a set of variables known as MIBs (Management Information Base) provided by the managed device (agent). If you are running an SNMP network management station on your network, you can manage the switch using the following standard SNMP MIBs:

- MIB II (RFC 1213)
- Ethernet MIB (RFC 1643)
- Bridge MIB (RFC 1493)

An SNMP agent is a software process on the managed device that listens on UDP port 161 for SNMP messages. Each SNMP message sent to the agent contains a list of management objects to retrieve or to modify.

SNMP parameters that can be modified include:

- System name
- System location
- System contact
- Use of the SNMP system authentication trap function
- Read community string
- Write community string
- Trap community strings

Table 150. System SNMP Options

Command Syntax and Usage
`snmp-server name` *<1-64 characters>* Configures the name for the system. The name can have a maximum of 64 characters. **Command mode:** Global configuration
`snmp-server location` *<1-64 characters>* Configures the name of the system location. The location can have a maximum of 64 characters. **Command mode:** Global configuration
`snmp-server contact` *<1-64 characters>* Configures the name of the system contact. The contact can have a maximum of 64 characters. **Command mode:** Global configuration
`snmp-server read-community` *<1-32 characters>* Configures the SNMP read community string. The read community string controls SNMP “get” access to the switch. It can have a maximum of 32 characters. The default read community string is *public*. **Command mode:** Global configuration
`[no] snmp-server read-community-additional` *<1-32 characters>* Adds or removes an additional SNMP read community string. Up to 7 additional read community strings are supported. **Command mode:** Global configuration

Table 150. System SNMP Options (continued)

Command Syntax and Usage
`[no] snmp-server write-community-additional` *<1-32 characters>* Adds or removes an additional SNMP write community string. Up to 7 additional write community strings are supported. **Command mode:** Global configuration
`snmp-server write-community` *<1-32 characters>* Configures the SNMP write community string. The write community string controls SNMP "set" and "get" access to the switch. It can have a maximum of 32 characters. The default write community string is *private*. **Command mode:** Global configuration
`snmp-server trap-source` {*<interface number>*|`loopback` *<1-5>*} Configures the source interface for SNMP traps. To send traps through the management ports, specify interface 126. **Command mode:** Global configuration
`snmp-server host` *<trap host IP address> <trap host community string>* Adds a trap host server. **Command mode:** Global configuration
`no snmp-server host` *<trap host IP address>* Removes the trap host server. **Command mode:** Global configuration
`snmp-server timeout` *<1-30>* Sets the timeout value for the SNMP state machine, in minutes. **Command mode:** Global configuration
`[no] snmp-server authentication-trap` Enables or disables the use of the system authentication trap facility. The default setting is `disabled`. **Command mode:** Global configuration
`[no] snmp-server link-trap` Enables or disables the sending of SNMP link up and link down traps. The default setting is `enabled`. **Command mode:** Global configuration
`show snmp-server` Displays the current SNMP configuration. **Command mode:** All

SNMPv3 Configuration

SNMP version 3 (SNMPv3) is an extensible SNMP Framework that supplements the SNMPv2 Framework by supporting the following:

- a new SNMP message format
- security for messages
- access control
- remote configuration of SNMP parameters

For more details on the SNMPv3 architecture please refer to RFC3411 to RFC3418.

Table 151. SNMPv3 Configuration Options

Command Syntax and Usage
`snmp-server user` *<1-16>* This command allows you to create a user security model (USM) entry for an authorized user. You can also configure this entry through SNMP. **Command mode:** Global configuration To view command options, see page 255.
`snmp-server view` *<1-128>* This command allows you to create different MIB views. **Command mode:** Global configuration To view command options, see page 256.
`snmp-server access` *<1-32>* This command allows you to specify access rights. The View-based Access Control Model defines a set of services that an application can use for checking access rights of the user. You need access control when you have to process retrieval or modification request from an SNMP entity. **Command mode:** Global configuration To view command options, see page 257.
`snmp-server group` *<1-16>* A group maps the user name to the access group names and their access rights needed to access SNMP management objects. A group defines the access rights assigned to all names that belong to a particular group. **Command mode:** Global configuration To view command options, see page 258.
`snmp-server community` *<1-16>* The community table contains objects for mapping community strings and version-independent SNMP message parameters. **Command mode:** Global configuration To view command options, see page 259.

Table 151. SNMPv3 Configuration Options (continued)

`snmp-server target-address` *<1-16>* This command allows you to configure destination information, consisting of a transport domain and a transport address. This is also termed as transport endpoint. The SNMP MIB provides a mechanism for performing source address validation on incoming requests, and for selecting community strings based on target addresses for outgoing notifications. **Command mode:** Global configuration To view command options, see page 260.
`snmp-server target-parameters` *<1-16>* This command allows you to configure SNMP parameters, consisting of message processing model, security model, security level, and security name information. There may be multiple transport endpoints associated with a particular set of SNMP parameters, or a particular transport endpoint may be associated with several sets of SNMP parameters. **Command mode:** Global configuration To view command options, see page 261.
`snmp-server notify` *<1-16>* A notification application typically monitors a system for particular events or conditions, and generates Notification-Class messages based on these events or conditions. **Command mode:** Global configuration To view command options, see page 262.
`snmp-server version {v1v2v3|v3only}` This command allows you to enable or disable the access to SNMP versions 1, 2 or 3. This command is enabled by default. **Command mode:** Global configuration
`show snmp-server v3` Displays the current SNMPv3 configuration. **Command mode:** All

User Security Model Configuration

You can make use of a defined set of user identities using this Security Model. An SNMP engine must have the knowledge of applicable attributes of a user.

These commands help you create a user security model entry for an authorized user. You need to provide a security name to create the USM entry.

Table 152. User Security Model Configuration Options

Command Syntax and Usage
`snmp-server user` *<1-16>* `name` *<1-32 characters>* This command allows you to configure a string that represents the name of the user. This is the login name that you need in order to access the switch. **Command mode:** Global configuration
`snmp-server user` *<1-16>* `authentication-protocol {md5|sha|none} authentication-password` *<password value>* This command allows you to configure the authentication protocol and password. The authentication protocol can be HMAC-MD5-96 or HMAC-SHA-96, or none. The default algorithm is `none`. When you configure an authentication algorithm, you must provide a password, otherwise you will get an error message during validation. This command allows you to create or change your password for authentication. **Command mode:** Global configuration
`snmp-server user` *<1-16>* `privacy-protocol {des|none} privacy-password` *<password value>* This command allows you to configure the type of privacy protocol and the privacy password. The privacy protocol protects messages from disclosure. The options are `des` (CBC-DES Symmetric Encryption Protocol) or `none`. If you specify `des` as the privacy protocol, then make sure that you have selected one of the authentication protocols (MD5 or HMAC-SHA-96). If you select `none` as the authentication protocol, you will get an error message. You can create or change the privacy password. **Command mode:** Global configuration
`no snmp-server user` *<1-16>* Deletes the USM user entries. **Command mode:** Global configuration
`show snmp-server v3 user` *<1-16>* Displays the USM user entries. **Command mode:** All

SNMPv3 View Configuration

Note that the first five default `vacmViewTreeFamily` entries cannot be removed, and their names cannot be changed.

Table 153. SNMPv3 View Configuration Options

Command Syntax and Usage
`snmp-server view` *<1-128>* `name` *<1-32 characters>* This command defines the name for a family of view subtrees. **Command mode:** Global configuration
`snmp-server view` *<1-128>* `tree` *<1-64 characters>* This command defines MIB tree, which when combined with the corresponding mask defines a family of view subtrees. **Command mode:** Global configuration
`[no] snmp-server view` *<1-128>* `mask` *<1-32 characters>* This command defines the bit mask, which in combination with the corresponding tree defines a family of view subtrees. **Command mode:** Global configuration
`snmp-server view` *<1-128>* `type` {`included`|`excluded`} This command indicates whether the corresponding instances of `vacmViewTreeFamilySubtree` and `vacmViewTreeFamilyMask` define a family of view subtrees, which is included in or excluded from the MIB view. **Command mode:** Global configuration
`no snmp-server view` *<1-128>* Deletes the `vacmViewTreeFamily` group entry. **Command mode:** Global configuration
`show snmp-server v3 view` *<1-128>* Displays the current `vacmViewTreeFamily` configuration. **Command mode:** All

View-based Access Control Model Configuration

The view-based Access Control Model defines a set of services that an application can use for checking access rights of the user. Access control is needed when the user has to process SNMP retrieval or modification request from an SNMP entity.

Table 154. View-based Access Control Model Options

Command Syntax and Usage
`snmp-server access` *<1-32>* `name` *<1-32 characters>* Defines the name of the group. **Command mode:** Global configuration
`snmp-server access` *<1-32>* `security {usm|snmpv1|snmpv2}` Allows you to select the security model to be used. **Command mode:** Global configuration
`snmp-server access` *<1-32>* `level {noAuthNoPriv|authNoPriv|authPriv}` Defines the minimum level of security required to gain access rights. The level `noAuthNoPriv` means that the SNMP message will be sent without authentication and without using a privacy protocol. The level `authNoPriv` means that the SNMP message will be sent with authentication but without using a privacy protocol. The `authPriv` means that the SNMP message will be sent both with authentication and using a privacy protocol. **Command mode:** Global configuration
`snmp-server access` *<1-32>* `read-view` *<1-32 characters>* Defines a read view name that allows you read access to a particular MIB view. If the value is empty or if there is no active MIB view having this value then no access is granted. **Command mode:** Global configuration
`snmp-server access` *<1-32>* `write-view` *<1-32 characters>* Defines a write view name that allows you write access to the MIB view. If the value is empty or if there is no active MIB view having this value then no access is granted. **Command mode:** Global configuration
`snmp-server access` *<1-32>* `notify-view` *<1-32 characters>* Defines a notify view name that allows you notify access to the MIB view. **Command mode:** Global configuration
`no snmp-server access` *<1-32>* Deletes the View-based Access Control entry. **Command mode:** Global configuration
`show snmp-server v3 access` *<1-32>* Displays the View-based Access Control configuration. **Command mode:** All

SNMPv3 Group Configuration

Table 155. SNMPv3 Group Configuration Options

Command Syntax and Usage
`snmp-server group` *<1-16>* `security {usm|snmpv1|snmpv2}` Defines the security model. **Command mode:** Global configuration
`snmp-server group` *<1-16>* `user-name` *<1-32 characters>* Sets the user name as defined in the following command on page 255: `snmp-server user` *<1-16>* `name` *<1-32 characters>* **Command mode:** Global configuration
`snmp-server group` *<1-16>* `group-name` *<1-32 characters>* The name for the access group as defined in the following command: `snmp-server access` *<1-32>* `name` *<1-32 characters>* on page 255. **Command mode:** Global configuration
`no snmp-server group` *<1-16>* Deletes the `vacmSecurityToGroup` entry. **Command mode:** Global configuration
`show snmp-server v3 group` *<1-16>* Displays the current `vacmSecurityToGroup` configuration. **Command mode:** All

SNMPv3 Community Table Configuration

These commands are used for configuring the community table entry. The configured entry is stored in the community table list in the SNMP engine. This table is used to configure community strings in the Local Configuration Datastore (LCD) of SNMP engine.

Table 156. SNMPv3 Community Table Configuration Options

Command Syntax and Usage
`snmp-server community` *<1-16>* `index` *<1-32 characters>* Allows you to configure the unique index value of a row in this table. **Command string:** Global configuration
`snmp-server community` *<1-16>* `name` *<1-32 characters>* Defines the user name as defined in the following command on page 255: `snmp-server user` *<1-16>* `name` *<1-32 characters>* **Command string:** Global configuration
`snmp-server community` *<1-16>* `user-name` *<1-32 characters>* Defines a readable string that represents the corresponding value of an SNMP community name in a security model. **Command mode:** Global configuration
`snmp-server community` *<1-16>* `tag` *<1-255 characters>* Allows you to configure a tag. This tag specifies a set of transport endpoints to which a command responder application sends an SNMP trap. **Command mode:** Global configuration
`no snmp-server community` *<1-16>* Deletes the community table entry. **Command mode:** Global configuration
`show snmp-server v3 community` *<1-16>* Displays the community table configuration. **Command mode:** All

SNMPv3 Target Address Table Configuration

These commands are used to configure the target transport entry. The configured entry is stored in the target address table list in the SNMP engine. This table of transport addresses is used in the generation of SNMP messages.

Table 157. Target Address Table Configuration Options

Command Syntax and Usage
`snmp-server target-address` *<1-16>* `address` *<IP address>* `name` *<1-32 characters>* Allows you to configure the locally arbitrary, but unique identifier, target address name associated with this entry. **Command mode:** Global configuration
`snmp-server target-address` *<1-16>* `name` *<1-32 characters>* `address` *<transport IP address>* Configures a transport IPv4 or IPv6 address that can be used in the generation of SNMP traps. IPv6 addresses are not displayed in the configuration, but they do receive traps. **Command mode:** Global configuration
`snmp-server target-address` *<1-16>* `port` *<port alias or number>* Allows you to configure a transport address port that can be used in the generation of SNMP traps. **Command mode:** Global configuration
`snmp-server target-address` *<1-16>* `taglist` *<1-255 characters>* Allows you to configure a list of tags that are used to select target addresses for a particular operation. **Command mode:** Global configuration
`snmp-server target-address` *<1-16>* `parameters-name` *<1-32 characters>* Defines the name as defined in the following command on page 261: `snmp-server target-parameters` *<1-16>* `name` *<1-32 characters>* **Command mode:** Global configuration
`no snmp-server target-address` *<1-16>* Deletes the Target Address Table entry. **Command mode:** Global configuration
`show snmp-server v3 target-address` *<1-16>* Displays the current Target Address Table configuration. **Command mode:** All

SNMPv3 Target Parameters Table Configuration

You can configure the target parameters entry and store it in the target parameters table in the SNMP engine. This table contains parameters that are used to generate a message. The parameters include the message processing model (for example: SNMPv3, SNMPv2c, SNMPv1), the security model (for example: USM), the security name, and the security level (`noAuthnoPriv, authNoPriv`, or `authPriv`).

Table 158. Target Parameters Table Configuration Options

Command Syntax and Usage
`snmp-server target-parameters` *<1-16>* `name` *<1-32 characters>* Allows you to configure the locally arbitrary, but unique, identifier that is associated with this entry. **Command mode:** Global configuration
`snmp-server target-parameters` *<1-16>* `message {snmpv1|snmpv2c|snmpv3}` Allows you to configure the message processing model that is used to generate SNMP messages. **Command mode:** Global configuration
`snmp-server target-parameters` *<1-16>* `security {usm|snmpv1|snmpv2}` Allows you to select the security model to be used when generating the SNMP messages. **Command mode:** Global configuration
`snmp-server target-parameters` *<1-16>* `user-name` *<1-32 characters>* Defines the name that identifies the user in the USM table (page 255) on whose behalf the SNMP messages are generated using this entry. **Command mode:** Global configuration
`snmp-server target-parameters` *<1-16>* `level {noAuthNoPriv|authNoPriv|authPriv}` Allows you to select the level of security to be used when generating the SNMP messages using this entry. The level `noAuthNoPriv` means that the SNMP message will be sent without authentication and without using a privacy protocol. The level `authNoPriv` means that the SNMP message will be sent with authentication but without using a privacy protocol. The `authPriv` means that the SNMP message will be sent both with authentication and using a privacy protocol. **Command mode:** Global configuration
`no snmp-server target-parameters` *<1-16>* Deletes the `targetParamsTable` entry. **Command mode:** Global configuration
`show snmp-server v3 target-parameters` *<1-16>* Displays the current `targetParamsTable` configuration. Command mode: All

SNMPv3 Notify Table Configuration

SNMPv3 uses Notification Originator to send out traps. A notification typically monitors a system for particular events or conditions, and generates Notification-Class messages based on these events or conditions.

Table 159. Notify Table Options

Command Syntax and Usage
`snmp-server notify` *<1-16>* `name` *<1-32 characters>* Defines a locally arbitrary, but unique, identifier associated with this SNMP notify entry. **Command mode:** Global configuration
`snmp-server notify` *<1-16>* `tag` *<1-255 characters>* Allows you to configure a tag that contains a tag value which is used to select entries in the Target Address Table. Any entry in the `snmpTargetAddrTable`, that matches the value of this tag, is selected. **Command mode:** Global configuration
`no snmp-server notify` *<1-16>* Deletes the notify table entry. **Command mode:** Global configuration
`show snmp-server v3 notify` *<1-16>* Displays the current notify table configuration. **Command mode:** All

System Access Configuration

Table 160. System Access Configuration Options

Command Syntax and Usage
`access user user-password` Sets the user (`user`) password. The user has no direct responsibility for switch management. The user view switch status information and statistics, but cannot make any configuration changes. This command will prompt for required information: current admin password, new password (up to 128 characters) and confirmation of the new password. **Note:** To disable the user account, set the password to null (no password). **Command Mode**: Global configuration
`access user operator-password` Sets the operator (`oper)` password. The operator manages all functions of the switch. The operator can view all switch information and statistics and can reset ports. This command will prompt for required information: current admin password, new password (up to 128 characters) and confirmation of the new password. **Note:** To disable the operator account, set the password to null (no password). The default setting is disabled (no password). **Command Mode**: Global configuration
`access user administrator-password` Sets the administrator (`admin`) password. The administrator has complete access to all menus, information, and configuration commands on the G8264, including the ability to change both the user and administrator passwords. This command will prompt for required information: current admin password, new password (up to 128 characters) and confirmation of the new password. Access includes “`oper`” functions. **Note:** You cannot disable the administrator password. **Command Mode**: Global configuration
`[no] access http enable` Enables or disables HTTP (Web) access to the Browser-Based Interface. It is enabled by default. **Command mode:** Global configuration
`[default] access http port` [*<port alias or number>*] Sets the switch port used for serving switch Web content. The default is HTTP port 80. Command mode: Global configuration

Table 160. System Access Configuration Options (continued)

Command Syntax and Usage
`[no] access snmp {read-only|read-write}` Disables or provides read-only/write-read SNMP access. **Command mode:** Global configuration
`[no] access telnet enable` Enables or disables Telnet access. This command is enabled by default. **Command mode:** Global configuration
`[default] access telnet port` [<*1-65535*>] Sets an optional Telnet server port number for cases where the server listens for Telnet sessions on a non-standard port. **Command mode:** Global configuration
`[default] access tftp-port` [<*1-65535*>] Sets the TFTP port for the switch. The default is port 69. **Command mode:** Global configuration
`[no] access tsbbi enable` Enables or disables Telnet/SSH configuration through the Browser-Based Interface (BBI). **Command mode:** Global configuration
`[no] access userbbi enable` Enables or disables user configuration access through the Browser-Based Interface (BBI). **Command mode:** Global configuration
`show access` Displays the current system access parameters. **Command mode:** All

Management Network Configuration

These commands are used to define IP address ranges which are allowed to access the switch for management purposes.

Table 161. Management Network Configuration Options

Command Syntax and Usage
`access management-network` *<mgmt network IPv4 or IPv6 address>* *<mgmt network mask or prefix length>* Adds a defined network through which switch access is allowed through Telnet, SNMP, RIP, or the IBM N/OS browser-based interface. A range of IP addresses is produced when used with a network mask address. Specify an IP address and mask address in dotted-decimal notation. **Note**: If you configure the management network without including the switch interfaces, the configuration causes the Firewall Load Balancing health checks to fail and creates a “Network Down” state on the network. **Command mode:** Global configuration
`no access management-network` *<mgmt network IPv4 or IPv6 address>* *<mgmt network mask or prefix length>* Removes a defined network, which consists of a management network address and a management network mask address. **Command mode:** Global configuration
`show access management-network` Displays the current management network configuration. **Command mode:** All except User EXEC
`clear access management-network` Removes all defined management networks. **Command mode:** Global configuration

NETCONF Configuration

This menu allows you to configure support for Network Configuration Protocol (NETCONF), which provides mechanisms to install, manipulate, and delete the configuration of network devices. NETCONF is described in RFC 4741.

Table 162. NETCONF Configuration Options

Command Syntax and Usage
`[no] access netconf enable` Enables or disables NETCONF access to the switch. **Command mode:** Global configuration
`access netconf timeout` *<30-3600>* Configures the timeout value for NETCONF sessions, in seconds. The default value is 300 seconds. **Command mode:** Global configuration
`show access` Displays the current configuration. **Command mode:** All

NETCONF over SSH Configuration

This menu allows you to enable NETCONF access over Secure Shell (SSH). NETCONF over SSH is described in RFC 4742.

Table 163. NETCONF over SSH Configuration Options

Command Syntax and Usage
`[no] access netconf ssh enable` Enables or disables NETCONF access over SSH. **Command mode:** Global configuration
`access netconf ssh port` *<TCP port number>* Configures the TCP port used for NETCONF. The default port number is 830. **Command mode:** Global configuration

User Access Control Configuration

The following table describes user-access control commands.

Passwords can be a maximum of 128 characters.

Table 164. User Access Control Configuration Options

Command Syntax and Usage
`access user eject` {<*user name*>|<*session ID*>} Ejects the specified user from the G8264. **Command mode:** Global configuration
`clear line` <*1-12*> Ejects the user with the corresponding session ID from the G8264. **Command mode:** Privileged EXEC
`access user user-password` Sets the user (`user`) password. This command will prompt for required information: current admin password, new password (up to 128 characters) and confirmation of the new password. **Command mode:** Global configuration
`access user operator-password` Sets the operator (`oper`) password. This command will prompt for required information: current admin password, new password (up to 128 characters) and confirmation of the new password. **Command mode:** Global configuration
`access user administrator-password` Sets the administrator (`admin`) password. This command will prompt for required information: current admin password, new password (up to 128 characters) and confirmation of the new password. Access includes "`oper`" functions. **Command mode:** Global configuration
`show access user` Displays the current user status. **Command mode:** All except User EXEC

System User ID Configuration

Table 165. User ID Configuration Options

Command Syntax and Usage
`access user <1-10> level {user|operator|administrator}` Sets the Class-of-Service to define the user's authority level. IBM N/OS defines these levels as: User, Operator, and Administrator, with User being the most restricted level. **Command mode:** Global configuration
`access user <1-10> name <1-8 characters>` Defines the user name of maximum eight characters. **Command mode:** Global configuration
`access user <1-10> password` Sets the user (`user`) password. This command will prompt for required information: current admin password, new password (up to 128 characters) and confirmation of the new password. **Command mode:** Global configuration
`access user <1-10> enable` Enables the user ID. **Command mode:** Global configuration
`no access user <1-10> enable` Disables the user ID. **Command mode:** Global configuration
`no access user <1-10>` Deletes the user ID. **Command mode:** Global configuration
`show access user` Displays the current user ID configuration. **Command mode:** All except User EXEC

Strong Password Configuration

Table 166. Strong Password Configuration Options

Command Syntax and Usage
`access user strong-password enable` Enables Strong Password requirement. **Command mode:** Global configuration
`no access user strong-password enable` Disables Strong Password requirement. **Command mode:** Global configuration
`access user strong-password expiry` *<1-365>* Configures the number of days allowed before the password must be changed. The default value is 60 days. **Command mode:** Global configuration
`access user strong-password warning` *<1-365>* Configures the number of days before password expiration, that a warning is issued to users. The default value is 15 days. **Command mode:** Global configuration
`access user strong-password faillog` *<1-255>* Configures the number of failed login attempts allowed before a security notification is logged. The default value is 3 login attempts. **Command mode:** Global configuration
`show access user strong-password` Displays the current Strong Password configuration. **Command mode:** All except User EXEC

HTTPS Access Configuration

Table 167. HTTPS Access Configuration Options

Command Syntax and Usage
`[no] access https enable` Enables or disables BBI access (Web access) using HTTPS. **Command mode:** Global configuration
`[default] access https port` [<*TCP port number*>] Defines the HTTPS Web server port number. The default port is 443. **Command mode:** Global configuration
`access https generate-certificate` Allows you to generate a certificate to connect to the SSL to be used during the key exchange. A default certificate is created when HTTPS is enabled for the first time. The user can create a new certificate defining the information that they want to be used in the various fields. For example: – Country Name (2 letter code): CA – State or Province Name (full name): Ontario – Locality Name (for example, city): Ottawa – Organization Name (for example, company): Blade – Organizational Unit Name (for example, section): Operations – Common Name (for example, user's name): Mr Smith – Email (for example, email address): info@bladenetwork.net You will be asked to confirm if you want to generate the certificate. It will take approximately 30 seconds to generate the certificate. Then the switch will restart SSL agent. **Command mode:** Global configuration
`access https save-certificate` Allows the client, or the Web browser, to accept the certificate and save the certificate to Flash to be used when the switch is rebooted. **Command mode:** Global configuration
`copy tftp ca-cert address` <*hostname or server-IP-addr*> `filename` <*server-filename*> Enables you to import a certificate authority root certificate using TFTP
`copy tftp host-key address` <*hostname or server-IP-addr*> `filename` <*server-filename*> Enables you to import a host private key using TFTP.
`copy tftp host-cert address` <*hostname or server-IP-addr*> `filename` <*server-filename*> Enables you to import a host certificate using TFTP.
`show access` Displays the current SSL Web Access configuration. **Command mode:** All except User EXEC

Custom Daylight Saving Time Configuration

Use these commands to configure custom Daylight Saving Time. The DST is defined by two rules, the start rule and end rule. The rules specify the dates when the DST starts and finishes. These dates are represented as specific calendar dates or as relative offsets in a month (for example, 'the second Sunday of September').

Relative offset example:
2070901 = Second Sunday of September, at 1:00 a.m.

Calendar date example:
0070901 = September 7, at 1:00 a.m.

Table 168. Custom DST Options

Command Syntax and Usage
`system custom-dst start-rule` <*WDDMMhh*> Configures the start date for custom DST, as follows: `WDMMhh` W = week (0-5, where 0 means use the calendar date) D = day of the week (01-07, where 01 is Monday) MM = month (1-12) hh = hour (0-23) **Note**: Week 5 is always considered to be the last week of the month. **Command mode:** Global configuration
`system custom-dst end-rule` <*WDDMMhh*> Configures the end date for custom DST, as follows: `WDMMhh` W = week (0-5, where 0 means use the calendar date) D = day of the week (01-07, where 01 is Monday) MM = month (1-12) hh = hour (0-23) **Note**: Week 5 is always considered to be the last week of the month. **Command mode:** Global configuration
`system custom-dst enable` Enables the Custom Daylight Saving Time settings. **Command mode:** Global configuration
`no system custom-dst enable` Disables the Custom Daylight Saving Time settings. **Command mode:** Global configuration
`show custom-dst` Displays the current Custom DST configuration. **Command mode:** All except User EXEC

sFlow Configuration

IBM N/OS supports sFlow version 5. sFlow is a sampling method used for monitoring high speed switched networks. Use these commands to configure the sFlow agent on the switch.

Table 169. sFlow Configuration Options

Command Syntax and Usage
`sflow enable` Enables the sFlow agent. **Command mode:** Global configuration
`no sflow enable` Disables the sFlow agent. **Command mode:** Global configuration
`sflow server` *<IP address>* `[data-port|mgt-port]` Defines the sFlow server address and interface port. **Command mode:** Global configuration
`sflow port` *<1-65535>* Configures the UDP port for the sFlow server. The default value is `6343`. **Command mode:** Global configuration
`show sflow` Displays sFlow configuration parameters. **Command mode:** All

sFlow Port Configuration

Use the following commands to configure the sFlow port on the switch.

Table 170. sFlow Port Configuration Options

Command Syntax and Usage
`[no] sflow polling` *<5-60>* Configures the sFlow polling interval, in seconds. The default setting is `disabled`. **Command mode:** Interface port
`[no] sflow sampling` *<256-65536>* Configures the sFlow sampling rate, in packets per sample. The default setting is `disabled`. **Command mode:** Interface port

Server Port Configuration

Use these commands to define a list of server ports. Ports that are not configured as server ports are considered to be uplink ports. VMready learns Virtual Machine information only from server ports.

Table 171. Server Port Configuration Options

Command Syntax and Usage
`system server-ports port` *<port alias or number>* Adds one or more port physical ports to the list of server ports. **Command mode:** Global configuration
`no system server-ports port` *<port alias or number>* Removes one of more ports from the list of server ports. **Command mode:** Global configuration
`show system server-ports` Displays the current server port configuration. **Command mode:** All

Port Configuration

Use the Port Configuration commands to configure settings for interface ports.

Table 172. Port Configuration Options

Command Syntax and Usage
`interface port` *<port alias or number>* Enter Interface port mode. **Command mode:** Global configuration
`interface portchannel` *<trunk number>*|`lacp` *<1-65535>* Enter Interface portchannel mode. These commands allow you to configure port parameters for all port members in the selected trunk group (portchannel). **Command mode:** Global configuration
`dot1p` *<0-7>* Configures the port's 802.1p priority level. **Command mode:** Interface port/Interface portchannel
`description` *<1-64 characters>* Sets a description for the port. The assigned port description appears next to the port number on some information and statistics screens. The default is set to the port number. **Command mode:** Interface port/Interface portchannel
`[no] bpdu-guard` Enables or disables BPDU guard, to avoid Spanning-Tree loops on ports configured as `edge` ports. **Command mode:** Interface port/Interface portchannel
`[no] dscp-marking` Enables or disables DSCP re-marking on a port. **Command mode:** Interface port/Interface portchannel
`[no] switchport` Enables or disables routing on a port. **Command mode:** Interface port/Interface portchannel
`switchport mode {access|trunk}` Configures the port's trunking mode: – `access` allows association to a single VLAN – `trunk` allows association to multiple VLANs Default mode is `access`. **Note**: When switching from access to trunk mode, the port inherits the access VLAN as the trunk Native-VLAN. **Note**: When switching from trunk to access mode, the port inherits the trunk Native-VLAN as the access VLAN. **Command mode:** Interface port/Interface portchannel

Table 172. Port Configuration Options (continued)

Command Syntax and Usage
`switchport mode private-vlan {host|promiscuous|trunk promiscuous| trunk secondary}` Configures port behavior when associated to a private VLAN. Private VLANs allow definition of VLAN sub-domains within a primary VLAN domain, usually for the purpose of enabling Layer 2 partitioning over a single Layer 3 subnet. – `host` ports are associated to a secondary VLAN within the private VLAN – `promiscuous` ports are associated to the primary VLAN within the private VLAN. – `trunk promiscuous` ports behave like promiscuous ports within the private VLAN domain, but can also belong to regular VLANs. – `trunk secondary` ports behave like secondary isolated ports within the private VLAN domain, but can also belong to regular VLANs. Default mode is `access`. **Command mode:** Interface port/Interface portchannel
`switchport access vlan` *<1-4094>* Configures the associated VLAN used in access mode. If the VLAN does not exist, it will be created and enabled automatically. Default value is 1 for data ports and 4095 for the management port. **Command mode:** Interface port/Interface portchannel
`no switchport access vlan` Resets the access VLAN to its default value. **Command mode:** Interface port/Interface portchannel
`switchport trunk native vlan` *<1-4094>* Configures the Port VLAN ID (PVID) or Native-VLAN used to carry untagged traffic in trunk mode. If the VLAN does not exist, it will be created and enabled automatically. Default value is 1 for data ports and 4095 for the management port. **Command mode:** Interface port/Interface portchannel
`switchport trunk allowed vlan [add|remove]` *<VLAN ID range>* Updates the associated VLANs in trunk mode.If any VLAN in the range does not exist, it will be created and enabled automatically. – `add` enables the VLAN range in addition to the current configuration – `remove` eliminates the VLAN range from the current configuration **Command mode:** Interface port/Interface portchannel
`witchport trunk allowed vlan {all|none}` – `all` associates all existing and enabled VLANs to the port – `none` removes the port from all currently associated VLANS except the default VLAN **Command mode:** Interface port/Interface portchannel

Table 172. Port Configuration Options (continued)

Command Syntax and Usage
`[no] switchport private-vlan mapping` *<primary VLAN>* Enables or disables a private VLAN on a port in promiscuous mode. **Command mode:** Interface port/Interface portchannel
`[no] switchport private-vlan association` *<primary VLAN> <secondary VLAN>* Enables or disables a primary VLAN - secondary VLAN association on a port in promiscuous mode. **Command mode:** Interface port/Interface portchannel
`[no] vlan dot1q tag native` Disables or enables VLAN tag persistence. When disabled, the VLAN tag is removed at egress from packets whose VLAN tag matches the port PVID/Native-vlan. The default setting is `disabled`. **Command mode:** Global configuration/Interface port/Interface portchannel
`[no] tagpvid-ingress` Enables or disables tagging the ingress frames with the port's VLAN ID. When enabled, the PVID tag is inserted into untagged and 802.1Q single-tagged ingress frames as outer VLAN ID. The default setting is `disabled`. **Command mode**: Interface port/Interface portchannel
`[no] flood-blocking` Enables or disables port Flood Blocking. When enabled, unicast and multicast packets with unknown destination MAC addresses are blocked from the port. **Command mode:** Interface port/Interface portchannel
`[no] mac-address-table mac-notification` Enables or disables MAC Address Notification. With MAC Address Notification enabled, the switch generates a syslog message when a MAC address is added or removed from the MAC address table. **Command mode:** Interface port/Interface portchannel
`[no] learning` Enables or disables FDB learning on the port. **Command mode:** Interface port/Interface portchannel
`port-channel min-links` *<1-8>* Set the minimum number of links for this port. If the specified minimum number of ports are not available, the trunk is placed in the `down` state. **Command mode:** Interface port
`storm-control {broadcast|multicast|unicast} level pps` *<0-2097151>* Limits the number of broadcast, multicast or unicast packets per second to the specified value. **Command mode:** Interface port/Interface portchannel

Table 172. Port Configuration Options (continued)

Command Syntax and Usage
`no storm-control {broadcast|multicast|unicast}` Sets the port to forward all broadcast, multicast or unicast packets. **Command mode:** Interface port/Interface portchannel
`[no] ip dhcp snooping trust` Configures this port as a trusted port for DHCP packets from the server. **Command mode:** Interface port
`ip dhcp snooping limit rate` *<1-2048>* Configures the maximum number of DHCP packets allowed per second. **Command mode:** Interface port
`[no] openflow edgeport` *<port numbers>* Enables or disables OpenFlow edge state for the ports. **Command mode**: Privileged EXEC
`[no] openflow mgmtport` *<port numbers>* Enables or disables OpenFlow management state for the ports. **Command mode**: Global Configuration
`no shutdown` Enables the port. **Command mode:** Interface port/Interface portchannel
`shutdown` Disables the port. (To temporarily disable a port without changing its configuration attributes, refer to "Temporarily Disabling a Port" on page 280.) **Command mode:** Interface port/Interface portchannel
`show interface port` *<port alias or number>* Displays current port parameters. **Command mode:** All

Port Error Disable and Recovery Configuration

The Error Disable and Recovery feature allows the switch to automatically disable a port if an error condition is detected on the port. The port remains in the error-disabled state until it is re-enabled manually, or re-enabled automatically by the switch after a timeout period has elapsed. The error-disabled state of a port does not persist across a system reboot.

Table 173. Port Error Disable Options

Command Syntax and Usage
`errdisable recovery` Enables automatic error-recovery for the port. The default setting is `enabled`. **Note**: Error-recovery must be enabled globally before port-level commands become active. **Command mode:** Interface port
`no errdisable recovery` Enables automatic error-recovery for the port. **Command mode:** Interface port
`show interface port` *<port alias or number>* `errdisable` Displays current port Error Disable parameters. **Command mode:** All

Port Link Flap Dampening Configuration

Table 174. Port Link Flap Dampening Configuration Options

Command Syntax and Usage
`errdisable link-flap enable` Enables Link Flap Dampening on the port. For more information, see "Link Flap Dampening Configuration" on page 237. **Command mode:** Interface port
`no errdisable link-flap enable` Disables Link Flap Dampening on the port. **Command mode:** Interface port
`show interface port errdisable` *<port alias or number>* `link-flap` Displays the current Link Flap Dampening parameters for the port. **Command mode:** All

Port Link Configuration

Use these commands to set flow control for the port link.

Table 175. Port Link Configuration Options

Command Syntax and Usage
`duplex {full|half|auto}` Sets the operating mode. The choices include: – “Auto negotiation (default) – Half-duplex – Full-duplex **Note**: Data ports are fixed at full duplex. **Command mode:** Interface port/Interface portchannel
`flowcontrol receive {on|off}` Enables or disables flow control receive. **Command mode:** Interface port/Interface portchannel
`flowcontrol send {on|off}` Enables or disables flow control transmit. **Command mode:** Interface port/Interface portchannel
`[no] auto` Turns auto-negotiation on or off. **Note**: Data ports are fixed at 10000 Mbps, and cannot be set to auto-negotiate, unless a 1 Gb SFP transceiver is used. **Command mode:** Interface port/Interface portchannel
`show interface port` *<port alias or number>* Displays current port parameters. **Command mode:** All

Temporarily Disabling a Port

To temporarily disable a port without changing its stored configuration attributes, enter the following command at any prompt:

```
Router# interface port <port alias or number> shutdown
```

Because this configuration sets a temporary state for the port, you do not need to use a save operation. The port state will revert to its original configuration when the RackSwitch G8264 is reset. See the “Operations Commands” on page 493 for other operations-level commands.

UniDirectional Link Detection Configuration

UDLD commands are described in the following table.

Table 176. Port UDLD Configuration Options

Command Syntax and Usage
`[no] udld` Enables or disables UDLD on the port. **Command mode:** Interface port
`[no] udld aggressive` Configures the UDLD mode for the selected port, as follows: – **Normal**: Detect unidirectional links that have mis-connected interfaces. The port is disabled if UDLD determines that the port is mis-connected. Use the “no” form to select normal operation. – **Aggressive**: In addition to the normal mode, the aggressive mode disables the port if the neighbor stops sending UDLD probes for 7 seconds. **Command mode:** Interface port
`show interface port <port number> udld` Displays current port UDLD parameters. **Command mode:** All

Port OAM Configuration

Operation, Administration, and Maintenance (OAM) protocol allows the switch to detect faults on the physical port links. OAM is described in the IEEE 802.3ah standard. OAM Discovery commands are described in the following table.

Table 177. Port OAM Configuration Options

Command Syntax and Usage
`oam {active|passive}` Configures the OAM discovery mode, as follows: – Active: This port link initiates OAM discovery. – Passive: This port allows its peer link to initiate OAM discovery. If OAM determines that the port is in an anomalous condition, the port is disabled. **Command mode:** Interface port/
`no oam {active|passive}` Disables OAM discovery on the port. **Command mode:** Interface port
`show interface port` *<port number>* `oam` Displays current port OAM parameters. **Command mode:** All

Port ACL Configuration

Table 178. ACL/QoS Configuration Options

Command Syntax and Usage
`access-control list` *<ACL number>* Adds the specified ACL to the port. You can add multiple ACLs to a port, but the total number of precedence levels allowed is two. **Command mode:** Interface port/Interface portchannel
`no access-control list` *<ACL number>* Removes the specified ACL list from the port. **Command mode:** Interface port/Interface portchannel
`access-control list6` *<ACL number>* Adds the specified IPv6 ACL to the port. You can add multiple ACLs to a port, but the total number of precedence levels allowed is two. **Command mode:** Interface port/Interface portchannel
`no access-control list6` *<ACL number>* Removes the specified IPv6 ACL list from the port. **Command mode:** Interface port/Interface portchannel
`access-control group` *<ACL group number>* Adds the specified ACL group to the port. You can add multiple ACL groups to a port, but the total number of precedence levels allowed is two. **Command mode:** Interface port/Interface portchannel
`no access-control group` *<ACL group number>* Removes the specified ACL group from the port. **Command mode:** Interface port/Interface portchannel
`show interface port` *<port alias or number>* `access-control` Displays current ACL QoS parameters. **Command mode:** All

Port WRED Configuration

These commands allow you to configure Weighted Random Early Detection (WRED) parameters for a selected port. For global WRED configuration, see "Weighted Random Early Detection Configuration" on page 290.

Table 179. Port WRED Options

Command Syntax and Usage
`[no] random-detect ecn enable` Enables or disables Explicit Congestion Notification (ECN). When ECN is on, the switch marks the ECN bit of the packet (if applicable) instead of dropping the packet. ECN-aware devices are notified of the congestion and those devices can take corrective actions. **Note**: ECN functions only on TCP traffic. **Command mode:** Interface port
`random-detect enable` Turns on Random Detection and avoidance. **Command mode:** Interface port
`no random-detect enable` Turns off Random Detection and avoidance. **Command mode:** Interface port
`show interface port` *<port alias or number>* `random-detect` Displays current Random Detection and avoidance parameters. **Command mode:** All

Port WRED Transmit Queue Configuration

Use this menu to define WRED thresholds for the port's transmit queues. Set each threshold between 1% and 100%. When the average queue size grows beyond the minimum threshold, packets begin to be dropped. When the average queue size reaches the maximum threshold, all packets are dropped. The probability of packet-drop between the thresholds is defined by the drop rate.

Table 180. Port WRED Transmit Queue Options

Command Syntax and Usage
`[no] random-detect transmit-queue` *<0-7>* `tcp` *<min. threshold (1-100)> <max. threshold (1-100)> <drop rate (1-100)>* Configures the WRED thresholds for TCP traffic. Use the `no` form to clear the WRED threshold value. **Command mode:** Interface port
`[no] random-detect transmit-queue` *<0-7>* `non-tcp` *<min. threshold (1-100)> <max. threshold (1-100)> <drop rate (1-100)>* Configures the WRED thresholds for non-TCP traffic. Use the `no` form to clear the WRED threshold value. **Command mode:** Interface port

Table 180. Port WRED Transmit Queue Options

Command Syntax and Usage
`random-detect transmit-queue` *<0-7>* `enable` Sets the WRED transmit queue configuration to `on`. **Command mode:** Interface port
`no random-detect transmit-queue` *<0-7>* `enable` Sets the WRED transmit queue configuration to `off`. **Command mode:** Interface port

Stacking Configuration

A *stack* is a group of switches that work together as a unified system. The network views a stack of switches as a single entity, identified by a single network IP address. The Stacking Configuration commands are used to configure a stack, and to define the Master and Backup interface that represents the stack on the network.

The Stacking Configuration commands are available only after Stacking is enabled and the switch is reset. For more information, see "Stacking Configuration" on page 285.

Table 181. Stacking Configuration Options

Command Syntax and Usage
`[no] stack name` *<1-63 characters>* Defines a name for the stack. **Command mode:** Global configuration
`[no] stack backup` *<csnum (1-8)>* Defines the backup switch in the stack, based on its configured switch number (csnum). **Command mode:** Global configuration
`show stack switch-number` *<csnum (1-8)>* Displays the current stacking parameters. **Command mode:** All

Stacking Switch Configuration

Table 182. Stacking Switch Options

Command Syntax and Usage
`stack switch-number` *<csnum (1-8)>* `bind` *<asnum (1-8)>* Binds the selected switch to the stack, based on its attached switch number (asnum). **Command mode:** Global configuration
`stack switch-number` *<csnum (1-8)>* `mac` *<MAC address>* Binds the selected switch to the stack, based on its MAC address. **Command mode:** Global configuration
`no stack switch-number` *<csnum (1-8)>* Deletes the selected switch from the stack. **Command mode:** Global configuration
`show stack attached-switches` Displays the current stacking switch parameters. **Command mode:** Global configuration

Quality of Service Configuration

Quality of Service (QoS) commands configure the 802.1p priority value and DiffServ Code Point value of incoming packets. This allows you to differentiate between various types of traffic, and provide different priority levels.

802.1p Configuration

This feature provides the G8264 the capability to filter IP packets based on the 802.1p bits in the packet's VLAN header. The 802.1p bits specify the priority that you should give to the packets while forwarding them. The packets with a higher (non-zero) priority bits are given forwarding preference over packets with numerically lower priority bits value.

Table 183. 802.1p Configuration Options

Command Syntax and Usage
`qos transmit-queue mapping` *<priority (0-7)> <COSq number>* Maps the 802.1p priority of to the Class of Service queue (COSq) priority. Enter the 802.1p priority value (0-7), followed by the Class of Service queue that handles the matching traffic. **Command mode:** Global configuration
`qos transmit-queue weight-cos` *<COSq number> <weight (0-15)>* Configures the weight of the selected Class of Service queue (COSq). Enter the queue number (0-1), followed by the scheduling weight (0-15). **Command mode:** Global configuration
`show qos transmit-queue` Displays the current 802.1p parameters. **Command mode:** All

DSCP Configuration

These commands map the DiffServ Code Point (DSCP) value of incoming packets to a new value or to an 802.1p priority value.

Table 184. DSCP Configuration Options

Command Syntax and Usage
`qos dscp dscp-mapping` *<DSCP (0-63)> <new DSCP (0-63)>* Maps the initial DiffServ Code Point (DSCP) value to a new value. Enter the DSCP value (0-63) of incoming packets, followed by the new value. **Command mode:** Global configuration
`qos dscp dot1p-mapping` *<DSCP (0-63)> <priority (0-7)>* Maps the DiffServ Code point value to an 802.1p priority value. Enter the DSCP value, followed by the corresponding 802.1p value. **Command mode:** Global configuration
`qos dscp re-marking` Turns on DSCP re-marking globally. **Command mode:** Global configuration
`no qos dscp re-marking` Turns off DSCP re-marking globally. **Command mode:** Global configuration
`show qos dscp` Displays the current DSCP parameters. **Command mode:** All

Control Plane Protection

These commands allow you to limit the number of selected protocol packets received by the control plane (CP) of the switch. These limits help protect the CP from receiving too many protocol packets in a given time period.

Table 185. Control Plane Protection Options

Command Syntax and Usage
`qos protocol-packet-control packet-queue-map` *<packet queue number (0-40)> <packet type>* Configures a packet type to associate with each packet queue number. Enter a queue number, followed by the packet type. You may map multiple packet types to a single queue. The following packet types are allowed: – **802.1x** (IEEE 802.1x packets) – **application-cri-packets** (critical packets of various applications, such as telnet,ssh) – **arp-bcast** (ARP broadcast packets) – **arp-ucast** (ARP unicast reply packets) – **bgp** (BGP packets) – **bpdu** (Spanning Tree Protocol packets) – **cisco-bpdu** (Cisco STP packets) – **dest-unknown** (packets with destination not yet learned) – **dhcp** (DHCP packets) – **icmp** (ICMP packets) – **igmp** (IGMP packets) – **ipv4-miscellaneous** (IPv4 packets with IP options and TTL exception) – **ipv6-nd** (IPv6 Neighbor Discovery packets) – **lacp** (LACP/Link Aggregation protocol packets) – **lldp** (LLDP packets) – **ospf** (OSPF packets) – **ospf3** (OSPF3 Packets) – **pim** (PIM packets) – **rip** (RIP packets) – **system** (system protocols, such as tftp, ftp, telnet, ssh) – **udld** (UDLD packets) – **vlag** (VLAG packets) – **vrrp** (VRRP packets) **Command mode:** Global configuration

Table 185. Control Plane Protection Options (continued)

Command Syntax and Usage
`qos protocol-packet-control rate-limit-packet-queue` *<packet queue number (0-40)> <1-10000>* Configures the number of packets per second allowed for each packet queue. **Command mode:** Global configuration
`no qos protocol-packet-control packet-queue-map` *<packet type>* Clears the selected packet type from its associated packet queue. **Command mode:** Global configuration
`no qos protocol-packet-control rate-limit-packet-queue` *<packet queue number (0-40)>* Clears the packet rate configured for the selected packet queue. **Command mode:** Global configuration
`show qos protocol-packet-control information protocol` Displays of mapping of protocol packet types to each packet queue number. The status indicates whether the protocol is running or not running. **Command mode:** All
`show qos protocol-packet-control information queue` Displays the packet rate configured for each packet queue. **Command mode:** All

Weighted Random Early Detection Configuration

Weighted Random Early Detection (WRED) provides congestion avoidance by pre-emptively dropping packets before a queue becomes full. G8264 implementation of WRED defines TCP and non-TCP traffic profiles on a per-port, per COS queue basis. For each port, you can define a transmit-queue profile with thresholds that define packet-drop probability.

These commands allow you to configure global WRED parameters. For port WRED commands, see “Port WRED Configuration” on page 283.

Table 186. WRED Configuration Options

Command Syntax and Usage
`qos random-detect ecn` Enables or disables Explicit Congestion Notification (ECN). When ECN is on, the switch marks the ECN bit of the packet (if applicable) instead of dropping the packet. ECN-aware devices are notified of the congestion and those devices can take corrective actions. **Note**: ECN functions only on TCP traffic. **Command mode:** Global configuration
`qos random-detect enable` Turns on Random Detection and avoidance. **Command mode:** Global configuration
`no qos random-detect enable` Turns off Random Detection and avoidance. **Command mode:** Global configuration
`show qos random-detect` Displays current Random Detection and avoidance parameters. **Command mode:** All

WRED Transmit Queue Configuration

Table 187. WRED Transmit Queue Options

Command Syntax and Usage
`[no] qos random-detect transmit-queue` *<0-7>* `tcp` *<min. threshold (1-100)> <max. threshold (1-100)> <drop rate (1-100)>* Configures the WRED thresholds for TCP traffic. Use the `no` form to clear the WRED threshold value. **Command mode:** Global configuration
`[no] qos random-detect transmit-queue` *<0-7>* `non-tcp` *<min. threshold (1-100)> <max. threshold (1-100)> <drop rate (1-100)>* Configures the WRED thresholds for non-TCP traffic. Use the `no` form to clear the WRED threshold value. **Command mode:** Global configuration
`qos random-detect transmit-queue` *<0-7>* `enable` Sets the WRED transmit queue configuration to `on`. **Command mode:** Global configuration
`no qos random-detect transmit-queue` *<0-7>* `enable` Sets the WRED transmit queue configuration to `off`. **Command mode:** Global configuration

Access Control Configuration

Use these commands to create Access Control Lists. ACLs define matching criteria used for IP filtering and Quality of Service functions.

For information about assigning ACLs to ports, see "Port ACL Configuration" on page 282.

Table 188. General ACL Configuration Options

Command Syntax and Usage
[no] `access-control list` *<1-256>* Configures an Access Control List. To view command options, see page 293. **Command mode:** Global configuration
[no] `access-control list6` *<1-128>* Configures an Access Control List. To view command options, see page 300. **Command mode:** Global configuration
[no] `access-control macl` *<1-256>* Configures an Access Control List. To view command options, see page 293. **Command mode:** Global configuration
[no] `access-control group` *<1-256>* Configures an ACL Group. To view command options, see page 304. **Command mode:** Global configuration
[no] `access-control vmap` *<1-256>* Configures an ACL VLAN map. To view command options, see page 308. **Command mode:** Global configuration
`show access-control` Displays the current ACL parameters. **Command mode:** All

ACL IPv4 Configuration

These commands allow you to define filtering criteria for each Access Control List (ACL).

Table 189. ACL Configuration Options

<table>
<tr><th>Command Syntax and Usage</th></tr>
<tr><td>access-control list <1-256> action {permit|deny|set-priority <0-7>}
Configures a filter action for packets that match the ACL definitions. You can choose to permit (pass) or deny (drop) packets, or set the 802.1p priority level (0-7).
<b>Command mode:</b> Global configuration</td></tr>
<tr><td>[no] access-control list <1-256> egress-port port <port alias or number>
Configures the ACL to function on egress packets.
<b>Command mode:</b> Global configuration</td></tr>
<tr><td>[no] access-control list <1-256> statistics
Enables or disables the statistics collection for the Access Control List.
<b>Command mode:</b> All except User EXEC</td></tr>
<tr><td>[no] access-control list <1-256> log
Enables or disables logging for the Access Control List.
<b>Command mode:</b> Global configuration</td></tr>
<tr><td>default access-control list <1-256>
Resets the ACL parameters to their default values.
<b>Command mode:</b> Global configuration</td></tr>
<tr><td>show access-control list <1-256>
Displays the current ACL parameters.
<b>Command mode:</b> All</td></tr>
</table>

ACL Mirroring Configuration

These commands allow you to define port mirroring for an ACL. Packets that match the ACL are mirrored to the destination interface.

Table 190. ACL Port Mirroring Options

<table>
<tr><th>Command Syntax and Usage</th></tr>
<tr><td>[no] access-control list <1-256> mirror port <port alias or number>|none
Configures the destination to which packets that match this ACL are mirrored.
<b>Command mode:</b> Global configuration</td></tr>
<tr><td>show access-control list <1-256> mirror
Displays the current port mirroring parameters for the ACL.
<b>Command mode:</b> All</td></tr>
</table>

Ethernet Filtering Configuration

These commands allow you to define Ethernet matching criteria for an ACL.

Table 191. Ethernet Filtering Configuration Options

Command Syntax and Usage
[no] `access-control list` *<1-256>* `ethernet source-mac-address` *<MAC address> <MAC mask>* Defines the source MAC address for this ACL. **Command mode:** Global configuration
[no] `access-control list` *<1-256>* `ethernet destination-mac-address` *<MAC address> <MAC mask>* Defines the destination MAC address for this ACL. **Command mode:** Global configuration
[no] `access-control list` *<1-256>* `ethernet vlan` *<VLAN ID> <VLAN mask>* Defines a VLAN number and mask for this ACL. **Command mode:** Global configuration
[no] `access-control list` *<1-256>* `ethernet ethernet-type` {`arp`|`ip`|`ipv6`|`mpls`|`rarp`|`any`|*<other (0x600-0xFFFF)>*} Defines the Ethernet type for this ACL. **Command mode:** Global configuration
[no] `access-control list` *<1-256>* `ethernet priority` *<0-7>* Defines the Ethernet priority value for the ACL. **Command mode:** Global configuration
`default access-control list` *<1-256>* `ethernet` Resets Ethernet parameters for the ACL to their default values. **Command mode:** Global configuration
`no access-control list` *<1-256>* `ethernet` Removes Ethernet parameters for the ACL. **Command mode:** Global configuration
`show access-control list` *<1-256>* `ethernet` Displays the current Ethernet parameters for the ACL. **Command mode:** All

IPv4 Filtering Configuration

These commands allow you to define IPv4 matching criteria for an ACL.

Table 192. IP version 4 Filtering Configuration Options

Command Syntax and Usage
[no] `access-control list` *<1-256>* `ipv4 source-ip-address` *<IP address> <IP mask>* Defines a source IP address for the ACL. If defined, traffic with this source IP address will match this ACL. Specify an IP address in dotted decimal notation. **Command mode:** Global configuration
[no] `access-control list` *<1-256>* `ipv4 destination-ip-address` *<IP address> <IP mask>* Defines a destination IP address for the ACL. If defined, traffic with this destination IP address will match this ACL. **Command mode:** Global configuration

[no] `access-control list` *<1-256>* `ipv4 protocol` *<0-255>*
Defines an IP protocol for the ACL. If defined, traffic from the specified protocol matches this filter. Specify the protocol number. Listed below are some of the well-known protocols.
Number **Name**
`1` `icmp`
`2` `igmp`
`6` `tcp`
`17` `udp`
`89` `ospf`
`112` `vrrp`
Command mode: Global configuration

[no] `access-control list` *<1-256>* `ipv4 type-of-service` *<0-255>* Defines a Type of Service (ToS) value for the ACL. For more information on ToS, refer to RFC 1340 and 1349. **Command mode:** Global configuration
`default access-control list` *<1-256>* `ipv4` Resets the IPv4 parameters for the ACL to their default values. **Command mode:** Global configuration
`show access-control list` *<1-256>* `ipv4` Displays the current IPv4 parameters. **Command mode:** All

TCP/UDP Filtering Configuration

These commands allow you to define TCP/UDP matching criteria for an ACL.

Table 193. TCP/UDP Filtering Configuration Options

Command Syntax and Usage
[no] access-control list *<1-256>* tcp-udp source-port *<1-65535>* *<mask (0xFFFF)>* Defines a source port for the ACL. If defined, traffic with the specified TCP or UDP source port will match this ACL. Specify the port number. Listed here are some of the well-known ports: **Number** **Name** 20 ftp-data 21 ftp 22 ssh 23 telnet 25 smtp 37 time 42 name 43 whois 53 domain 69 tftp 70 gopher 79 finger 80 http **Command mode:** Global configuration
[no] access-control list *<1-256>* tcp-udp destination-port *<1-65535> <mask (0xFFFF)>* Defines a destination port for the ACL. If defined, traffic with the specified TCP or UDP destination port will match this ACL. Specify the port number, just as with source-port. **Command mode:** Global configuration
[no] access-control list *<1-256>* tcp-udp flags *<value (0x0-0x3f)> <mask (0x0-0x3f)>* Defines a TCP/UDP flag for the ACL. **Command mode:** Global configuration
default access-control list *<1-256>* tcp-udp Resets the TCP/UDP parameters for the ACL to their default values. **Command mode:** Global configuration
show access-control list *<1-256>* tcp-udp Displays the current TCP/UDP Filtering parameters. **Command mode:** All

Packet Format Filtering Configuration

These commands allow you to define Packet Format matching criteria for an ACL.

Table 194. Packet Format Filtering Configuration Options

Command Syntax and Usage
`[no] access-control list` *<1-256>* `packet-format ethernet {ethertype2|snap|llc}` Defines the Ethernet format for the ACL. **Command mode:** Global configuration
`[no] access-control list` *<1-256>* `packet-format tagging {any|none|tagged}` Defines the tagging format for the ACL. **Command mode:** Global configuration
`[no] access-control list` *<1-256>* `packet-format ip {ipv4|ipv6}` Defines the IP format for the ACL. **Command mode:** Global configuration
`default access-control list` *<1-256>* `packet-format` Resets Packet Format parameters for the ACL to their default values. **Command mode:** Global configuration
`show access-control list` *<1-256>* `packet-format` Displays the current Packet Format parameters for the ACL. **Command mode:** All

ACL Metering Configuration

These commands define the Access Control profile for the selected ACL.

Table 195. ACL Metering Configuration Options

Command Syntax and Usage
`access-control list` *<1-256>* `meter committed-rate` *<64-10000000>* Configures the committed rate, in kilobits per second. The committed rate must be a multiple of 64. **Command mode:** Global configuration
`access-control list` *<1-256>* `meter maximum-burst-size` *<32-4096>* Configures the maximum burst size, in kilobits. Enter one of the following values for `mbsize`: 32, 64, 128, 256, 512, 1024, 2048, 4096 **Command mode:** Global configuration
[`no`] `access-control list` *<1-256>* `meter enable` Enables or disables ACL Metering. **Command mode:** Global configuration
`access-control list` *<1-256>* `meter action` {`drop`|`pass`} Configures the ACL Meter to either drop or pass out-of-profile traffic. **Command mode:** Global configuration
`default access-control list` *<1-256>* `meter` Sets the ACL meter configuration to its default values. **Command mode:** Global configuration
`no access-control list` *<1-256>* `meter` Deletes the selected ACL meter. **Command mode:** Global configuration
`show access-control list` *<1-256>* `meter` Displays current ACL Metering parameters. **Command mode:** All

ACL Re-Mark Configuration

You can choose to re-mark IP header data for the selected ACL. You can configure different re-mark values, based on whether packets fall within the ACL Metering profile, or out of the ACL Metering profile.

Re-Marking In-Profile Configuration

Table 196. ACL Re-Marking In-Profile Options

Command Syntax and Usage
[no] access-control list <*1-256*> re-mark in-profile dot1p <*0-7*> Re-marks the 802.1p value. The value is the priority bits information in the packet structure. **Command mode:** Global configuration
[no] no access-control list <*1-256*> re-mark in-profile dscp <*0-63*> Remarks the DSCP value for in-profile traffic. **Command mode:** Global configuration
[no] no access-control list <*1-256*> re-mark use-tos-precedence Enables or disables mapping of TOS (Type of Service) priority to 802.1p priority for in-profile packets. When enabled, the TOS value is used to set the 802.1p value. **Command mode:** Global configuration
default access-control list <*1-256*> re-mark Sets the ACL re-mark parameters to their default values. **Command mode:** Global configuration
show access-control list <*1-256*> re-markS Displays current re-mark parameters. **Command mode:** All

Re-Marking Out-of-Profile Configuration

Table 197. ACL Re-Marking Out-of-Profile Options

Command Syntax and Usage
access-control list <*1-256*> re-mark out-profile dscp <*1-63*> Re-marks the DSCP value on out-of-profile packets for the ACL. **Command mode:** Global configuration
no access-control list <*1-256*> re-mark out-profile Disables re-marking on out-of-profile traffic. **Command mode:** Global configuration
show access-control list <*1-256*> re-mark Displays current re-mark parameters. **Command mode:** All

ACL IPv6 Configuration

These commands allow you to define filtering criteria for each IPv6 Access Control List (ACL).

Table 198. IPv6 ACL Options

Command Syntax and Usage
[no] access-control list6 *<1-128>* egress-port port *<port alias or number>* Configures the ACL to function on egress packets. **Command mode:** Global configuration
access-control list6 *<1-128>* action {permit|deny|set-priority *<0-7>*} Configures a filter action for packets that match the ACL definitions. You can choose to permit (pass) or deny (drop) packets, or set the 802.1p priority level (0-7). **Command mode:** Global configuration
[no] access-control list6 *<1-128>* statistics Enables or disables the statistics collection for the Access Control List. **Command mode:** Global configuration
[no] access-control list6 *<1-128>* log Enables or disables Access Control List logging.
default access-control list6 *<1-128>* Resets the ACL parameters to their default values. **Command mode:** Global configuration
show access-control list *<1-128>* Displays the current ACL parameters. **Command mode:** All

IP version 6 Filtering Configuration

These commands allow you to define IPv6 matching criteria for an ACL.

Table 199. IP version 6 Filtering Options

Command Syntax and Usage
[no] `access-control list6` *<1-128>* `ipv6 source-address` *<IPv6 address> <prefix length (1-128)>* Defines a source IPv6 address for the ACL. If defined, traffic with this source address will match this ACL. **Command mode:** Global configuration
[no] `access-control list6` *<1-128>* `ipv6 destination-address` *<IPv6 address> <prefix length (1-128)>* Defines a destination IPv6 address for the ACL. If defined, traffic with this destination address will match this ACL. **Command mode:** Global configuration
[no] `access-control list6` *<1-128>* `ipv6 next-header` *<0-255>* Defines the next header value for the ACL. If defined, traffic with this next header value will match this ACL.
[no] `access-control list6` *<1-128>* `ipv6 flow-label` *<0-1048575>* Defines the flow label for the ACL. If defined, traffic with this flow label will match this ACL.
[no] `access-control list6` *<1-128>* `ipv6 traffic-class` *<0-255>* Defines the traffic class for the ACL. If defined, traffic with this traffic class will match this ACL.
`default access-control list6` *<1-128>* `ipv6` Resets the IPv6 parameters for the ACL to their default values. **Command mode:** Global configuration
`show access-control list6` *<1-128>* `ipv6` Displays the current IPv6 parameters. **Command mode:** All

IPv6 TCP/UDP Filtering Configuration

These commands allows you to define TCP/UDP matching criteria for an ACL.

Table 200. IPv6 ACL TCP/UDP Filtering Options

<table>
<tr><th>Command Syntax and Usage</th></tr>
<tr><td>[no] <code>access-control list6</code> <i>&lt;1-128&gt;</i> <code>tcp-udp source-port</code> <i>&lt;1-65535&gt;</i> <i>&lt;mask (0xFFFF)&gt;</i>
Defines a source port for the ACL. If defined, traffic with the specified TCP or UDP source port will match this ACL. Specify the port number. Listed here are some of the well-known ports:
<table><tr><th>Number</th><th>Name</th></tr><tr><td>20</td><td>ftp-data</td></tr><tr><td>21</td><td>ftp</td></tr><tr><td>22</td><td>ssh</td></tr><tr><td>23</td><td>telnet</td></tr><tr><td>25</td><td>smtp</td></tr><tr><td>37</td><td>time</td></tr><tr><td>42</td><td>name</td></tr><tr><td>43</td><td>whois</td></tr><tr><td>53</td><td>domain</td></tr><tr><td>69</td><td>tftp</td></tr><tr><td>70</td><td>gopher</td></tr><tr><td>79</td><td>finger</td></tr><tr><td>80</td><td>http</td></tr></table><b>Command mode:</b> Global configuration</td></tr>
<tr><td>[no] <code>access-control list6</code> <i>&lt;1-128&gt;</i> <code>tcp-udp destination-port</code> <i>&lt;1-65535&gt;</i> <i>&lt;mask (0xFFFF)&gt;</i>
Defines a destination port for the ACL. If defined, traffic with the specified TCP or UDP destination port will match this ACL. Specify the port number, just as with <code>sport</code> above.
<b>Command mode:</b> Global configuration</td></tr>
<tr><td>[no] <code>access-control list6</code> <i>&lt;1-128&gt;</i> <code>tcp-udp flags</code> <i>&lt;value (0x0-0x3f)&gt;</i> <i>&lt;mask (0x0-0x3f)&gt;</i>
Defines a TCP/UDP flag for the ACL.
<b>Command mode:</b> Global configuration</td></tr>
<tr><td><code>default access-control list6</code> <i>&lt;1-128&gt;</i> <code>tcp-udp</code>
Resets the TCP/UDP parameters for the ACL to their default values.
<b>Command mode:</b> Global configuration</td></tr>
<tr><td><code>show access-control list6</code> <i>&lt;1-128&gt;</i> <code>tcp-udp</code>
Displays the current TCP/UDP Filtering parameters.
<b>Command mode:</b> All</td></tr>
</table>

IPv6 Re-Mark Configuration

You can choose to re-mark IP header data for the selected ACL. You can configure different re-mark values, based on whether packets fall within the ACL metering profile, or out of the ACL metering profile.

IPv6 Re-Marking In-Profile Configuration

Table 201. IPv6 Re-Marking In-Profile Options

Command Syntax and Usage
`[no] access-control list6` *<1-128>* `re-mark dot1p` *<0-7>* Re-marks the 802.1p value. The value is the priority bits information in the packet structure. **Command mode:** Global configuration
`[no] access-control list6` *<1-128>* `re-mark in-profile dscp` *<0-63>* Re-marks the DSCP value for in-profile traffic. **Command mode:** Global configuration
`[no] access-control list6` *<1-128>* `re-mark use-tos-precedence` Enables or disables mapping of TOS (Type of Service) priority to 802.1p priority for in-profile packets. When enabled, the TOS value is used to set the 802.1p value. **Command mode:** Global configuration
`default access-control list6` *<1-128>* `re-mark` Sets the ACL re-mark parameters to their default values. **Command mode:** Global configuration
`show access-control list6` *<1-128>* `re-mark` Displays current re-mark parameters. **Command mode:** All

ACL Log Configuration

These commands allow you to define filtering criteria for each IPv6 Access Control List (ACL) log.

Table 202. ACL Log Configuration Options

Command Syntax and Usage
`access-control list <1-128> log` Enables access control list logging.
`access-control log interval <seconds>` Sets the filter log displaying interval in seconds.
`access-control log rate-limit <seconds>` Sets the filter log queue rate limit in seconds.
`default access-control log [interval | rate-lmt]` Resets the specified filter log parameters to their default values.
`show access-control log` Displays the current ACL log parameters.

ACL Group Configuration

These commands allow you to compile one or more ACLs into an ACL group. Once you create an ACL group, you can assign the ACL group to one or more ports.

Table 203. ACL Group Configuration Commands

Command Syntax and Usage
`access-control group <1-256> list <1-256>` Adds the selected IPv4 ACL to the ACL group. **Command mode:** Global configuration
`no access-control group <1-256> list <1-256>` Removes the selected IPv4 ACL from the ACL group. **Command mode:** Global configuration
`access-control group <1-256> list6 <1-128>` Adds the selected IPv6 ACL to the ACL group. **Command mode:** Global configuration
`no access-control group <1-256> list6 <1-128>` Removes the selected IPv6 ACL from the ACL group. **Command mode:** Global configuration
`show access-control group <1-256>` Displays the current ACL group parameters. **Command mode:** All

Management ACL Configuration

These commands allow you to define filtering criteria for each management ACL (MACL).

Table 204. MACL Configuration Options

Command Syntax and Usage
`access-control macl <1-256> action {permit|deny|set-priority <0-7>}` Configures a filter action for packets that match the MACL definitions. You can choose to permit (pass) or deny (drop) packets, or set the 802.1p priority level (0-7). **Command mode:** Global configuration
`[no] access-control macl <1-256> statistics` Enables or disables the statistics collection for the MACL. **Command mode:** All except User EXEC
`[no] access-control macl <1-256> enable` Enables or disables the management ACL. **Command mode:** Global configuration
`show access-control macl <1-256>` Displays the current MACL parameters. **Command mode:** All

MACL IPv4 Filtering Configuration

These commands allow you to define IPv4 matching criteria for an MACL.

Table 205. IP version 4 Filtering Configuration Options

Command Syntax and Usage
[no] access-control macl *<1-256>* ipv4 source-ip-address *<IP address>* *<IP mask>* Defines a source IP address for the MACL. If defined, traffic with this source IP address will match this MACL. Specify an IP address in dotted decimal notation. **Command mode:** Global configuration
[no] access-control macl *<1-256>* ipv4 destination-ip-address *<IP address>* *<IP mask>* Defines a destination IP address for the MACL. If defined, traffic with this destination IP address will match this MACL. **Command mode:** Global configuration
[no] access-control macl *<1-256>* ipv4 protocol *<0-255>* Defines an IP protocol for the MACL. If defined, traffic from the specified protocol matches this filter. Specify the protocol number. Listed below are some of the well-known protocols. **Number** **Name** 1 icmp 2 igmp 6 tcp 17 udp 89 ospf 112 vrrp **Command mode:** Global configuration
default access-control macl *<1-256>* ipv4 Resets the IPv4 parameters for the MACL to their default values. **Command mode:** Global configuration
show access-control macl *<1-256>* ipv4 Displays the current IPv4 parameters. **Command mode:** All

MACL TCP/UDP Filtering Configuration

These commands allow you to define TCP/UDP matching criteria for an MACL.

Table 206. TCP/UDP Filtering Configuration Options

<table>
<tr><th>Command Syntax and Usage</th></tr>
<tr><td>[no] <code>access-control macl</code> <i><1-256></i> <code>tcp-udp source-port</code> <i><1-65535></i> <i><mask (0xFFFF)></i>
Defines a source port for the MACL. If defined, traffic with the specified TCP or UDP source port will match this MACL. Specify the port number. Listed below are some of the well-known ports:
<table>
<tr><th>Number</th><th>Name</th></tr>
<tr><td><code>20</code></td><td><code>ftp-data</code></td></tr>
<tr><td><code>21</code></td><td><code>ftp</code></td></tr>
<tr><td><code>22</code></td><td><code>ssh</code></td></tr>
<tr><td><code>23</code></td><td><code>telnet</code></td></tr>
<tr><td><code>25</code></td><td><code>smtp</code></td></tr>
<tr><td><code>37</code></td><td><code>time</code></td></tr>
<tr><td><code>42</code></td><td><code>name</code></td></tr>
<tr><td><code>43</code></td><td><code>whois</code></td></tr>
<tr><td><code>53</code></td><td><code>domain</code></td></tr>
<tr><td><code>69</code></td><td><code>tftp</code></td></tr>
<tr><td><code>70</code></td><td><code>gopher</code></td></tr>
<tr><td><code>79</code></td><td><code>finger</code></td></tr>
<tr><td><code>80</code></td><td><code>http</code></td></tr>
</table>
<b>Command mode:</b> Global configuration</td></tr>
<tr><td>[no] <code>access-control macl</code> <i><1-256></i> <code>tcp-udp destination-port</code> <i><1-65535></i> <i><mask (0xFFFF)></i>
Defines a destination port for the MACL. If defined, traffic with the specified TCP or UDP destination port will match this MACL. Specify the port number, just as with <code>sport</code> above.
<b>Command mode:</b> Global configuration</td></tr>
<tr><td>[no] <code>access-control macl</code> <i><1-256></i> <code>tcp-udp flags</code> <i><value (0x0-0x3f)></i> <i><mask (0x0-0x3f)></i>
Defines a TCP/UDP flag for the MACL.
<b>Command mode:</b> Global configuration</td></tr>
<tr><td><code>default access-control macl</code> <i><1-256></i> <code>tcp-udp</code>
Resets the TCP/UDP parameters for the MACL to their default values.
<b>Command mode:</b> Global configuration</td></tr>
<tr><td><code>show access-control macl</code> <i><1-256></i> <code>tcp-udp</code>
Displays the current TCP/UDP Filtering parameters.
<b>Command mode:</b> All</td></tr>
</table>

VMAP Configuration

A VLAN Map is an Access Control List (ACL) that can be assigned to a VLAN or a VM group instead of a port. In a virtualized environment where Virtual Machines move between physical servers, VLAN Maps allow you to create traffic filtering and metering policies associated with a VM's VLAN.

For more information about VLAN Map configuration commands, see "ACL IPv4 Configuration" on page 293.

For more information about assigning VLAN Maps to a VLAN, see "VLAN Configuration" on page 347.

For more information about assigning VLAN Maps to a VM group, see "VM Group Configuration" on page 469.

Table 207. lists the general VMAP configuration commands. no

Table 207. VMAP Configuration Options

Command Syntax and Usage
[no] `access-control vmap` *<1-128>* `egress-port` *<port alias or number>* Configures the VMAP to function on egress packets. **Command mode:** Global configuration
`access-control vmap` *<1-256>* `action` {`permit`|`deny`|`set-priority` *<0-7>*} Configures a filter action for packets that match the VMAP definitions. You can choose to permit (pass) or deny (drop) packets, or set the 802.1p priority level (0-7). **Command mode:** Global configuration
[no] `access-control vmap` *<1-256>* `ipv4 source-ip-address` *<IPv4 address> <IPv4 mask>* Enables or disables filtering of VMAP statistics collection based on source IP address. **Command mode:** Global configuration
[no] `access-control vmap` *<1-256>* `ipv4 destination-ip-address` *<IPv4 address> <IPv4 mask>* Enables or disables filtering of VMAP statistics collection based on destination IP address. **Command mode:** Global configuration
[no] `access-control vmap` *<1-256>* `ipv4 protocol` *<0-255>* Enables or disables filtering of VMAP statistics collection based on protocol. **Command mode:** Global configuration
[no] `access-control vmap` *<1-256>* `ipv4 type-of-service` *<0-255>* Enables or disables filtering of VMAP statistics collection based on type of service. **Command mode:** Global configuration

Table 207. VMAP Configuration Options

Command Syntax and Usage
`access-control vmap <1-256> meter enable` Enables ACL port metering. **Command mode:** All except User EXEC
`access-control vmap <1-256> meter action drop|pass` Sets ACL port metering to drop or pass out-of-profile traffic. **Command mode:** Global configuration
`access-control vmap <1-256> meter committed-rate <64-10000000>` Sets the ACL port metering control rate in kilobits per second. **Command mode:** Global configuration
`access-control vmap <1-256> meter maximum-burst-size <32-4096>` Sets the ACL port metering maximum burst size in kilobytes. The following eight values are allowed: – 32 – 64 – 128 – 256 – 512 – 1024 – 2048 – 4096 **Command mode:** Global configuration
`no access-control vmap <1-256> meter enable` Disables ACL port metering. **Command mode:** Global configuration
`access-control vmap <1-256> mirror port <port>` Sets the specified port as the mirror target. **Command mode:** Global configuration
`no access-control vmap <1-256> mirror` Turns off ACL mirroring. **Command mode:** Global configuration
`access-control vmap <1-256> packet-format ethernet ethernet-type2|llc|snap` Sets to filter the specified ethernet packet format type. **Command mode:** Global configuration
`access-control vmap <1-256> packet-format ip ipv4|ipv6` Sets to filter the specified IP packet format type. **Command mode:** Global configuration

Table 207. VMAP Configuration Options

Command Syntax and Usage
`access-control vmap` *<1-256>* `packet-format tagging any|none|tagged` Sets to filter the based on packet tagging. The options are: – `any`: Filter tagged & untagged packets – `none`: Filter only untagged packets – `tagged`: Filter only tagged packets **Command mode:** Global configuration
`no access-control vmap` *<1-256>* `packet-format ethernet|ip|tagging` Disables filtering based on the specified packet format. **Command mode:** Global configuration
`access-control vmap` *<1-256>* `re-mark dot1p` *<0-7>* Sets the ACL re-mark configuration user update priority. **Command mode:** Global configuration
`no access-control vmap` *<1-256>* `re-mark dot1p` *<0-7>* Disables the use of dot1p for in-profile traffic ACL re-mark configuration. **Command mode:** Global configuration
`access-control vmap` *<1-256>* `re-mark in-profile|out-profile dscp` *<0-63>* Sets the ACL re-mark configuration user update priority. **Command mode:** Global configuration
`no access-control vmap` *<1-256>* `re-mark in-profile|out-profile` Removes all re-mark in-profile or out-profile settings. **Command mode:** Global configuration
`[no] access-control vmap` *<1-256>* `re-mark use-tos-precedence` Enables or disables the use of the TOS precedence for in-profile traffic. **Command mode:** Global configuration
`[no] access-control vmap` *<1-256>* `statistics` Enables or disables statistics for this access control list. **Command mode:** Global configuration
`access-control vmap` *<1-256>* `tcp-udp source-port|destination-port` *<1-65535> <port mask (0x0001 - 0xFFFF)>* Sets the TCP/UDP filtering source port or destination port and port mask for this ACL. **Command mode:** Global configuration
`access-control vmap` *<1-256>* `tcp-udp [`*<flags mask (0x0-0x3F)>*`]` Sets the TCP flags for this ACL. **Command mode:** Global configuration

Table 207. VMAP Configuration Options

Command Syntax and Usage
`no access-control vmap` *<1-256>* `tcp-udp` Removes TCP/UDP filtering for this ACL. **Command mode:** Global configuration
`default access-control vmap` *<1-256>* Resets the VMAP parameters to their default values. **Command mode:** Global configuration
`show access-control vmap` *<1-256>* Displays the current VMAP parameters. **Command mode:** All except User EXEC

Port Mirroring

Port mirroring is disabled by default. For more information about port mirroring on the G8264, see “Appendix A: Troubleshooting” in the *IBM N/OS 7.6 Application Guide*.

Port Mirroring commands are used to configure, enable, and disable the monitor port. When enabled, network packets being sent and/or received on a target port are duplicated and sent to a monitor port. By attaching a network analyzer to the monitor port, you can collect detailed information about your network performance and usage.

Table 208. Port Mirroring Configuration Options

Command Syntax and Usage
`[no] port-mirroring enable` Enables or disables port mirroring. **Command mode:** Global configuration
`show port-mirroring` Displays current settings of the mirrored and monitoring ports. **Command mode:** All except User EXEC

Port-Mirroring Configuration

Table 209. Port-Based Port-Mirroring Configuration Options

Command Syntax and Usage
`port-mirroring monitor-port` *<port alias or number>* `mirroring-port` *<port alias or number>* `{in|out|both}` Adds the port to be mirrored. This command also allows you to enter the direction of the traffic. It is necessary to specify the direction because: If the source port of the frame matches the mirrored port and the mirrored direction is ingress or both (ingress and egress), the frame is sent to the monitoring port. If the destination port of the frame matches the mirrored port and the mirrored direction is egress or both, the frame is sent to the monitoring port. **Command mode:** Global configuration
`no port-mirroring monitor-port` *<port alias or number>* `mirroring-port` *<port alias or number>* Removes the mirrored port. **Command mode:** Global configuration
`show port-mirroring` Displays the current settings of the monitoring port. **Command mode:** All except User EXEC

Layer 2 Configuration

The following table describes basic Layer 2 Configuration commands. The following sections provide more detailed information and commands.

Table 210. Layer 2 Configuration Commands

Command Syntax and Usage
`vlan` *<VLAN number>* Enter VLAN configuration mode. To view command options, see page 347. **Command mode:** Global configuration
`show layer2` Displays current Layer 2 parameters. **Command mode:** All

802.1X Configuration

These commands allow you to configure the G8264 as an IEEE 802.1X Authenticator, to provide port-based network access control.

Table 211. 802.1x Configuration Options

Command Syntax and Usage
`dot1x enable` Globally enables 802.1X. **Command mode:** Global configuration
`no dot1x enable` Globally disables 802.1X. **Command mode:** Global configuration
`show dot1x` Displays current 802.1X parameters. **Command mode:** All

The following sections describe the 802.1x configuration options.

- "802.1X Global Configuration" on page 314
- "802.1X Guest VLAN Configuration" on page 315
- "802.1X Port Configuration" on page 316

802.1X Global Configuration

The global 802.1X commands allow you to configure parameters that affect all ports in the switch.

Table 212. 802.1X Global Configuration Options

Command Syntax and Usage
`dot1x mode [force-unauthorized|auto|force-authorized]` Sets the type of access control for all ports: – `force-unauthorized` - the port is unauthorized unconditionally. – `auto` - the port is unauthorized until it is successfully authorized by the RADIUS server. – `force-authorized` - the port is authorized unconditionally, allowing all traffic. The default value is `force-authorized`. **Command mode:** Global configuration
`dot1x quiet-time` *<0-65535>* Sets the time, in seconds, the authenticator waits before transmitting an EAP-Request/ Identity frame to the supplicant (client) after an authentication failure in the previous round of authentication. The default value is 60 seconds. **Command mode:** Global configuration
`dot1x transmit-interval` *<1-65535>* Sets the time, in seconds, the authenticator waits for an EAP-Response/Identity frame from the supplicant (client) before retransmitting an EAP-Request/Identity frame. The default value is 30 seconds. **Command mode:** Global configuration
`dot1x supplicant-timeout` *<1-65535>* Sets the time, in seconds, the authenticator waits for an EAP-Response packet from the supplicant (client) before retransmitting the EAP-Request packet from the authentication server. The default value is 30 seconds. **Command mode:** Global configuration
`dot1x server-timeout` *<1-65535>* Sets the time, in seconds, the authenticator waits for a response from the RADIUS server before declaring an authentication timeout. The default value is 30 seconds. The time interval between transmissions of the RADIUS Access-Request packet containing the supplicant's (client's) EAP-Response packet is determined by the current setting of `radius-server timeout` *<timeout-value>* (default is 3 seconds). **Command mode:** Global configuration
`dot1x max-request` *<1-10>* Sets the maximum number of times the authenticator retransmits an EAP-Request packet to the supplicant (client). The default value is 2. **Command mode:** Global configuration

Table 212. 802.1X Global Configuration Options (continued)

Command Syntax and Usage
`dot1x re-authentication-interval` *<1-604800>* Sets the time, in seconds, the authenticator waits before re-authenticating a supplicant (client) when periodic re-authentication is enabled. The default value is 3600 seconds. **Command mode:** Global configuration
`dot1x re-authenticate` Sets the re-authentication status to `on`. The default value is `off`. **Command mode:** Global configuration
`[no] dot1x re-authenticate` Sets the re-authentication status to `off`. The default value is `off`. **Command mode:** Global configuration
`[no] dot1x vlan-assign` Sets the dynamic VLAN assignment status to `on` or `off`. The default value is `off`. **Command mode:** Global configuration
`default dot1x` Resets the global 802.1X parameters to their default values. **Command mode:** Global configuration
`show dot1x` Displays current global 802.1X parameters. **Command mode:** All

802.1X Guest VLAN Configuration

The 802.1X Guest VLAN commands allow you to configure a Guest VLAN for unauthenticated ports. The Guest VLAN provides limited access to switch functions.

Table 213. 802.1X Guest VLAN Configuration Options

Command Syntax and Usage
`[no] dot1x guest-vlan vlan` *<VLAN number>* Configures the Guest VLAN number. **Command mode:** Global configuration
`dot1x guest-vlan enable` Enables the 802.1X Guest VLAN. **Command mode:** Global configuration

Table 213. 802.1X Guest VLAN Configuration Options

Command Syntax and Usage
`no dot1x guest-vlan enable` Disables the 802.1X Guest VLAN. **Command mode:** Global configuration
`show dot1x` Displays current 802.1X parameters. **Command mode:** All

802.1X Port Configuration

The 802.1X port commands allows you to configure parameters that affect the selected port in the switch. These settings override the global 802.1X parameters.

Table 214. 802.1X Port Options

Command Syntax and Usage
`dot1x mode force-unauthorized|auto|force-authorized` Sets the type of access control for the port: – `force-unauthorized` - the port is unauthorized unconditionally. – `auto` - the port is unauthorized until it is successfully authorized by the RADIUS server. – `force-authorized` - the port is authorized unconditionally, allowing all traffic. The default value is `force-authorized`. **Command mode:** Interface port
`dot1x quiet-time` *<0-65535>* Sets the time, in seconds, the authenticator waits before transmitting an EAP-Request/ Identity frame to the supplicant (client) after an authentication failure in the previous round of authentication. The default value is 60 seconds. **Command mode:** Interface port
`dot1x transmit-interval` *<1-65535>* Sets the time, in seconds, the authenticator waits for an EAP-Response/Identity frame from the supplicant (client) before retransmitting an EAP-Request/Identity frame. The default value is 30 seconds. **Command mode:** Interface port
`dot1x supplicant-timeout` *<1-65535>* Sets the time, in seconds, the authenticator waits for an EAP-Response packet from the supplicant (client) before retransmitting the EAP-Request packet from the authentication server. The default value is 30 seconds. **Command mode:** Interface port

Table 214. 802.1X Port Options (continued)

Command Syntax and Usage
`dot1x server-timeout` *<1-65535>* Sets the time, in seconds, the authenticator waits for a response from the RADIUS server before declaring an authentication timeout. The default value is 30 seconds. The time interval between transmissions of the RADIUS Access-Request packet containing the supplicant's (client's) EAP-Response packet is determined by the current setting of the `radius-server timeout` command. **Command mode:** Interface port
`dot1x max-request` *<1-10>* Sets the maximum number of times the authenticator retransmits an EAP-Request packet to the supplicant (client). The default value is 2. **Command mode:** Interface port
`dot1x re-authentication-interval` *<1-604800>* Sets the time, in seconds, the authenticator waits before re-authenticating a supplicant (client) when periodic re-authentication is enabled. The default value is 3600 seconds. **Command mode:** Interface port
`dot1x re-authenticate` Sets the re-authentication status to `on`. The default value is `off`. **Command mode:** Interface port
`[no] dot1x re-authenticate` Sets the re-authentication status `off`. The default value is `off`. **Command mode:** Interface port
`[no] dot1x vlan-assign` Sets the dynamic VLAN assignment status to `on` or `off`. The default value is `off`. **Command mode:** Interface port
`default dot1x` Resets the 802.1X port parameters to their default values. **Command mode:** Interface port
`dot1x apply-global` Applies current global 802.1X configuration parameters to the port. **Command mode:** Interface port
`show interface port` *<port alias or number>* `dot1x` Displays current 802.1X port parameters. **Command mode:** All

Spanning Tree Configuration

IBM N/OS supports the IEEE 802.1w Rapid Spanning Tree Protocol (RSTP), the IEEE 802.1s Multiple Spanning Tree Protocol (MSTP), and Per VLAN Rapid Spanning Tree Protocol (PVRST+). STP is used to prevent loops in the network topology. Up to 128 Spanning Tree Groups can be configured on the switch (STG 128 is reserved for management).

Note: When VRRP is used for active/active redundancy, STG must be enabled.

Table 215. Spanning Tree Configuration Options

Command Syntax and Usage
`spanning-tree mode [disable|mst|pvrst|rstp]` Selects and enables Multiple Spanning Tree mode (`mst`), Per VLAN Rapid Spanning Tree mode (`pvrst`), or Rapid Spanning Tree mode (`rstp`). The default mode is PVRST+. When you select `spanning-tree disable`, the switch globally turns Spanning Tree `off`. All ports are placed into forwarding state. Any BPDU's received are flooded. BPDU Guard is not affected by this command. **Command mode:** Global configuration
`[no] spanning-tree stg-auto` Enables or disables VLAN Automatic STG Assignment (VASA). When enabled, each time a new VLAN is configured, the switch will automatically assign the new VLAN its own STG. Conversely, when a VLAN is deleted, if its STG is not associated with any other VLAN, the STG is returned to the available pool. **Note**: When using VASA, a maximum number of 127 automatically assigned STGs is supported. **Note**: VASA applies only to PVRST mode. **Command mode:** Global configuration
`[no] spanning-tree pvst-compatibility` Enables or disables VLAN tagging of Spanning Tree BPDUs. The default setting is `enabled`. **Command mode:** Global configuration
`[no] spanning-tree portfast` Enables or disables this port as an edge port. An edge port is not connected to a bridge, and can begin forwarding traffic as soon as the link is up. Configure server ports as edge ports (`enabled`). **Note**: After you configure the port as an edge port, you must disable the port and then re-enable the port for the change to take effect. **Command mode:** Interface port/Interface portchannel

Table 215. Spanning Tree Configuration Options (continued)

Command Syntax and Usage
`[no] spanning-tree link-type {p2p|shared|auto}` Defines the type of link connected to the port, as follows: – `auto`: Configures the port to detect the link type, and automatically match its settings. – `p2p`: Configures the port for Point-To-Point protocol. – `shared`: Configures the port to connect to a shared medium (usually a hub). The default link type is `auto`. **Command mode:** Interface port/Interface portchannel
`spanning-tree guard loop` Enables STP loop guard. STP loop guard prevents the port from forwarding traffic if no BPDUs are received. The port is placed into a loop-inconsistent blocking state until a BPDU is received. **Command mode:** Interface port/Interface portchannel
`spanning-tree guard root` Enables STP root guard. STP root guard enforces the position of the root bridge. If the bridge receives a superior BPDU, the port is placed into a root-inconsistent state (listening). **Command mode:** Interface port/Interface portchannel
`spanning-tree guard none` Disables STP loop guard and root guard. **Command mode:** Interface port/Interface portchannel
`no spanning-tree guard` Sets the Spanning Tree guard parameters to their default values. **Command mode:** Interface port/Interface portchannel
`show spanning-tree` Displays Spanning Tree information, including the status (on or off), Spanning Tree mode (RSTP, PVRST, or MSTP), and VLAN membership. In addition to seeing if STG is enabled or disabled, you can view the following STG bridge information: – Priority – Hello interval – Maximum age value – Forwarding delay – Aging time You can also see the following port-specific STG information: – Port alias and priority – Cost – State **Command mode:** All

Table 215. Spanning Tree Configuration Options (continued)

Command Syntax and Usage
`show spanning-tree root` Displays the Spanning Tree configuration on the root bridge for each STP instance. For details, see page 48. **Command mode:** All
`show spanning-tree blockedports` Lists the ports blocked by each STP instance. **Command mode:** All
`show spanning-tree [vlan <VLAN ID>] bridge` Displays Spanning Tree bridge information. For details, see page 48. **Command mode:** All

MSTP Configuration

Up to 32 Spanning Tree Groups can be configured in MSTP mode. MSTP is turned off by default and the default STP mode is PVRST+.

Note: When Multiple Spanning Tree is turned on, VLAN 4095 is moved from Spanning Tree Group 128 to the Common Internal Spanning Tree (CIST). When Multiple Spanning Tree is turned off, VLAN 4095 is moved back to Spanning Tree Group 128.

Table 216. Multiple Spanning Tree Configuration Options

Command Syntax and Usage
`spanning-tree mst name <1-32 characters>` Configures a name for the MSTP region. All devices within an MSTP region must have the same region name. **Command mode:** Global configuration
`spanning-tree mst revision <0-65535>` Configures a revision number for the MSTP region. The revision is used as a numerical identifier for the region. All devices within an MSTP region must have the same revision number. **Command mode:** Global configuration
`spanning-tree mst max-hops <4-60>` Configures the maximum number of bridge hops a packet may traverse before it is dropped. The default value is 20. **Command mode:** Global configuration
`[no] spanning-tree mst <1-32> enable` Enables or disables the specified MSTP instance. **Command mode:** Global configuration

Table 216. Multiple Spanning Tree Configuration Options (continued)

Command Syntax and Usage
`spanning-tree mst forward-time <4-30>` Configures the forward delay time in seconds. The forward delay parameter specifies the amount of time that a bridge port has to wait before it changes from the listening state to the learning state and from the learning state to the forwarding state. Default value is 15. **Command mode:** Global configuration
`spanning-tree mst max-age <6-40>` Configures the maximum age interval in seconds. The maximum age parameter specifies the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the MSTP network. Default value is 20. **Command mode:** Global configuration
`default spanning-tree mst <0-32>` Restores the Spanning Tree instance to its default configuration. **Command mode:** Global configuration
`spanning-tree mst <1-32> vlan <VLAN numbers>` Add the specified VLANs to the Spanning Tree instance. If a VLAN does not exist, it will be created automatically, but it will not be enabled by default. **Command mode:** Global configuration
`no spanning-tree mst <1-32> vlan {<VLAN numbers>|all}` Remove the specified VLANs or all VLANs from the Spanning Tree instance. **Command mode:** Global configuration
`spanning-tree mst <0-32> priority <0-65535>` Configures the CIST bridge priority for the specified MSTP instance. The bridge priority parameter controls which bridge on the network is the MSTP root bridge. To make this switch the root bridge, configure the bridge priority lower than all other switches and bridges on your network. The lower the value, the higher the bridge priority. The range is 0 to 65535, in steps of 4096 (0, 4096, 8192...); the default value is 61440. **Command mode:** Global configuration
`show spanning-tree mst <0-32> information` Displays the current CIST configuration for the specified instance. **Command mode:** All
`show spanning-tree mst configuration` Displays the current MSTP settings. **Command mode:** All

MSTP Port Configuration

MSTP port parameters are used to modify MSTP operation on an individual port basis. MSTP parameters do not affect operation of STP/PVST+. For each port, RSTP/MSTP is turned on by default.

Table 217. MSTP Port Configuration Options

Command Syntax and Usage
`spanning-tree mst <0-32> port-priority <0-240>` Configures the port priority for the specified MSTP instance. The port priority helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment. The range is 0 to 240, in steps of 16 (0, 16, 32...), and the default is 128. **Command mode:** Interface port/Interface portchannel
`spanning-tree mst <0-32> cost <0-200000000>` Configures the port path cost for the specified MSTP instance. The port path cost is used to help determine the designated port for a segment. Port path cost is based on the port speed, and is calculated as follows: – 1Gbps = 20000 – 10Gbps = 2000 The default value of 0 (zero) indicates that the default path cost will be computed for an auto negotiated link speed. **Command mode:** Interface port/Interface portchannel
`spanning-tree mst  hello-time <1-10>` Configures the port Hello time.The Hello time specifies how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge Hello value. The range is 1 to 10 seconds, and the default is 2 seconds. **Command mode:** Interface port/Interface portchannel
`[no] spanning-tree pvst-protection` Configures PVST Protection on the selected port. If the port receives any PVST+/PVRST+ BPDUs, it error disabled. PVST Protection works only in MSTP mode. The default setting is `disabled`. **Note**: Not available in stacking. **Command mode:** Interface port
`[no] spanning-tree mst <0-32> enable` Enables or disables the specified MSTP instance on the port. **Command mode:** Interface port/Interface portchannel
`show interface port <port alias or number> spanning-tree mstp cist` Displays the current CIST port configuration. **Command mode:** All

RSTP/PVRST Configuration

Table 218 describes the commands used to configure the Rapid Spanning Tree (RSTP) and Per VLAN Rapid Spanning Tree Protocol (PVRST+) protocols.

Table 218. RSTP/PVRST Configuration Options

Command Syntax and Usage
`spanning-tree stp` <*STG number*> `vlan` <*VLAN number*> Associates a VLAN with a Spanning Tree Group and requires a VLAN ID as a parameter. If the VLAN does not exist, it will be created automatically, but it will not be enabled by default. **Command mode:** Global configuration
`no spanning-tree stp` <*STG number*> `vlan` <*VLAN number*> Breaks the association between a VLAN and a Spanning Tree Group and requires a VLAN ID as a parameter. **Command mode:** Global configuration
`no spanning-tree stp` <*STG number*> `vlan all` Removes all VLANs from a Spanning Tree Group. **Command mode:** Global configuration
`spanning-tree stp` <*STG number*> `enable` Globally enables Spanning Tree Protocol. STG is turned on by default. **Command mode:** Global configuration
`no spanning-tree stp` <*STG number*> `enable` Globally disables Spanning Tree Protocol. **Command mode:** Global configuration
`default spanning-tree` <*STG number*> Restores a Spanning Tree instance to its default configuration. **Command mode:** Global configuration
`show spanning-tree stp` <*STG number*> Displays current Spanning Tree Protocol parameters. **Command mode:** All

Bridge RSTP/PVRST Configuration

Spanning Tree bridge parameters affect the global STG operation of the switch. STG bridge parameters include:

- Bridge priority
- Bridge hello time
- Bridge maximum age
- Forwarding delay

Table 219. Bridge Spanning Tree Configuration Options

Command Syntax and Usage
spanning-tree stp <*STG number*> bridge priority <*0-65535*> Configures the bridge priority. The bridge priority parameter controls which bridge on the network is the STG root bridge. To make this switch the root bridge, configure the bridge priority lower than all other switches and bridges on your network. The lower the value, the higher the bridge priority. The default value is 61440. **Command mode:** Global configuration
spanning-tree stp <*STG number*> bridge hello-time <*1-10*> Configures the bridge Hello time.The Hello time specifies how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge Hello value. The range is 1 to 10 seconds, and the default is 2 seconds. This command does not apply to MSTP. **Command mode:** Global configuration
spanning-tree stp <*STG number*> bridge maximum-age <*6-40*> Configures the bridge maximum age. The maximum age parameter specifies the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it re configures the STG network. The range is 6 to 40 seconds, and the default is 20 seconds. This command does not apply to MSTP. **Command mode:** Global configuration
spanning-tree stp <*STG number*> bridge forward-delay <*4-30*> Configures the bridge forward delay parameter. The forward delay parameter specifies the amount of time that a bridge port has to wait before it changes from the listening state to the learning state and from the learning state to the forwarding state. The range is 4 to 30 seconds, and the default is 15 seconds. This command does not apply to MSTP **Command mode:** Global configuration
show spanning-tree [vlan <*VLAN ID*>] bridge Displays the current Spanning Tree parameters either globally or for a specific VLAN. See page 48 for sample output. **Command mode:** All

When configuring STG bridge parameters, the following formulas must be used:

- $2*(\mathit{fwd}-1) \geq \mathit{mxage}$

- 2*(*hello*+1) ≤ *mxage*

RSTP/PVRST Port Configuration

By default, Spanning Tree is turned `off` for management ports, and turned `on` for data ports. STG port parameters include:

- Port priority
- Port path cost

Table 220. Spanning Tree Port Options

Command Syntax and Usage
`spanning-tree stp` *<STG number>* `priority` *<0-240>* Configures the port priority. The port priority helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment. The default value is 128. **RSTP/MSTP**: The range is 0 to 240, in steps of 16 (0, 16, 32...) and the default is 128. **Command mode:** Interface port
`spanning-tree stp` *<STG number>* `path-cost` *<1-200000000, 0 for default)>* Configures the port path cost. The port path cost is used to help determine the designated port for a segment. Port path cost is based on the port speed, and is calculated as follows: – 1Gbps = 20000 – 10Gbps = 2000 The default value of 0 (zero) indicates that the default path cost will be computed for an auto negotiated link speed. **Command mode:** Interface port
`spanning-tree stp link-type` {`auto`|`p2p`|`shared`} Defines the type of link connected to the port, as follows: – `auto`: Configures the port to detect the link type, and automatically match its settings. – `p2p`: Configures the port for Point-To-Point protocol. – `shared`: Configures the port to connect to a shared medium (usually a hub). **Command mode:** Interface port
`spanning-tree stp` *<STG number>* `enable` Enables STG on the port. **Command mode:** Interface port

Table 220. Spanning Tree Port Options (continued)

Command Syntax and Usage
`no spanning-tree stp <`*STG number*`> enable` Disables STG on the port. **Command mode:** Interface port
`show interface port <`*port alias or number*`> spanning-tree stp <`*STG number*`>` Displays the current STG port parameters. **Command mode:** All

Forwarding Database Configuration

Use the following commands to configure the Forwarding Database (FDB).

Table 221. FDB Configuration Options

Command Syntax and Usage
`mac-address-table aging <`*0-65535*`>` Configures the aging value for FDB entries, in seconds. The default value is 300. **Command mode**: Global configuration
`show mac-address-table` Display current FDB configuration. **Command mode**: All except User EXEC

Static Multicast MAC Configuration

The following options are available to control the forwarding of known and unknown multicast packets:

- All multicast packets are flooded to the entire VLAN. This is the default switch behavior.
- Known multicast packets are forwarded only to those ports specified. Unknown multicast packets are flooded to the entire VLAN. To configure this option, define the Multicast MAC address for the VLAN and specify ports that are to receive multicast packets (`mac-address-table multicast`).
- Known multicast packets are forwarded only to those ports specified. Unknown multicast packets are dropped. To configure this option:
  - – Define the Multicast MAC address for the VLAN and specify ports that are to receive multicast packets (`mac-address-table multicast`).
  - – Enable Flood Blocking on ports that are not to receive multicast packets (`interface port` *x*) (`flood-blocking`).

Use the following commands to configure static Multicast MAC entries in the Forwarding Database (FDB).

Table 222. Static Multicast MAC Configuration Options

Command Syntax and Usage
`mac-address-table multicast` *<MAC address> <VLAN number>* {`port` *<port alias or number>*} Adds a static multicast entry. You can list ports separated by a comma, or enter a range of ports separated by a hyphen (-). For example: `mac-address-table multicast 01:00:00:23:3f:01 200 1-4` **Command mode**: Global configuration
`mac-address-table multicast` *<cluster MAC address>* `port` *<port number or range>*} Adds a static multicast entry for Network Load Balancing (NLB). You can list ports separated by a comma, or enter a range of ports separated by a hyphen (-). For example: `mac-address-table multicast 01:00:00:23:3f:01 port 1-4` **Command mode**: Global configuration
`no mac-address-table multicast` {`all`|*<MAC address> <VLAN number>*} Deletes a static multicast entry. **Command mode**: Global configuration
`show mac-address-table multicast` Display the current static multicast entries. **Command mode**: All

Static FDB Configuration

Use the following commands to configure static entries in the Forwarding Database (FDB).

Table 223. FDB Configuration Options

Command Syntax and Usage
`mac-address-table static <MAC address> vlan <VLAN number> {port <port alias or number>|portchannel <trunk number>| adminkey <1-65535>}` Adds a permanent FDB entry. Enter the MAC address using the following format, `xx:xx:xx:xx:xx:xx` For example, `08:00:20:12:34:56` You can also enter the MAC address as follows: `xxxxxxxxxxxx` For example, `080020123456` **Command mode**: Global configuration
`no mac-address-table static [<MAC address>] [<VLAN number>]|all` Deletes permanent FDB entries. **Command mode**: Global configuration
`show mac-address-table` Display current FDB configuration. **Command mode**: All except User EXEC

ECP Configuration

Use the following commands to configure Edge Control Protocol (ECP).

Table 224. ECP Configuration Options

Command Syntax and Usage
`ecp retransmit-interval <100-9000>` Configures ECP retransmit interval in milliseconds. Default value is 1000. **Command mode**: Global configuration
`default ecp retransmit-interval` Resets the ECP retransmit interval to the default 1000 milliseconds. **Command mode**: Global configuration
`show ecp [channels|upper-layer-protocols]` Displays settings for all ECP channels or registered ULPs. **Command mode**: All

LLDP Configuration

Use the following commands to configure Link Layer Detection Protocol (LLDP).

Table 225. LLDP Configuration Options

Command Syntax and Usage
`lldp refresh-interval` *<5-32768>* Configures the message transmission interval, in seconds. The default value is 30. **Command mode**: Global configuration
`lldp holdtime-multiplier` *<2-10>* Configures the message hold time multiplier. The hold time is configured as a multiple of the message transmission interval. The default value is 4. **Command mode**: Global configuration
`lldp trap-notification-interval` *<1-3600>* Configures the trap notification interval, in seconds. The default value is 5. **Command mode**: Global configuration
`lldp transmission-delay` *<1-8192>* Configures the transmission delay interval. The transmit delay timer represents the minimum time permitted between successive LLDP transmissions on a port. The default value is 2. **Command mode**: Global configuration
`lldp reinit-delay` *<1-10>* Configures the re-initialization delay interval, in seconds. The re-initialization delay allows the port LLDP information to stabilize before transmitting LLDP messages. The default value is 2. **Command mode**: Global configuration
`lldp enable` Globally turns LLDP on. The default setting is `on`. **Command mode**: Global configuration
`no lldp enable` Globally turns LLDP off. **Command mode**: Global configuration
`show lldp [port` *<port_number>*`]` Display current LLDP configuration. **Command mode**: All

LLDP Port Configuration

Use the following commands to configure LLDP port options.

Table 226. LLDP Port Options

Command Syntax and Usage
`lldp admin-status {disabled|tx_only|rx_only|tx_rx}` Configures the LLDP transmission type for the port, as follows: – Transmit only – Receive only – Transmit and receive – Disabled The default setting is `tx_rx`. **Command mode**: Interface port
`[no] lldp trap-notification` Enables or disables SNMP trap notification for LLDP messages. **Command mode**: Interface port
`show interface port` *<port alias or number>* `lldp` Display current LLDP port configuration. **Command mode**: All

LLDP Optional TLV configuration

Use the following commands to configure LLDP port TLV (Type, Length, Value) options for the selected port.

Table 227. Optional TLV Options

Command Syntax and Usage
`[no] lldp tlv portdesc` Enables or disables the Port Description information type. **Command mode**: Interface port
`[no] lldp tlv sysname` Enables or disables the System Name information type. **Command mode**: Interface port
`[no] lldp tlv sysdescr` Enables or disables the System Description information type. **Command mode**: Interface port
`[no] lldp tlv syscap` Enables or disables the System Capabilities information type. **Command mode**: Interface port
`[no] lldp tlv mgmtaddr` Enables or disables the Management Address information type. **Command mode**: Interface port
`[no] lldp tlv portvid` Enables or disables the Port VLAN ID information type. **Command mode**: Interface port
`[no] lldp tlv portprot` Enables or disables the Port and VLAN Protocol ID information type. **Command mode**: Interface port
`[no] lldp tlv vlanname` Enables or disables the VLAN Name information type. **Command mode**: Interface port
`[no] lldp tlv protid` Enables or disables the Protocol ID information type. **Command mode**: Interface port
`[no] lldp tlv macphy` Enables or disables the MAC/Phy Configuration information type. **Command mode**: Interface port

Table 227. Optional TLV Options (continued)

Command Syntax and Usage
`[no] lldp tlv powermdi` Enables or disables the Power via MDI information type. **Command mode**: Interface port
`[no] lldp tlv linkaggr` Enables or disables the Link Aggregation information type. **Command mode**: Interface port
`[no] lldp tlv framesz` Enables or disables the Maximum Frame Size information type. **Command mode**: Interface port
`[no] lldp tlv dcbx` Enables or disables the Maximum Frame Size information type. **Command mode**: Interface port
`[no] lldp tlv all` Enables or disables all optional TLV information types. **Command mode**: Interface port
`show interface port` *<port alias or number>* `lldp` Display current LLDP port configuration. **Command mode**: All

Trunk Configuration

Trunk groups can provide super-bandwidth connections between RackSwitch G8264s or other trunk capable devices. A *trunk* is a group of ports that act together, combining their bandwidth to create a single, larger port. Up to 64 static trunk groups can be configured on the G8264, with the following restrictions:

- Any physical switch port can belong to no more than one trunk group.
- Up to 32 ports can belong to the same trunk group.
- You must configure all ports in a trunk group with the same properties (speed, duplex, flow control, STG, VLAN, and so on).
- Trunking from non-IBM devices must comply with Cisco® EtherChannel® technology.

By default, each trunk group is empty and disabled.

Table 228. Trunk Configuration Options

Command Syntax and Usage
`portchannel` *<1-64>* `port` *<port alias or number>* Adds a physical port or ports to the current trunk group. You can add several ports, with each port separated by a comma (,) or a range of ports, separated by a dash (-). **Command mode:** Global configuration
`no portchannel` *<1-64>* `port` *<port alias or number>* Removes a physical port or ports from the current trunk group. **Command mode:** Global configuration
[no] `portchannel` *<1-64>* `enable` Enables or Disables the current trunk group. **Command mode:** Global configuration
`no portchannel` *<1-64>* Removes the current trunk group configuration. **Command mode:** Global configuration
`show portchannel` *<1-64>* Displays current trunk group parameters. **Command mode:** All

Trunk Hash Configuration

Use the following commands to configure trunk hash settings for the G8264. The trunk hash settings affect both static trunks and LACP trunks.

To achieve the most even traffic distribution, select options that exhibit a wide range of values for your particular network. You may use the configuration settings listed in Table 229 combined with the hash parameters listed in Table 230 and Table 231.

Table 229. Trunk Hash Options

Command Syntax and Usage
`[no] portchannel thash ingress` Enables or disables trunk hash computation based on the ingress port. The default setting is `disabled`. **Command mode:** Global configuration
`[no] portchannel thash L4port` Enables or disables use of Layer 4 service ports (TCP, UDP, and so on) to compute the hash value. The default setting is `disabled`. **Command mode:** Global configuration
`show portchannel hash` Display current trunk hash configuration. **Command mode**: All

Layer 2 Trunk Hash

Layer 2 trunk hash parameters are set globally. You can enable one or both parameters, to configure any of the following valid combinations:

- SMAC (source MAC only)
- DMAC (destination MAC only)
- SMAC and DMAC

Use the following commands to configure Layer 2 trunk hash parameters for the switch.

Table 230. Layer 2 Trunk Hash Options

Command Syntax and Usage
`[no] portchannel thash l2hash l2-source-mac-address` Enables or disables Layer 2 trunk hashing on the source MAC. **Command mode:** Global configuration
`[no] portchannel thash l2hash l2-destination-mac-address` Enables or disables Layer 2 trunk hashing on the destination MAC. **Command mode:** Global configuration

Table 230. Layer 2 Trunk Hash Options

Command Syntax and Usage
`[no] portchannel thash l2hash l2-source-destination-mac` Enables or disables Layer 2 trunk hashing on both the source and destination MAC. **Command mode:** Global configuration
`show portchannel hash` Displays the current trunk hash settings. **Command mode:** All

Layer 3 Trunk Hash

Layer 3 trunk hash parameters are set globally. You can enable one or both parameters, to configure any of the following valid combinations:

- SIP (source IP only)
- DIP (destination IP only)
- SIP and DIP

Use the following commands to configure Layer 3 trunk hash parameters for the switch.

Table 231. Layer 3 Trunk Hash Options

Command Syntax and Usage
`[no] portchannel thash l3thash l3-use-l2-hash` Enables or disables use of Layer 2 hash parameters only. When enabled, Layer 3 hashing parameters are cleared. **Command mode:** Global configuration
`[no] portchannel thash l3thash l3-source-ip-address` Enables or disables Layer 3 trunk hashing on the source IP address. **Command mode:** Global configuration
`[no] portchannel thash l3thash l3-destination-ip-address` Enables or disables Layer 3 trunk hashing on the destination IP address. **Command mode:** Global configuration
`[no] portchannel thash l3thash l3-source-destination-ip` Enables or disables Layer 3 trunk hashing on both the source and the destination IP address. **Command mode:** Global configuration
`show portchannel hash` Displays the current trunk hash settings. **Command mode:** All

Virtual Link Aggregation Control Protocol Configuration

vLAG groups allow you to enhance redundancy and prevent implicit loops without using STP. The vLAG group acts as a single virtual entity for the purpose of establishing a multi-port trunk.

Table 232. vLAG Configuration Options

Command Syntax and Usage
`[no] vlag portchannel` *<trunk group number>* `enable` Enables or disables vLAG on the selected trunk group. **Command mode:** Global configuration
`[no] vlag adminkey` *<1-65535>* `enable` Enables or disables vLAG on the selected LACP *admin key*. LACP trunks formed with this *admin key* will be included in the vLAG configuration. **Command mode:** Global configuration
`[no] vlag enable` Enables or disables vLAG globally. **Command mode:** Global configuration
`[no] vlag tier-id` *<1-512>* Sets the vLAG peer ID.
`vlag priority` *<0-65535>* Configures the vLAG priority for the switch, used for election of Primary and Secondary vLAG switches. The switch with lower priority is elected to the role of Primary vLAG switch. **Command mode:** Global configuration
`vlag auto-recovery` *<240-3600>* Sets the duration in seconds of the auto-recovery timer. This timer configures how log after boot-up configuration load, the switch can assume the Primary role from an unresponsive ISL peer and bring up the vLAG ports. The default value is 300. **Command mode:** Global configuration
`no vlag auto-recovery` Sets the auto-recovery timer to the default 300 seconds duration. **Command mode:** Global configuration
`vlag startup-delay` *<seconds>* Sets, in seconds, the vLAG startup delay interval. **Command mode:** Global configuration
`show vlag` Displays current vLAG parameters. **Command mode:** All

vLAG Health Check Configuration

These commands enable you to configure a way to check the health status of the vLAG peer.

Table 233. vLAG Health Check Configuration Options

Command Syntax and Usage
`vlag hlthchk peer-ip` *<IP address>* Configures the IP address of the peer switch, used for health checks. Use the management IP address of the peer switch. **Command mode:** Global configuration
`[no] vlag hlthchk connect-retry-interval` *<1-300>* Sets, in seconds, the vLAG health check connect retry interval. The default value is 30. **Command mode:** Global configuration
`[no] vlag hlthchk keepalive-attempts` *<1-24>* Sets the number of vLAG keep alive attempts. The default value is 3. **Command mode:** Global configuration
`[no] vlag hlthchk keepalive-interval` *<2-300>* Sets, in seconds, the time between vLAG keep alive attempts. The default value is 5. **Command mode:** Global configuration

vLAG ISL Configuration

These commands allow you to configure a dedicated inter-switch link (ISL) for synchronization between vLAG peers.

Table 234. vLAG ISL Configuration Options

Command Syntax and Usage
`[no] vlag isl portchannel` *<1-64>* `enable` Enables or disables vLAG Inter-Switch Link (ISL) on the selected trunk group. **Command mode:** Global configuration
`[no] vlag isl adminkey` *<1-65535>* Enables or disables vLAG Inter-Switch Link (ISL) on the selected LACP *admin key*. LACP trunks formed with this *admin key* will be included in the ISL. **Command mode:** Global configuration
`show vlag` Displays current vLAG parameters. **Command mode:** All

Link Aggregation Control Protocol Configuration

Use the following commands to configure Link Aggregation Control Protocol (LACP) for the G8264.

Table 235. Link Aggregation Control Protocol Options

Command Syntax and Usage
`lacp system-priority` *<1-65535>* Defines the priority value for the G8264. Lower numbers provide higher priority. The default value is 32768. **Command mode:** Global configuration
`lacp timeout {short|long}` Defines the timeout period before invalidating LACP data from a remote partner. Choose `short` (3 seconds) or `long` (90 seconds). The default value is `long`. **Note:** To reduce LACPDU processing, use a timeout value of `long`, . If your G8264's CPU utilization rate remains at 100% for periods of 90 seconds or more, consider using static trunks instead of LACP. **Command mode:** Global configuration
`no lacp` *<1-65535>* Deletes a selected LACP trunk, based on its *admin key*. This command is equivalent to disabling LACP on each of the ports configured with the same *admin key*. **Command mode:** Global configuration
`show lacp` Display current LACP configuration. **Command mode:** All

LACP Port Configuration

Use the following commands to configure Link Aggregation Control Protocol (LACP) for the selected port.

Table 236. LACP Port Options

Command Syntax and Usage
`lacp mode {off|active|passive}` Set the LACP mode for this port, as follows: – **off** Turn LACP off for this port. You can use this port to manually configure a static trunk. The default value is `off`. – **active** Turn LACP on and set this port to active. Active ports initiate LACPDUs. – **passive** Turn LACP on and set this port to passive. Passive ports do not initiate LACPDUs, but respond to LACPDUs from active ports. **Command mode:** Interface port
`lacp priority` *<1-65535>* Sets the priority value for the selected port. Lower numbers provide higher priority. The default value is 32768. **Command mode:** Interface port
`lacp key` *<1-65535>* Set the *admin key* for this port. Only ports with the same *admin key* and *oper key* (operational state generated internally) can form a LACP trunk group. **Command mode:** Interface port
`port-channel min-links` *<1-32>* Set the minimum number of links for this port. If the specified minimum number of ports are not available, the trunk is placed in the `down` state. **Command mode:** Interface port
`default lacp [key|mode|priority]` Restores the selected parameters to their default values. **Command mode:** Interface port
`default port-channel min-links` Restores the minimum number of links for this port to its default value. **Command mode:** Interface port
`show interface port` *<port alias or number>* `lacp` Displays the current LACP configuration for this port. **Command mode:** All

Layer 2 Failover Configuration

Use these commands to configure Layer 2 Failover. For more information about Layer 2 Failover, see “High Availability” in the *IBM N/OS Application Guide*.

Table 237. Layer 2 Failover Configuration Options

Command Syntax and Usage
`failover enable` Globally turns Layer 2 Failover `on`. **Command mode:** Global configuration
`no failover enable` Globally turns Layer 2 Failover `off`. **Command mode:** Global configuration
`show failover trigger` Displays current Layer 2 Failover parameters. **Command mode:** All

Failover Trigger Configuration

Table 238. Failover Trigger Configuration Options

Command Syntax and Usage
[no] `failover trigger` *<1-8>* `enable` Enables or disables the Failover trigger. **Command mode:** Global configuration
`no failover trigger` *<1-8>* Deletes the Failover trigger. **Command mode:** Global configuration
`failover trigger` *<1-8>* `limit` *<0-1024>* Configures the minimum number of operational links allowed within each trigger before the trigger initiates a failover event. If you enter a value of zero (0), the switch triggers a failover event only when no links in the trigger are operational. **Command mode:** Global configuration
`show failover trigger` *<1-8>* Displays the current failover trigger settings. **Command mode:** All

Failover Manual Monitor Port Configuration

Use these commands to define the port link(s) to monitor. The Manual Monitor Port configuration accepts any non-management port.

Table 239. Failover Manual Monitor Port Options

Command Syntax and Usage
`failover trigger` *<1-8>* `mmon monitor member` *<port alias or number>* Adds the selected port to the Manual Monitor Port configuration. **Command mode:** Global configuration
`no failover trigger` *<1-8>* `mmon monitor member` *<port alias or number>* Removes the selected port from the Manual Monitor Port configuration. **Command mode:** Global configuration
`failover trigger` *<1-8>* `mmon monitor portchannel` *<trunk number>* Adds the selected trunk group to the Manual Monitor Port configuration. **Command mode:** Global configuration
`no failover trigger` *<1-8>* `mmon monitor portchannel` *<trunk number>* Removes the selected trunk group from the Manual Monitor Port configuration. **Command mode:** Global configuration
`failover trigger` *<1-8>* `mmon monitor adminkey` *<1-65535>* Adds an LACP *admin key* to the Manual Monitor Port configuration. LACP trunks formed with this admin key will be included in the Manual Monitor Port configuration. **Command mode:** Global configuration
`no failover trigger` *<1-8>* `mmon monitor adminkey` *<1-65535>* Removes an LACP *admin key* from the Manual Monitor Port configuration. **Command mode:** Global configuration
`show failover trigger` *<1-8>* Displays the current Failover settings. **Command mode:** All

Failover Manual Monitor Control Configuration

Use these commands to define the port link(s) to control. The Manual Monitor Control configuration accepts any non-management port.

Table 240. Failover Manual Monitor Control Options

Command Syntax and Usage
`failover trigger <1-8> mmon control member <port alias or number>` Adds the selected port to the Manual Monitor Control configuration. **Command mode:** Global configuration
`no failover trigger <1-8> mmon control member <port alias or number>` Removes the selected port from the Manual Monitor Control configuration. **Command mode:** Global configuration
`failover trigger <1-8> mmon control portchannel <trunk number>` Adds the selected trunk group to the Manual Monitor Control configuration. **Command mode:** Global configuration
`no failover trigger <1-8> mmon control portchannel <trunk number>` Removes the selected trunk group from the Manual Monitor Control configuration. **Command mode:** Global configuration
`failover trigger <1-8> mmon control adminkey <1-65535>` Adds an LACP *admin key* to the Manual Monitor Control configuration. LACP trunks formed with this admin key will be included in the Manual Monitor Control configuration. **Command mode:** Global configuration
`no failover trigger <1-8> mmon control adminkey <1-65535>` Removes an LACP *admin key* from the Manual Monitor Control configuration. **Command mode:** Global configuration
`show failover trigger <1-8>` Displays the current Failover settings. **Command mode:** All

Hot Links Configuration

Use these commands to configure Hot Links. For more information about Hot Links, see “Hot Links” in the *IBM N/OS 7.6 Application Guide*.

Table 241. Hot Links Configuration Options

Command Syntax and Usage
[no] `hotlinks bpdu` Enables or disables flooding of Spanning-Tree BPDUs on the active Hot Links interface when the interface belongs to a Spanning Tree group that is globally turned `off`. This feature can prevent unintentional loop scenarios (for example, if two uplinks come up at the same time). The default setting is `disabled`. **Command mode:** Global configuration
[no] `hotlinks fdb-update` Enables or disables FDB Update, which allows the switch to send FDB and MAC update packets over the active interface. The default value is `disabled`. **Command mode:** Global configuration
`hotlinks fdb-update-rate` *<10-200>* Configures the FDB Update rate in packets per second. **Command mode:** Global configuration
`hotlinks enable` Globally enables Hot Links. **Command mode:** Global configuration
`no hotlinks enable` Globally disables Hot Links. **Command mode:** Global configuration
`show hotlinks` Displays current Hot Links parameters. **Command mode:** All

Hot Links Trigger Configuration

Table 242. Hot Links Trigger Configuration Options

Command Syntax and Usage
`hotlinks trigger` *<1-25>* `forward-delay` *<0-3600>* Configures the Forward Delay interval, in seconds. The default value is `1`. **Command mode:** Global configuration
`[no] hotlinks trigger` *<1-25>* `name` *<1-32 characters>* Defines a name for the Hot Links trigger. **Command mode:** Global configuration
[no] `hotlinks trigger` *<1-25>* `preemption` Enables or disables pre-emption, which allows the Master interface to transition to the Active state whenever it becomes available. The default setting is `enabled`. **Command mode:** Global configuration
[no] `hotlinks trigger` *<1-25>* `enable` Enables or disables the Hot Links trigger. **Command mode:** Global configuration
`no hotlinks trigger` *<1-25>* Deletes the Hot Links trigger. **Command mode:** Global configuration
`show hotlinks trigger` *<1-25>* Displays the current Hot Links trigger settings. **Command mode:** All

Hot Links Master Configuration

Use the following commands to configure the Hot Links Master interface.

Table 243. Hot Links Master Configuration Options

Command Syntax and Usage
[no] `hotlinks trigger` *<1-25>* `master port` *<port alias or number>* Adds or removes the selected port to the Hot Links Master interface. **Command mode:** Global configuration
[no] `hotlinks trigger` *<1-25>* `master portchannel` *<trunk group number>* Adds or removes the selected trunk group to the Master interface. **Command mode:** Global configuration
[no] `hotlinks trigger` *<1-25>* `master adminkey` *<0-65535>* Adds or removes an LACP *admin key* to the Master interface. LACP trunks formed with this *admin key* will be included in the Master interface. **Command mode:** Global configuration
`show hotlinks trigger` *<1-25>* Displays the current Hot Links trigger settings. **Command mode:** All

Hot Links Backup Configuration

Use the following commands to configure the Hot Links Backup interface.

Table 244. Hot Links Backup Configuration Options

Command Syntax and Usage
[no] `hotlinks trigger` *<1-25>* `backup port` *<port alias or number>* Adds or removes the selected port to the Hot Links Backup interface. **Command mode:** Global configuration
[no] `hotlinks trigger` *<1-25>* `backup portchannel` *<trunk group number>* Adds or removes the selected trunk group to the Backup interface. **Command mode:** Global configuration
[no] `hotlinks trigger` *<1-25>* `backup adminkey` *<0-65535>* Adds or removes an LACP *admin key* to the Backup interface. LACP trunks formed with this *admin key* will be included in the Backup interface. **Command mode:** Global configuration
`show hotlinks trigger` *<1-25>* Displays the current Hot Links trigger settings. **Command mode:** All

VLAN Configuration

These commands configure VLAN attributes, change the status of each VLAN, change the port membership of each VLAN, and delete VLANs.

By default, VLAN 1 is the only VLAN configured on the switch. All ports are members of VLAN 1 by default. Up to 4094 VLANs can be configured on the G8264.

VLANs can be assigned any number between 1 and 4094. VLAN 4095 is reserved for switch management.

Table 245. VLAN Configuration Options

Command Syntax and Usage
`vlan` *<VLAN number>* Enter VLAN configuration mode. **Command mode:** Global configuration
`protocol-vlan` *<1-8>* Configures the Protocol-based VLAN (PVLAN). **Command mode:** VLAN
`name` *<1-32 characters>* Assigns a name to the VLAN or changes the existing name. The default VLAN name is the first one. **Command mode:** VLAN
`no shutdown` Disables or enables local traffic on the specified VLAN. Default setting is enabled (`no shutdown`) **Command mode:** VLAN
`stg` *<STG number>* Assigns a VLAN to a Spanning Tree Group. **Command mode:** VLAN
`[no] vmap` *<1-256>* `[serverports|non-serverports]` Adds or removes a VLAN Map to the VLAN membership. You can choose to limit operation of the VLAN Map to server ports only or non-server ports only. If you do not select a port type, the VMAP is applied to the entire VLAN. **Command mode:** VLAN
`[no] flood` Configures the switch to flood unregistered IP multicast traffic to all ports. The default setting is `enabled`. **Note:** If none of the IGMP hosts reside on the VLAN of the streaming server for a IPMC group, you must disable IGMP flooding to ensure that multicast data is forwarded across the VLANs for that IPMC group. **Command mode:** VLAN

Table 245. VLAN Configuration Options (continued)

Command Syntax and Usage
`[no] cpu` Configures the switch to forward unregistered IP multicast traffic to the MP, which adds an entry in the IPMC table, as follows: – If no Mrouter is present, drop subsequent packets with same IPMC. – If an Mrouter is present, forward subsequent packets to the Mrouter(s) on the ingress VLAN. The default setting is `enabled`. **Note**: If both `flood` and `cpu` are disabled, the switch drops all unregistered IPMC traffic. **Command mode:** VLAN
`[no] optflood` Enables or disables optimized flooding. When enabled, optimized flooding avoids packet loss during the learning period. The default setting is `disabled`. **Command mode:** VLAN
`no vlan` *<VLAN number>* Deletes this VLAN. **Command mode:** VLAN
`show vlan information` Displays the current VLAN configuration. **Command mode:** All

Note: All ports must belong to at least one VLAN. Any port which is removed from a VLAN and which is not a member of any other VLAN is automatically added to default VLAN 1. You cannot remove a port from VLAN 1 if the port has no membership in any other VLAN. Also, you cannot add a port to more than one VLAN unless the port has VLAN tagging turned `on`.

Protocol-Based VLAN Configuration

Use the following commands to configure Protocol-based VLAN for the selected VLAN.

Table 246. Protocol VLAN Configuration Options

Command Syntax and Usage
`protocol-vlan` *<1-8>* `frame-type {ether2|llc|snap}` *<Ethernet type>* Configures the frame type and the Ethernet type for the selected protocol. Ethernet type consists of a 4-digit (16 bit) hex code, such as `0080` (IPv4). **Command mode:** VLAN
`protocol-vlan` *<1-8>* `protocol` *<protocol type>* Selects a pre-defined protocol, as follows: – `decEther2`: DEC Local Area Transport – `ipv4Ether2`: Internet IP (IPv4) – `ipv6Ether2`: IPv6 – `ipx802.2`: Novell IPX 802.2 – `ipx802.3`: Novell IPX 802.3 – `ipxEther2`: Novell IPX – `ipxSnap`: Novell IPX SNAP – `netbios`: NetBIOS 802.2 – `rarpEther2`: Reverse ARP – `sna802.2`: SNA 802.2 – `snaEther2`: IBM SNA Service on Ethernet – `vinesEther2`: Banyan VINES – `xnsEther2`: XNS Compatibility **Command mode:** VLAN
`protocol-vlan` *<1-8>* `priority` *<0-7>* Configures the priority value for this PVLAN. **Command mode:** VLAN
`protocol-vlan` *<1-8>* `member` *<port alias or number>* Adds a port to the selected PVLAN. **Command mode:** VLAN
`no protocol-vlan` *<1-8>* `member` *<port alias or number>* Removes a port from the selected PVLAN. **Command mode:** VLAN
[no] `protocol-vlan` *<1-8>* `tag-pvlan` *<port alias or number>* Defines a port that will be tagged by the selected protocol on this VLAN. **Command mode:** VLAN

Table 246. Protocol VLAN Configuration Options (continued)

Command Syntax and Usage
`protocol-vlan <1-8> enable` Enables the selected protocol on the VLAN. **Command mode:** VLAN
`no protocol-vlan <1-8> enable` Disables the selected protocol on the VLAN. **Command mode:** VLAN
`no protocol-vlan <1-8>` Deletes the selected protocol configuration from the VLAN. **Command mode:** VLAN
`show protocol-vlan <1-8>` Displays current parameters for the selected PVLAN. **Command mode:** All

Private VLAN Configuration

Use the following commands to configure Private VLANs.

Table 247. Private VLAN Options

Command Syntax and Usage
`[no] private-vlan primary` Enables or disables the VLAN type as a Primary VLAN. A Private VLAN must have only one primary VLAN. The primary VLAN carries unidirectional traffic to ports on the isolated VLAN or to community VLAN. **Command mode:** VLAN
`[no] private-vlan community` Enables or disables the VLAN type as a community VLAN. Community VLANs carry upstream traffic from host ports. A Private VLAN may have multiple community VLANs. **Command mode:** VLAN
`[no] private-vlan isolated` Enables or disables the VLAN type as an isolated VLAN. The isolated VLAN carries unidirectional traffic from host ports. A Private VLAN may have only one isolated VLAN. **Command mode:** VLAN
`private-vlan association [add|remove]` *<secondary VLAN list>* Configures Private VLAN mapping between a primary VLAN and secondary VLANs. If no optional parameter is specified, the list of secondary VLANs, replaces the currently associated secondary VLANs. Otherwise: – `add` appends the secondary VLANs to the ones currently associated – `remove` excludes the secondary VLANs from the ones currently associated **Command mode:** VLAN
`private-vlan enable` Enables the private VLAN. **Command mode:** VLAN
`no private-vlan enable` Disables the Private VLAN. **Command mode:** VLAN
`show vlan private-vlan [`*<2-4094>*`]` Displays current parameters for the selected Private VLAN(s). **Command mode:** VLAN

Layer 3 Configuration

The following table describes basic Layer 3 Configuration commands. The following sections provide more detailed information and commands.

Table 248. Layer 3 Configuration Commands

Command Syntax and Usage
`interface ip` *<interface number>* Configures the IP Interface. The G8264 supports up to 126 IP interfaces. However, IP interface 127 and 126 are reserved for switch management. To view command options, see page 354. **Command mode:** Global configuration
`route-map` {*<1-64>*} Enters IP Route Map mode. To view command options, see page 365. **Command mode:** Global configuration
`router rip` Enters the Routing Interface Protocol (RIP) configuration mode. To view command options, see page 370. **Command mode:** Global configuration
`router ospf` Enters OSPF configuration mode. To view command options, see page 374. **Command mode:** Global configuration
`ipv6 router ospf` Enters OSPFv3 configuration mode. To view command options, see page 385. **Command mode:** Global configuration
`router bgp` Enters Border Gateway Protocol (BGP) configuration mode. To view command options, see page 399. **Command mode:** Global configuration
`router vrrp` Enters Virtual Router Redundancy (VRRP) configuration mode. To view command options, see page 433. **Command mode:** Global configuration
`ip pim component` *<1-2>* Enters Protocol Independent Multicast (PIM) component configuration mode. To view command options, see page 442. **Command mode:** Global configuration

Table 248. Layer 3 Configuration Commands (continued)

Command Syntax and Usage
`ip router-id` *<IP address>* Sets the router ID. **Command mode:** Global configuration
`show layer3` Displays the current IP configuration. **Command mode:** All

IP Interface Configuration

The G8264 supports up to 126 IP interfaces. Each IP interface represents the G8264 on an IP subnet on your network. The Interface option is disabled by default.

Interface 127 and interface 126 are reserved for switch management..

Table 249. IP Interface Configuration Options

Command Syntax and Usage
`interface ip` *<interface number>* Enter IP interface mode. **Command mode:** Global configuration
`ip address` *<IP address>* [*<IP netmask>*] Configures the IP address of the switch interface, using dotted decimal notation. **Command mode:** Interface IP
`ip netmask` *<IP netmask>* Configures the IP subnet address mask for the interface, using dotted decimal notation. **Command mode:** Interface IP
`ipv6 address` *<IP address (such as 3001:0:0:0:0:0:abcd:12)>* [`anycast`|`enable`|`no enable`] Configures the IPv6 address of the switch interface, using hexadecimal format with colons. **Command mode:** Interface IP
`ipv6 secaddr6 address` *<IP address (such as 3001:0:0:0:0:0:abcd:12)>* *<prefix length>* [`anycast`] Configures the secondary IPv6 address of the switch interface, using hexadecimal format with colons. **Command mode:** Interface IP
`ipv6 prefixlen` *<IPv6 prefix length (1-128)>* Configures the subnet IPv6 prefix length. The default value is 0 (zero). **Command mode:** Interface IP
`vlan` *<VLAN number>* Configures the VLAN number for this interface. Each interface can belong to one VLAN. **IPv4**: Each VLAN can contain multiple IPv4 interfaces. **IPv6**: Each VLAN can contain only one IPv6 interface. **Command mode:** Interface IP
[`no`] `relay` Enables or disables the BOOTP relay on this interface. The default setting is `enabled`. **Command mode:** Interface IP

Table 249. IP Interface Configuration Options (continued)

Command Syntax and Usage
`[no] ip6host` Enables or disables the IPv6 Host Mode on this interface. The default setting is `disabled` for data interfaces, and `enabled` for the management interface. **Command mode:** Interface IP
`[no] ipv6 unreachables` Enables or disables sending of ICMP Unreachable messages. The default setting is `enabled`. **Command mode:** Interface IP
`enable` Enables this IP interface. **Command mode:** Interface IP
`no enable` Disables this IP interface. **Command mode:** Interface IP
`no interface ip` *<interface number>* Removes this IP interface. **Command mode:** Interface IP
`show interface ip` *<interface number>* Displays the current interface settings. **Command mode:** All

IPv6 Neighbor Discovery Configuration

The following table describes the IPv6 Neighbor Discovery configuration commands.

Table 250. IPv6 Neighbor Discovery Configuration Options

Command Syntax and Usage
[no] `ipv6 nd suppress-ra` Enables or disables IPv6 Router Advertisements on the interface. The default setting is `disabled` (suppress Router Advertisements). **Command mode:** Interface IP
[no] `ipv6 nd managed-config` Enables or disables the managed address configuration flag of the interface. When enabled, the host IP address can be set automatically through DHCP. The default setting is `disabled`. **Command mode:** Interface IP
[no] `ipv6 nd other-config` Enables or disables the other stateful configuration flag, which allows the interface to use DHCP for other stateful configuration. The default setting is `disabled`. **Command mode:** Interface IP
`ipv6 nd ra-lifetime` *<0-9000>* Configures the IPv6 Router Advertisement lifetime interval. The RA lifetime interval must be greater than or equal to the RA maximum interval (`advint`). The default value is 1800 seconds. **Command mode:** Interface IP
[no] `ipv6 nd dad-attempts` *<1-10>* Configures the maximum number of duplicate address detection attempts. The default value is 1. **Command mode:** Interface IP
[no] `ipv6 nd reachable-time` *<1-3600>* [no] `ipv6 nd reachable-time` *<1-3600000>* `ms` Configures the advertised reachability time, in seconds or milliseconds (ms). The default value is 30 seconds. **Command mode:** Interface IP
[no] `ipv6 nd ra-interval` *<4-1800>* Configures the Router Advertisement maximum interval. The default value is 600 seconds. **Note**: Set the maximum RA interval to a value greater than or equal to 4/3 of the minimum RA interval. **Command mode:** Interface IP

Table 250. IPv6 Neighbor Discovery Configuration Options (continued)

Command Syntax and Usage
[no] `ipv6 nd ra-intervalmin` *<3-1800>* Configures the Router Advertisement minimum interval. The default value is 198 seconds. **Note**: Set the minimum RA interval to a value less than or equal to 0.75 of the maximum RA interval. **Command mode:** Interface IP
[no] `ipv6 nd retransmit-time` *<0-4294967>* [no] `ipv6 nd retransmit-time` *<0-4294967295>* `ms` Configures the Router Advertisement re-transmit timer, in seconds or milliseconds (ms). The default value is 1 second. **Command mode:** Interface IP
[no] `ipv6 nd hops-limit` *<0-255>* Configures the Router Advertisement hop limit. The default value is 64. **Command mode:** Interface IP
[no] `ipv6 nd advmtu` Enables or disables the MTU option in Router Advertisements. The default setting is `enabled`. **Command mode:** Interface IP

Default Gateway Configuration

The switch can be configured with up to four IPv4 gateways, as follows:

- Gateway 1 and 2: data traffic
- Gateway 3: management traffic for interface 127
- Gateway 4: management traffic for interface 128

This option is disabled by default.

Table 251. IPv4 Default Gateway Options

Command Syntax and Usage
`ip gateway` *<1-4>* `address` *<IP address>* Configures the IP address of the default IP gateway using dotted decimal notation. **Command mode:** Global configuration
`ip gateway` *<1-4>* `interval` *<0-60>* The switch pings the default gateway to verify that it's up. This command sets the time between health checks. The range is from 0 to 60 seconds. The default is 2 seconds. **Command mode:** Global configuration
`ip gateway` *<1-4>* `retry` *<1-120>* Sets the number of failed health check attempts required before declaring this default gateway inoperative. The range is from 1 to 120 attempts. The default is 8 attempts. **Command mode:** Global configuration
[`no`] `ip gateway` *<1-4>* `arp-health-check` Enables or disables Address Resolution Protocol (ARP) health checks. The default setting is `disabled`. The `arp` option does not apply to management gateways. **Command mode:** Global configuration
`ip gateway` *<1-4>* `enable` Enables the gateway for use. **Command mode:** Global configuration
`no ip gateway` *<1-4>* `enable` Disables the gateway. **Command mode:** Global configuration
`no ip gateway` *<1-4>* Deletes the gateway from the configuration. **Command mode:** Global configuration
`show ip gateway` *<1-4>* Displays the current gateway settings. **Command mode:** All

IPv4 Static Route Configuration

Up to 128 IPv4 static routes can be configured.

Table 252. IPv4 Static Route Configuration Options

Command Syntax and Usage
`ip route` *<IP subnet> <IP netmask> <IP nexthop>* [*<interface number>*] Adds a static route. You will be prompted to enter a destination IP address, destination subnet mask, and gateway address. Enter all addresses using dotted decimal notation. **Command mode:** Global configuration
`no ip route` *<IP subnet> <IP netmask>* [*<interface number>*] Removes a static route. The destination address of the route to remove must be specified using dotted decimal notation. **Command mode:** Global configuration
`no ip route destination-address` *<IP address>* Clears all IP static routes with this destination. **Command mode:** Global configuration
`no ip route gateway` *<IP address>* Clears all IP static routes that use this gateway. **Command mode:** Global configuration
`ip route ecmphash [dipsip] [sip]` Configures ECMP hashing parameters. You may choose one or more of the following parameters: – `dipsip`: Destination IP and source IP address – `sip`: Source IP address **Command mode:** Global configuration
`ip route interval` *<1-60>* Configures the ECMP health-check ping interval, in seconds. The default value is 1 second. **Command mode:** Global configuration
`ip route retries` *<1-60>* Configures the number of ECMP health-check retries. The default value is 3. **Command mode:** Global configuration
`[no] ip route healthcheck` Enables or disables static route health checks. The default setting is `disabled`. **Command mode:** Global configuration
`show ip route static` Displays the current IP static routes. **Command mode:** All

IP Multicast Route Configuration

The following table describes the IP Multicast (IPMC) route commands.

Note: Before you can add an IPMC route, IGMP must be turned on, IGMP Snooping must be enabled, and the required VLANs must be added to IGMP Snooping.

Table 253. IP Multicast Route Configuration Commands

Command Syntax and Usage
`ip mroute` *<IPMC destination> <VLAN number> <port alias or number>*] `[primary|backup|host] [<`*virtual router ID*`>]` Adds a static multicast route. The destination address, VLAN, and member port of the route must be specified. **Command mode:** Global configuration
`no ip mroute` *<IPMC destination> <VLAN number> <port alias or number>* `[primary|backup|host] [<`*virtual router ID*`>]` Removes a static multicast route. The destination address, VLAN, and member port of the route to remove must be specified. **Command mode:** Global configuration
`ip mroute` *<IP address> <VLAN number>* `portchannel` *<trunk group number>* `[primary|backup|host] [<`*virtual router ID*`>]` Adds a static multicast route. The destination address, VLAN, and member trunk group of the route must be specified. **Command mode:** Global configuration
`no ip mroute` *<IP address> <VLAN number>* `portchannel` *<trunk group number>* `[primary|backup|host] [<`*virtual router ID*`>]` Removes a static multicast route. The destination address, VLAN, and member trunk group of the route to remove must be specified. **Command mode:** Global configuration
`ip mroute` *<IP address> <VLAN number>* `adminkey` *<1-65535>* `[primary|backup|host]` [<*virtual router ID*>`|none`] Adds a static multicast route. The destination address, VLAN, and LACP *admin key* of the route must be specified. **Command mode:** Global configuration
`no ip mroute` *<IP address> <VLAN number>* `adminkey` *<1-65535>* `[primary|backup|host]` [<*virtual router ID*>`|none`] Removes a static multicast route. The destination address, VLAN, and LACP *admin key* of the route to remove must be specified. **Command mode:** Global configuration

Table 253. IP Multicast Route Configuration Commands

Command Syntax and Usage
`no ip mroute all` Removes all the static multicast routes configured. **Command mode:** Global configuration
`show ip mroute` Displays the current IP multicast routes. **Command mode:** All except User EXEC

ARP Configuration

Address Resolution Protocol (ARP) is the TCP/IP protocol that resides within the Internet layer. ARP resolves a physical address from an IP address. ARP queries machines on the local network for their physical addresses. ARP also maintains IP to physical address pairs in its cache memory. In any IP communication, the ARP cache is consulted to see if the IP address of the computer or the router is present in the ARP cache. Then the corresponding physical address is used to send a packet.

Table 254. ARP Configuration Options

Command Syntax and Usage
`ip arp rearp` *<2-120>* Defines re-ARP period, in minutes, for entries in the switch arp table. When ARP entries reach this value the switch will re-ARP for the address to attempt to refresh the ARP cache. The default value is 5 minutes. **Command mode:** Global configuration
`show ip arp` Displays the current ARP configurations. **Command mode:** All except User EXEC

ARP Static Configuration

Static ARP entries are permanent in the ARP cache and do not age out like the ARP entries that are learned dynamically. Static ARP entries enable the switch to reach the hosts without sending an ARP broadcast request to the network. Static ARPs are also useful to communicate with devices that do not respond to ARP requests. Static ARPs can also be configured on some gateways as a protection against malicious ARP Cache corruption and possible DOS attacks.

Table 255. ARP Static Configuration Options

Command Syntax and Usage
`ip arp` *<IP address> <MAC address>* `vlan` *<vlan number>* `port` *<port alias or number>* Adds a permanent ARP entry. **Command mode:** Global configuration
`ip arp` *<destination unicast IP address> <destination multicast MAC address>* `vlan` *<cluster vlan number>* Adds a static multicast ARP entry for Network Load Balancing (NLB). **Command mode:** Global configuration
`no ip arp` *<IP address>* Deletes a permanent ARP entry. **Command mode:** Global configuration
`no ip arp all` Deletes all static ARP entries. **Command mode:** Global configuration
`show ip arp static` Displays current static ARP configuration. **Command mode:** All

IP Forwarding Configuration

Table 256. IP Forwarding Configuration Options

Command Syntax and Usage
`[no] ip routing directed-broadcasts` Enables or disables forwarding directed broadcasts. The default setting is `disabled`. **Command mode:** Global configuration
`[no] ip routing no-icmp-redirect` Enables or disables ICMP re-directs. The default setting is `disabled`. **Command mode:** Global configuration
`[no] ip routing icmp6-redirect` Enables or disables IPv6 ICMP re-directs. The default setting is `disabled`. **Command mode:** Global configuration
`ip routing` Enables IP forwarding (routing) on the G8264. Forwarding is turned on by default. **Command mode:** Global configuration
`no ip routing` Disables IP forwarding (routing) on the G8264. **Command mode:** Global configuration
`show ip routing` Displays the current IP forwarding settings. **Command mode:** All except User EXEC

Network Filter Configuration

Table 257. IP Network Filter Configuration Options

Command Syntax and Usage
`ip match-address` *<1-256> <IP address> <IP netmask>* Sets the starting IP address and IP Netmask for this filter to define the range of IP addresses that will be accepted by the peer when the filter is enabled. The default address is `0.0.0.0 0.0.0.0` **Command mode:** Global configuration.
`ip match-address` *<1-256>* `enable` Enables the Network Filter configuration. **Command mode:** Global configuration
`no ip match-address` *<1-256>* `enable` Disables the Network Filter configuration. **Command mode:** Global configuration
`no ip match-address` *<1-256>* Deletes the Network Filter configuration. **Command mode:** Global configuration
`show ip match-address` [*<1-256>*] Displays the current the Network Filter configuration. **Command mode:** All except User EXEC

Routing Map Configuration

Note: The *map number* (1-64) represents the routing map you wish to configure.

Routing maps control and modify routing information.

Table 258. Routing Map Configuration Options

Command Syntax and Usage
`route-map` *<1-64>* Enter route map configuration mode. **Command mode:** Global configuration
[no] `access-list` *<1-32>* Configures the Access List. **Command mode:** Route map For more information, see page 367.
[no] `as-path-list` *<1-8>* Configures the Autonomous System (AS) Filter. **Command mode:** Route map For more information, see page 369.
[no] `as-path-preference` *<1-65535>* Sets the AS path preference of the matched route. You can configure up to three path preferences. **Command mode:** Route map
[no] `local-preference` *<0-4294967294>* Sets the local preference of the matched route, which affects both inbound and outbound directions. The path with the higher preference is preferred. **Command mode:** Route map
[no] `metric` *<1-4294967294>* Sets the metric of the matched route. **Command mode:** Route map
[no] `metric-type {1|2}` Assigns the type of OSPF metric. The default is type 1. – **Type 1**—External routes are calculated using both internal and external metrics. – **Type 2**—External routes are calculated using only the external metrics. Type 1 routes have more cost than Type 2. – `none`—Removes the OSPF metric. **Command mode:** Route map
`precedence` *<1-255>* Sets the precedence of the route map. The smaller the value, the higher the precedence. Default value is 10. **Command mode:** Route map

Table 258. Routing Map Configuration Options (continued)

Command Syntax and Usage
[no] weight *<0-65534>* Sets the weight of the route map. **Command mode:** Route map
enable Enables the route map. **Command mode:** Route map
no enable Disables the route map. **Command mode:** Route map
no route-map *<1-64>* Deletes the route map. **Command mode:** Route map
show route-map [*<1-255>*] Displays the current route configuration. **Command mode:** All except User EXEC

IP Access List Configuration

Note: The *route map number (*1-64) and the *access list number* (1-32) represent the IP access list you wish to configure.

Table 259. IP Access List Configuration Options

Command Syntax and Usage
[no] access-list <*1-32*> match-address <*1-256*> Sets the network filter number. **Command mode:** Route map See "Network Filter Configuration" on page 364 for details.
[no] access-list <*1-32*> metric <*1-4294967294*> Sets the metric value in the AS-External (ASE) LSA. **Command mode:** Route map
access-list <*1-32*> action {permit|deny} Permits or denies action for the access list. **Command mode:** Route map
access-list <*1-32*> enable Enables the access list. **Command mode:** Route map
no access-list <*1-32*> enable Disables the access list. **Command mode:** Route map
[no] access-list <*1-32*> match-access-control <*1-640*> Sets the network filter number. **Command mode:** Route map
no access-list <*1-32*> Deletes the access list. **Command mode:** Route map
show route-map <*1-64*> access-list <*1-32*> Displays the current Access List configuration. **Command mode:** All

Policy-Based Routing Configuration

Use the following commands to set up policy-based routing.

Note: Multiple access lists can be entered separated by a comma (for example, "2,5,17"); a range of access lists can be entered using a hyphen (such as "2-23").

Table 260. IP Next Hop Configuration Options

Command Syntax and Usage
[no] set ip next-hop *<IPv4_addresses>* access-list *<1-32>* Sets the IP addresses for the next-hop to which packets are forwarded for each specified access list. When multiple addresses are specified they are prioritized in the order in which they are entered. Each next-hop must be an adjacent router. Use the no form of the command to remove the entry. **Command mode:** Route map
[no] set ip next-hop verify-ability *<IPv4_address>* *<sequence (1-255)>* [arp | icmp] [interval *<1-60>*] [retry *<1-3>*] [access-list *<1-32>*] Performs health-checking on and inserts the next hop IP address at the specified place (*sequence*) in the specified access list using ARP or ICMP as the tracking protocol. If not successful, the command will retry the health check at regular intervals of the specified number of seconds for the number of retries specified by retry. Use the no form of the command to remove the entry. Default values are arp, 2 seconds, and 3 retries. **Note:** This command overrides the "set ip next-hop *<IPv4_address>*" command. **Command mode:** Route map
[no] set ip next-hop peer-address Applied on output, sets the next-hop to the current peer address. Applied on input, sets the next-hop to the neighbor address. Use the no form of the command to remove the entry. **Command mode:** Route map
[no] set ip precedence *<precedence_value>* [access-list *<1-32>*] Sets the IP precedence value in the IP header for packets that match route map policy. **Command mode:** Route map
[no] set ip dscp *<0-63>* [access-list *<1-32>*] Sets the IP DSCP value in the IP header for packets that match route map policy. **Command mode:** Route map
[no] ip policy route-map *<1-255>* Applies the route map to an IP interface that has a VLAN configured. **Command mode:** Interface IP

Table 260. IP Next Hop Configuration Options

Command Syntax and Usage
`show route-map <1-255>` Displays the current route map configuration. **Command mode:** All
`show route-map <1-255> access-list <1-32>` Displays the current Access List configuration. **Command mode:** All
`show ip policy` Displays the current routing policy information. **Command mode:** All
`show ip policy statistics` Displays statistics for the current routing policy. **Command mode:** All

Autonomous System Filter Path Configuration

Note: The *rmap number* and the *path number* represent the AS path you wish to configure.

Table 261. AS Filter Configuration Options

Command Syntax and Usage
`as-path-list <1-8> as-path <1-65535>` Sets the Autonomous System filter's path number. **Command mode:** Route map
`as-path-list <1-8> action {permit|deny}` Permits or denies Autonomous System filter action. **Command mode:** Route map
`as-path-list <1-8> enable` Enables the Autonomous System filter. **Command mode:** Route map
`no as-path-list <1-8> enable` Disables the Autonomous System filter. **Command mode:** Route map

Table 261. AS Filter Configuration Options

Command Syntax and Usage
`no as-path-list` *<1-8>* Deletes the Autonomous System filter. **Command mode:** Route map
`show route-map` *<1-64>* `as-path-list` *<1-8>* Displays the current Autonomous System filter configuration. **Command mode:** All

Routing Information Protocol Configuration

RIP commands are used for configuring Routing Information Protocol parameters. This option is turned off by default.

Table 262. Routing Information Protocol Options

Command Syntax and Usage
`router rip` Enter Router RIP configuration mode. **Command mode:** Router RIP
`timers update` *<1-120>* Configures the time interval for sending for RIP table updates, in seconds. The default value is 30 seconds. **Command mode:** Router RIP
`enable` Globally turns RIP `on`. **Command mode:** Router RIP
`no enable` Globally turns RIP `off`. **Command mode:** Router RIP
`show ip rip` Displays the current RIP configuration. **Command mode:** All except User EXEC

Routing Information Protocol Interface Configuration

The RIP Interface commands are used for configuring Routing Information Protocol parameters for the selected interface.

Note: Do not configure RIP version 1 parameters if your routing equipment uses RIP version 2.

Table 263. RIP Interface Options

Command Syntax and Usage
`ip rip version {1|2|both}` Configures the RIP version used by this interface. The default value is version `2`. **Command mode:** Interface IP
`[no] ip rip supply` When enabled, the switch supplies routes to other routers. The default value is `enabled`. **Command mode:** Interface IP
`[no] ip rip listen` When enabled, the switch learns routes from other routers. The default value is `enabled`. **Command mode:** Interface IP
`[no] ip rip poison` When enabled, the switch uses split horizon with poisoned reverse. When disabled, the switch uses only split horizon. The default value is `disabled`. **Command mode:** Interface IP
`[no] ip rip split-horizon` Enables or disables split horizon. The default value is `enabled`. **Command mode:** Interface IP
`[no] ip rip triggered` Enables or disables Triggered Updates. Triggered Updates are used to speed convergence. When enabled, Triggered Updates force a router to send update messages immediately, even if it is not yet time for the update message. The default value is `enabled`. **Command mode:** Interface IP
`[no] ip rip multicast-updates` Enables or disables multicast updates of the routing table (using address 224.0.0.9). The default value is `enabled`. **Command mode:** Interface IP
`[no] ip rip default-action {listen|supply|both}` When enabled, the switch accepts RIP default routes from other routers, but gives them lower priority than configured default gateways. When disabled, the switch rejects RIP default routes. The default value is `none`. **Command mode:** Interface IP

Table 263. RIP Interface Options (continued)

Command Syntax and Usage
`[no] ip rip metric [`*<1-15>*`]` Configures the route metric, which indicates the relative distance to the destination. The default value is 1. **Command mode:** Interface IP
`[no] ip rip authentication type [`*<password>*`]` Configures the authentication type. The default is `none`. **Command mode:** Interface IP
`[no] ip rip authentication key` *<password>* Configures the authentication key password. **Command mode:** Interface IP
`ip rip enable` Enables this RIP interface. **Command mode:** Interface IP
`no ip rip enable` Disables this RIP interface. **Command mode:** Interface IP
`show interface ip` *<interface number>* `rip` Displays the current RIP configuration. **Command mode:** All

RIP Route Redistribution Configuration

The following table describes the RIP Route Redistribution commands.

Table 264. RIP Redistribution Options

Command Syntax and Usage
`redistribute {fixed|static|ospf|eospf|ebgp|ibgp}` *<1-64>* Adds selected routing maps to the RIP route redistribution list. To add specific route maps, enter routing map numbers, separated by a comma (,). To add all 64 route maps, type `all`. The routes of the redistribution protocol matched by the route maps in the route redistribution list will be redistributed. **Command mode:** Router RIP
`no redistribute {fixed|static|ospf|eospf|ebgp|ibgp}` *<1-64>* Removes the route map from the RIP route redistribution list. To remove specific route maps, enter routing map numbers, separated by a comma (,). To remove all 64 route maps, type `all`. **Command mode:** Router RIP
`redistribute {fixed|static|ospf|eospf|ebgp|ibgp} export` *<1-15>* Exports the routes of this protocol in which the metric and metric type are specified. To remove a previous configuration and stop exporting the routes of the protocol, enter `none`. **Command mode:** Router RIP
`show ip rip redistribute` Displays the current RIP route redistribute configuration. **Command mode:** All

Open Shortest Path First Configuration

Table 265. OSPF Configuration Options

Command Syntax and Usage
`router ospf` Enter Router OSPF configuration mode. **Command mode:** Global configuration
`area-range` *<1-16>* Configures summary routes for up to 16 IP addresses. See page 378 to view command options. **Command mode:** Router OSPF
`ip ospf` *<1-126>* Configures the OSPF interface. See page 379 to view command options. **Command mode:** Interface IP
`area-virtual-link` *<1-3>* Configures the Virtual Links used to configure OSPF for a Virtual Link. See page 381 to view command options. **Command mode:** Router OSPF
`message-digest-key` *<1-255>* `md5-key` *<text string>* Assigns a string to MD5 authentication key. **Command mode:** Router OSPF
`host` *<1-128>* Configures OSPF for the host routes. Up to 128 host routes can be configured. Host routes are used for advertising network device IP addresses to external networks to perform server load balancing within OSPF. It also makes Area Border Route (ABR) load sharing and ABR failover possible. See page 383 to view command options. **Command mode:** Router OSPF
`lsdb-limit` *<LSDB limit (0-16384, 0 for no limit)>* Sets the link state database limit. **Command mode:** Router OSPF
`[no] default-information` *<1-16777214>* {*<AS external metric type (1-2)>*} Sets one default route among multiple choices in an area. Use `none` for no default. **Command mode:** Router OSPF

Table 265. OSPF Configuration Options (continued)

Command Syntax and Usage
`enable` Enables OSPF on the G8264. **Command mode:** Router OSPF
`no enable` Disables OSPF on the G8264. **Command mode:** Router OSPF
`show ip ospf` Displays the current OSPF configuration settings. **Command mode:** All except User EXEC

Area Index Configuration

Table 266. Area Index Configuration Options

Command Syntax and Usage
`area` *<0-5>* `area-id` *<IP address>* Defines the IP address of the OSPF area number. **Command mode:** Router OSPF
`area` *<0-5>* `type {transit|stub|nssa}` Defines the type of area. For example, when a virtual link has to be established with the backbone, the area type must be defined as transit. – **Transit area:** allows area summary information to be exchanged between routing devices. Any area that is not a stub area or NSSA is considered to be transit area. – **Stub area:** is an area where external routing information is not distributed. Typically, a stub area is connected to only one other area. – **NSSA:** Not-So-Stubby Area (NSSA) is similar to stub area with additional capabilities. For example, routes originating from within the NSSA can be propagated to adjacent transit and backbone areas. **Command mode:** Router OSPF
`area` *<0-5>* `stub-metric` *<1-65535>* Configures a stub area to send a numeric metric value. All routes received via that stub area carry the configured metric to potentially influencing routing decisions. Metric value assigns the priority for choosing the switch for default route. Metric type determines the method for influencing routing decisions for external routes. **Command mode:** Router OSPF
`[no] area` *<0-5>* `authentication-type {password|md5}` **None:** No authentication required. **Password:** Authenticates simple passwords so that only trusted routing devices can participate. **MD5:** This parameter is used when MD5 cryptographic authentication is required. **Command mode:** Router OSPF
`area` *<0-5>* `spf-interval` *<1-255>* Configures the minimum time interval, in seconds, between two successive SPF (shortest path first) calculations of the shortest path tree using the Dijkstra’s algorithm. The default value is 10 seconds. **Command mode:** Router OSPF
`area` *<0-5>* `enable` Enables the OSPF area. **Command mode:** Router OSPF

Table 266. Area Index Configuration Options (continued)

Command Syntax and Usage
`no area <0-5> enable` Disables the OSPF area. **Command mode:** Router OSPF
`no area <0-5>` Deletes the OSPF area. **Command mode:** Router OSPF
`show ip ospf area <0-5>` Displays the current OSPF configuration. **Command mode:** All except User EXEC

OSPF Summary Range Configuration

Table 267. OSPF Summary Range Configuration Options

Command Syntax and Usage
`area-range` *<1-16>* `address` *<IP address> <IP netmask>* Displays the base IP address or the IP address mask for the range. **Command mode:** Router OSPF
`area-range` *<1-16>* `area` *<0-5>* Displays the area index used by the G8264. **Command mode:** Router OSPF
[`no`] `area-range` *<1-16>* `hide` Hides the OSPF summary range. **Command mode:** Router OSPF
`area-range` *<1-16>* `enable` Enables the OSPF summary range. **Command mode:** Router OSPF
`no area-range` *<1-16>* `enable` Disables the OSPF summary range. **Command mode:** Router OSPF
`no area-range` *<1-16>* Deletes the OSPF summary range. **Command mode:** Router OSPF
`show ip ospf area-range` *<1-16>* Displays the current OSPF summary range. **Command mode:** Router OSPF

OSPF Interface Configuration

Table 268. OSPF Interface Configuration Options

Command Syntax and Usage
`ip ospf area` *<0-5>* Configures the OSPF area index. **Command mode:** Interface IP
`ip ospf priority` *<0-255>* Configures the priority value for the G8264's OSPF interfaces. A priority value of 255 is the highest and 1 is the lowest. A priority value of 0 specifies that the interface cannot be used as Designated Router (DR) or Backup Designated Router (BDR). **Command mode:** Interface IP
`ip ospf cost` *<1-65535>* Configures cost set for the selected path—preferred or backup. Usually the cost is inversely proportional to the bandwidth of the interface. Low cost indicates high bandwidth. **Command mode:** Interface IP
`ip ospf hello-interval` *<1-65535>* `ip ospf hello-interval` *<50-65535ms>* Configures the interval, in seconds or milliseconds, between the `hello` packets for the interfaces. **Command mode:** Interface IP
`ip ospf dead-interval` *<1-65535>* `ip ospf dead-interval` *<1000-65535ms>* Configures the health parameters of a `hello` packet, in seconds or milliseconds, before declaring a silent router to be down. **Command mode:** Interface IP
`ip ospf transit-delay` *<1-3600>* Configures the transit delay in seconds. **Command mode:** Interface IP
`ip ospf retransmit-interval` *<1-3600>* Configures the retransmit interval in seconds. **Command mode:** Interface IP
[no] `ip ospf key` *<key string>* Sets the authentication key to clear the password. **Command mode:** Interface IP

Table 268. OSPF Interface Configuration Options (continued)

Command Syntax and Usage
`[no] ip ospf message-digest-key <1-255>` Assigns an MD5 key to the interface. **Command mode:** Interface IP
`[no] ip ospf passive-interface` Sets the interface as passive. On a passive interface, you can disable OSPF protocol exchanges, but the router advertises the interface in its LSAs so that IP connectivity to the attached network segment will be established. **Command mode:** Interface IP
`[no] ip ospf point-to-point` Sets the interface as point-to-point. **Command mode:** Interface IP
`ip ospf enable` Enables OSPF interface. **Command mode:** Interface IP
`no ip ospf enable` Disables OSPF interface. **Command mode:** Interface IP
`no ip ospf` Deletes the OSPF interface. **Command mode:** Interface IP
`show interface ip <interface number> ospf` Displays the current settings for OSPF interface. **Command mode:** All except User EXEC

OSPF Virtual Link Configuration

Table 269. OSPF Virtual Link Configuration Options

Command Syntax and Usage
`area-virtual-link` *<1-3>* `area` *<0-5>* Configures the OSPF area index for the virtual link. **Command mode:** Router OSPF
`area-virtual-link` *<1-3>* `hello-interval` *<1-65535>* `area-virtual-link` *<1-3>* `hello-interval` *<50-65535ms>* Configures the authentication parameters of a hello packet, in seconds or milliseconds. The default value is 10 seconds. **Command mode:** Router OSPF
`area-virtual-link` *<1-3>* `dead-interval` *<1-65535>* `area-virtual-link` *<1-3>* `dead-interval` *<1000-65535ms>* Configures the health parameters of a hello packet, in seconds or milliseconds. The default value is 40 seconds. **Command mode:** Router OSPF
`area-virtual-link` *<1-3>* `transit-delay` *<1-3600>* Configures the delay in transit, in seconds. The default value is one second. **Command mode:** Router OSPF
`area-virtual-link` *<1-3>* `retransmit-interval` *<1-3600>* Configures the retransmit interval, in seconds. The default value is five seconds. **Command mode:** Router OSPF
`area-virtual-link` *<1-3>* `neighbor-router` *<IP address>* Configures the router ID of the virtual neighbor. The default value is 0.0.0.0. **Command mode:** Router OSPF
[no] `area-virtual-link` *<1-3>* `key` *<password>* Configures the password (up to eight characters) for each virtual link. The default setting is `none`. **Command mode:** Router OSPF
`area-virtual-link` *<1-3>* `message-digest-key` *<1-255>* Sets MD5 key ID for each virtual link. The default setting is `none`. **Command mode:** Router OSPF
`area-virtual-link` *<1-3>* `enable` Enables OSPF virtual link. **Command mode:** Router OSPF

Table 269. OSPF Virtual Link Configuration Options (continued)

Command Syntax and Usage
`no area-virtual-link` *<1-3>* `enable` Disables OSPF virtual link. **Command mode:** Router OSPF
`no area-virtual-link` *<1-3>* Deletes OSPF virtual link. **Command mode:** Router OSPF
`show ip ospf area-virtual-link` *<1-3>* Displays the current OSPF virtual link settings. **Command mode:** All except User EXEC

OSPF Host Entry Configuration

Table 270. OSPF Host Entry Configuration Options

Command Syntax and Usage
`host` *<1-128>* `address` *<IP address>* Configures the base IP address for the host entry. **Command mode:** Router OSPF
`host` *<1-128>* `area` *<0-5>* Configures the area index of the host. **Command mode:** Router OSPF
`host` *<1-128>* `cost` *<1-65535>* Configures the cost value of the host. **Command mode:** Router OSPF
`host` *<1-128>* `enable` Enables OSPF host entry. **Command mode:** Router OSPF
`no host` *<1-128>* `enable` Disables OSPF host entry. **Command mode:** Router OSPF
`no host` *<1-128>* Deletes OSPF host entry. **Command mode:** Router OSPF
`show ip ospf host` *<1-128>* Displays the current OSPF host entries. **Command mode:** All except User EXEC

OSPF Route Redistribution Configuration

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Table 271. OSPF Route Redistribution Configuration Options

Command Syntax and Usage
`redistribute {fixed|static|rip|ebgp|ibgp}` *<rmap ID (1-64)>* Adds selected routing map to the rmap list. This option adds a route map to the route redistribution list. The routes of the redistribution protocol matched by the route maps in the route redistribution list will be redistributed. **Command mode:** Router OSPF
`no redistribute {fixed|static|rip|ebgp|ibgp}` *<rmap ID (1-64)>* Removes the route map from the route redistribution list. Removes routing maps from the `rmap` list. **Command mode:** Router OSPF
`[no] redistribute {fixed|static|rip|ebgp|ibgp} export metric` *<1-16777214>* `metric-type {type1|type2}` Exports the routes of this protocol as external OSPF AS-external LSAs in which the metric and metric type are specified. To remove a previous configuration and stop exporting the routes of the protocol, enter `none`. **Command mode:** Router OSPF
`show ip ospf redistribute` Displays the current route map settings. **Command mode:** All except User EXEC

OSPF MD5 Key Configuration

Table 272. OSPF MD5 Key Options

Command Syntax and Usage
`message-digest-key` *<1-255>* `md5-key` *<1-16 characters>* Sets the authentication key for this OSPF packet. **Command mode:** Router OSPF
`no message-digest-key` *<1-255>* Deletes the authentication key for this OSPF packet. **Command mode:** Router OSPF
`show ip ospf message-digest-key` *<1-255>* Displays the current MD5 key configuration. **Command mode:** All except User EXEC

Open Shortest Path First Version 3 Configuration

Table 273. OSPFv3 Configuration Options

Command Syntax and Usage
`[no] ipv6 router ospf` Enter OSPFv3 configuration mode. Enables or disables OSPFv3 routing protocol. **Command mode**: Global configuration
`abr-type [standard|cisco|ibm]` Configures the Area Border Router (ABR) type, as follows: – Standard – Cisco – IBM The default setting is `standard`. **Command mode**: Router OSPF3
`as-external lsdb-limit` *<LSDB limit (0-2147483647, -1 for no limit)>* Sets the link state database limit. **Command mode**: Router OSPF3
`exit-overflow-interval` *<0-4294967295>* Configures the number of seconds that a router takes to exit Overflow State. The default value is 0 (zero). **Command mode**: Router OSPF3

`neighbor` *<1-256>* `{address` *<IPv6 address>*`|enable|interface` *<1-126>*`|`
`priority` *<0-255>*`}`
Configures directly reachable routers over non-broadcast networks.This is required for non-broadcast multiple access (NBMA) networks and optional for Point-to-Multipoint networks.
– `address` configures the neighbor’s IPv6 address
– `enable` activates a previously disabled neighbor
– `interface` configures the OSPFv3 interface used for the neighbor entry
– `priority` configures the priority value used for the neighbor entry. A priority value of 255 is the highest and 1 is the lowest. A priority value of 0 specifies that the neighbor cannot be used as Designated Router. The default value is 1.
Command mode: Router OSPF3

`no neighbor` *<1-256>* `[enable]` Deletes the neighbor entry. Using the `enable` option only disables the neighbor, while preserving it’s settings. **Command mode**: Router OSPF3

Table 273. OSPFv3 Configuration Options (continued)

Command Syntax and Usage
`reference-bandwidth` *<0-4294967295>* Configures the reference bandwidth, in kilobits per second, used to calculate the default interface metric. The default value is 100,000. **Command mode**: Router OSPF3
`timers spf` {*<SPF delay (0-65535)>*} {*<SPF hold time (0-65535)>*} Configures the number of seconds that SPF calculation is delayed after a topology change message is received. The default value is 5. Configures the number of seconds between SPF calculations. The default value is 10. **Command mode**: Router OSPF3
`router-id` *<IPv4 address>* Defines the router ID. **Command mode**: Router OSPF3
`[no] nssaAsbrDfRtTrans` Enables or disables setting of the P-bit in the default Type 7 LSA generated by an NSSA internal ASBR. The default setting is `disabled`. **Command mode**: Router OSPF3
`enable` Enables OSPFv3 on the switch. **Command mode**: Router OSPF3
`no enable` Disables OSPFv3 on the switch. **Command mode**: Router OSPF3
`show ipv6 ospf` Displays the current OSPF configuration settings. **Command mode**: All

OSPFv3 Area Index Configuration

Table 274. OSPFv3 Area Index Configuration Options

Command Syntax and Usage
`area` *<area index>* `area-id` *<IP address>* Defines the IP address of the OSPFv3 area number. **Command mode**: Router OSPF3
`area` *<area index>* `type {transit|stub|nssa} {no-summary}` Defines the type of area. For example, when a virtual link has to be established with the backbone, the area type must be defined as transit. **Transit area:** allows area summary information to be exchanged between routing devices. Any area that is not a stub area or NSSA is considered to be transit area. **Stub area:** is an area where external routing information is not distributed. Typically, a stub area is connected to only one other area. **NSSA:** Not-So-Stubby Area (NSSA) is similar to stub area with additional capabilities. For example, routes originating from within the NSSA can be propagated to adjacent transit and backbone areas. External routes from outside the Autonomous System (AS) can be advertised within the NSSA but are not distributed into other areas. Enables or disables the no-summary option. When enabled, the area-border router neither originates nor propagates Inter-Area-Prefix LSAs into stub/NSSA areas. Instead it generates a default Inter-Area-Prefix LSA. The default setting is `disabled`. **Command mode**: Router OSPF3
`area` *<area index>* `default-metric` *<metric value (1-16777215)>* Configures the cost for the default summary route in a stub area or NSSA. **Command mode**: Router OSPF3
`area` *<area index>* `default-metric type` *<1-3>* Configures the default metric type applied to the route. This command applies only to area type of Stub/NSSA. **Command mode**: Router OSPF3
`area` *<area index>* `stability-interval` *<1-255>* Configures the stability interval for an NSSA, in seconds. When the interval expires, an elected translator determines that its services are no longer required. The default value is 40. **Command mode**: Router OSPF3

Table 274. *OSPFv3 Area Index Configuration Options (continued)*

Command Syntax and Usage
`area <area index> translation-role always|candidate` Configures the translation role for an NSSA area, as follows: – Always: Type 7 LSAs are always translated into Type 5 LSAs. – Candidate: An NSSA border router participates in the translator election process. The default setting is `candidate`. **Command mode**: Router OSPF3
`area <area index> enable` Enables the OSPF area. **Command mode**: Router OSPF3
`area <area index> no enable` Disables the OSPF area. **Command mode**: Router OSPF3
`no area <area index>` Deletes the OSPF area. **Command mode**: Router OSPF3
`show ipv6 ospf areas` Displays the current OSPFv3 area configuration. **Command mode**: All

OSPFv3 Summary Range Configuration

Table 275. OSPFv3 Summary Range Configuration Options

Command Syntax and Usage
`area-range` *<1-16>* `address` *<IPv6 address> <prefix length (1-128)>* Configures the base IPv6 address and subnet prefix length for the range. **Command mode**: Router OSPF3
`area-range` *<1-16>* `area` *<area index (0-2)>* Configures the area index used by the switch. **Command mode**: Router OSPF3
`area-range` *<1-16>* `lsa-type summary|Type7` Configures the LSA type, as follows: – Summary LSA – Type7 LSA **Command mode**: Router OSPF3
`area-range` *<1-16>* `tag` *<0-4294967295>* Configures the route tag. **Command mode**: Router OSPF3
`[no] area-range` *<1-16>* `hide` Hides the OSPFv3 summary range. **Command mode**: Router OSPF3
`area-range` *<1-16>* `enable` Enables the OSPFv3 summary range. **Command mode**: Router OSPF3
`area-range` *<1-16>* `no enable` Disables the OSPFv3 summary range. **Command mode**: Router OSPF3
`no area-range` *<1-16>* Deletes the OSPFv3 summary range. **Command mode**: Router OSPF3
`show ipv6 ospf area-range` Displays the current OSPFv3 summary range. **Command mode**: All

OSPFv3 AS-External Range Configuration

Table 276. OSPFv3 AS_External Range Configuration Options

Command Syntax and Usage
`summary-prefix` *<1-16>* `address` *<IPv6 address> <IPv6 prefix length (1-128)>* Configures the base IPv6 address and the subnet prefix length for the range. **Command mode**: Router OSPF3
`summary-prefix` *<1-16>* `area` *<area index (0-2)>* Configures the area index used by the switch. **Command mode**: Router OSPF3
`summary-prefix` *<1-16>* `aggregation-effect {allowAll|denyAll|advertise|not-advertise}` Configures the aggregation effect, as follows: – `allowAll`: If the area ID is 0.0.0.0, aggregated Type-5 LSAs are generated. Aggregated Type-7 LSAs are generated in all the attached NSSAs for the range. – `denyAll`: Type-5 and Type-7 LSAs are not generated. – `advertise`: If the area ID is 0.0.0.0, aggregated Type-5 LSAs are generated. For other area IDs, aggregated Type-7 LSAs are generated in the NSSA area. – `not-advertise`: If the area ID is 0.0.0.0, Type-5 LSAs are not generated, while all NSSA LSAs within the range are cleared and aggregated Type-7 LSAs are generated for all NSSAs. For other area IDs, aggregated Type-7 LSAs are not generated in the NSSA area. **Command mode**: Router OSPF3
`[no] summary-prefix` *<1-16>* `translation` When enabled, the P-bit is set in the generated Type-7 LSA. When disabled, the P-bit is cleared. The default setting is `disabled`. **Command mode**: Router OSPF3
`summary-prefix` *<1-16>* `enable` Enables the OSPFv3 AS-external range. **Command mode**: Router OSPF3
`summary-prefix` *<1-16>* `no enable` Disables the OSPFv3 AS-external range. **Command mode**: Router OSPF3
`no summary-prefix` *<1-16>* Deletes the OSPFv3 AS-external range. **Command mode**: Router OSPF3
`show ipv6 ospf summary-prefix` *<1-16>* Displays the current OSPFv3 AS-external range. **Command mode**: All

OSPFv3 Interface Configuration

Table 277. OSPFv3 Interface Configuration Options

Command Syntax and Usage
`interface ip` *<interface number>* Enter Interface IP mode, from Global Configuration mode. **Command mode**: Global configuration
`ipv6 ospf area` *<area index (0-2)>* Configures the OSPFv3 area index. **Command mode**: Interface IP
`ipv6 ospf area` *<area index (0-2)>* `instance` *<0-255>* Configures the instance ID for the interface. **Command mode**: Interface IP
`[no] ipv6 ospf priority` *<priority value (0-255)>* Configures the priority value for the switch’s OSPFv3 interface. A priority value of 255 is the highest and 1 is the lowest. A priority value of 0 specifies that the interface cannot be used as Designated Router (DR). **Command mode**: Interface IP
`[no] ipv6 ospf cost` *<1-65535>* Configures the metric value for sending a packet on the interface. **Command mode**: Interface IP
`[no] ipv6 ospf hello-interval` *<1-65535>* Configures the indicated interval, in seconds, between the `hello` packets, that the router sends on the interface. **Command mode**: Interface IP
`[no] ipv6 ospf linklsasuppress` Enables or disables Link LSA suppression. When suppressed, no Link LSAs are originated. Default setting is disabled. **Command mode**: Interface IP

Table 277. OSPFv3 Interface Configuration Options (continued)

Command Syntax and Usage
`ipv6 ospf network {broadcast|non-broadcast|pint-to-multipoint| point-to-point}` Configures the network type for the OSPFv3 interface: – `broadcast`: network where all routers use the broadcast capability – `non-broadcast`: non-broadcast multiple access (NBMA) network supporting pseudo-broadcast (multicast and broadcast traffic is configured manually) – `point-to-multipoint`: network where multiple point-to-point links are set up on the same interface – `point-to-point`: network that joins a single pair of routers The default value is `broadcast`. **Command mode**: Interface IP
`ipv6 ospf poll-interval` *<0-4294967295>* Configures the poll interval in seconds for neighbors in NBMA networks. Default value is 120. **Command mode**: Interface IP
`no ipv6 ospf poll-interval` Configures the poll interval in seconds for neighbors in NBMA and point-to-multipoint networks to its default 120 seconds value. **Command mode**: Interface IP
`[no] ipv6 ospf dead-interval` *<1-65535>* Configures the time period, in seconds, for which the router waits for `hello` packet from the neighbor before declaring this neighbor down. **Command mode**: Interface IP
`[no] ipv6 ospf transmit-delay` *<1-1800>* Configures the estimated time, in seconds, taken to transmit LS update packet over this interface. **Command mode**: Interface IP
`[no] ipv6 ospf retransmit-interval` *<1-1800>* Configures the interval in seconds, between LSA retransmissions for adjacencies belonging to interface. **Command mode**: Interface IP
`[no] ipv6 ospf passive-interface` Enables or disables the `passive` setting on the interface. On a passive interface, OSPFv3 protocol packets are suppressed. **Command mode**: Interface IP
`ipv6 ospf enable` Enables OSPFv3 on the interface. **Command mode**: Interface IP

Table 277. OSPFv3 Interface Configuration Options (continued)

Command Syntax and Usage
`ipv6 ospf no enable` Disables OSPFv3 on the interface. **Command mode**: Interface IP
`no ipv6 ospf` Deletes OSPFv3 from interface. **Command mode**: Interface IP
`show ipv6 ospf interface` Displays the current settings for OSPFv3 interface. **Command mode**: Interface IP

OSPFv3 over IPSec Configuration

The following table describes the OSPFv3 over IPsec Configuration commands.

Table 278. Layer 3 IPsec Configuration Options

Command Syntax and Usage
`ipv6 ospf authentication ipsec spi` *<256-4294967295>* `{md5|sha1}` *<authentication key (hexadecimal)>* Configures the Security Parameters Index (SPI), algorithm, and authentication key for the Authentication Header (AH). The algorithms supported are: – MD5 (hexadecimal key length is 32) – SHA1 (hexadecimal key length is 40) **Command mode:** Interface IP
`[no] ipv6 ospf authentication ipsec enable` Enables or disables IPsec. **Command mode:** Interface IP
`no ipv6 ospf authentication ipsec spi` *<256-4294967295>* Disables the specified Authentication Header (AH) SPI. **Command mode:** Interface IP
`ipv6 ospf authentication ipsec default` Resets the Authentication Header (AH) configuration to default values. **Command mode:** Interface IP

Table 278. Layer 3 IPsec Configuration Options (continued)

Command Syntax and Usage
`ipv6 ospf encryption ipsec spi` *<256-4294967295>* `esp {3des|aes-cbc|des|null}` *<encryption key (hexadecimal)>*`|null}` `{md5|sha1|none}` *<authentication key (hexadecimal)>* Configures the Security Parameters Index (SPI), encryption algorithm, authentication algorithm, and authentication key for the Encapsulating Security Payload (ESP). The ESP algorithms supported are: – 3DES (hexadecimal key length is 48) – AES-CBC (hexadecimal key length is 32) – DES (hexadecimal key length is 16) The authentication algorithms supported are: – MD5 (hexadecimal key length is 32) – SHA1 (hexadecimal key length is 40) – none **Note:** If the encryption algorithm is null, the authentication algorithm must be either MD5 or SHA1. (hexadecimal key length is 40). If an encryption algorithm is specified (3DES, AES-CBC, or DES), the authentication algorithm can be none. **Command mode:** Interface IP
`ipv6 ospf encryption ipsec enable` Enables OSPFv3 encryption for this interface. **Command mode:** Interface IP
`no ipv6 ospf encryption ipsec spi` *<256-4294967295>* Disables the specified Encapsulating Security Payload (ESP) SPI. **Command mode:** Interface IP
`ipv6 ospf encryption ipsec default` Resets the Encapsulating Security Payload (ESP) configuration to default values. **Command mode:** Interface IP

OSPFv3 Virtual Link Configuration

Table 279. OSPFv3 Virtual Link Configuration Options

Command Syntax and Usage
`area-virtual-link` *<1-3>* `area` *<area index (0-2)>* Configures the OSPF area index. **Command mode**: Router OSPF3
`area-virtual-link` *<1-3>* `hello-interval` *<1-65535)>* Configures the indicated interval, in seconds, between the hello packets, that the router sends on the interface. **Command mode**: Router OSPF3
`area-virtual-link` *<1-3>* `dead-interval` *<1-65535>* Configures the time period, in seconds, for which the router waits for hello packet from the neighbor before declaring this neighbor down. **Command mode**: Router OSPF3
`area-virtual-link` *<1-3>* `transmit-delay` *<1-1800>* Configures the estimated time, in seconds, taken to transmit LS update packet over this interface. **Command mode**: Router OSPF3
`area-virtual-link` *<1-3>* `retransmit-interval` *<1-1800>* Configures the interval, in seconds, between link-state advertisement (LSA) retransmissions for adjacencies belonging to the OSPFv3 virtual link interface. The default value is five seconds. **Command mode**: Router OSPF3
`area-virtual-link` *<1-3>* `neighbor-router` *<NBR router ID (IP address)>* Configures the router ID of the virtual neighbor. The default setting is 0.0.0.0 **Command mode**: Router OSPF3
`area-virtual-link` *<1-3>* `enable` Enables OSPF virtual link. **Command mode**: Router OSPF3
`area-virtual-link` *<1-3>* `no enable` Disables OSPF virtual link. **Command mode**: Router OSPF3
`no area-virtual-link` *<1-3>* Deletes OSPF virtual link. **Command mode**: Router OSPF3
`show ipv6 ospf area-virtual-link` Displays the current OSPFv3 virtual link settings. **Command mode**: All

OSPFv3 Host Entry Configuration

Table 280. OSPFv3 Host Entry Configuration Options

Command Syntax and Usage
`host` *<1-128>* `address` *<IPv6 address> <prefix length (1-128)>* Configures the base IPv6 address and the subnet prefix length for the host entry. **Command mode**: Router OSPF3
`host` *<1-128>* `area` *<area index (0-2)>* Configures the area index of the host. **Command mode**: Router OSPF3
`host` *<1-128>* `cost` *<1-65535>* Configures the cost value of the host. **Command mode**: Router OSPF3
`host` *<1-128>* `enable` Enables the host entry. **Command mode**: Router OSPF3
`no host` *<1-128>* `enable` Disables the host entry. **Command mode**: Router OSPF3
`no host` *<1-128>* Deletes the host entry. **Command mode**: Router OSPF3
`show ipv6 ospf host [`*<1-128>*`]` Displays the current OSPFv3 host entries. **Command mode**: All

OSPFv3 Redistribute Entry Configuration

Table 281. OSPFv3 Redist Entry Configuration Options

Command Syntax and Usage
`redist-config` *<1-128>* `address` *<IPv6 address> <IPv6 prefix length (1-128)>* Configures the base IPv6 address and the subnet prefix length for the redistribution entry. **Command mode**: Router OSPF3
`redist-config` *<1-128>* `metric-value` *<1-16777215>* Configures the route metric value applied to the route before it is advertised into the OSPFv3 domain. **Command mode**: Router OSPF3
`redist-config` *<1-128>* `metric-type asExttype1|asExttype2` Configures the metric type applied to the route before it is advertised into the OSPFv3 domain. **Command mode**: Router OSPF3
`[no] redist-config` *<1-128>* `tag` *<0-4294967295>* Configures the route tag. **Command mode**: Router OSPF3
`redist-config` *<1-128>* `enable` Enables the OSPFv3 redistribution entry. **Command mode**: Router OSPF3
`no redist-config` *<1-128>* `enable` Disables the OSPFv3 redistribution entry. **Command mode**: Router OSPF3
`no redist-config` *<1-128>* Deletes the OSPFv3 redistribution entry. **Command mode**: Router OSPF3
`show ipv6 ospf redist-config` Displays the current OSPFv3 redistribution configuration entries. **Command mode**: Router OSPF3

OSPFv3 Redistribute Configuration

Table 282. OSPFv3 Redistribute Configuration Options

Command Syntax and Usage
`[no] redistribute {connected|static} export` *<metric value (1-16777215)> <metric type (1-2)> <tag (0-4294967295)>* Exports the routes of this protocol as external OSPFv3 AS-external LSAs in which the metric, metric type, and route tag are specified. To remove a previous configuration and stop exporting the routes of the protocol, use the `no` form of the command. **Command mode**: Router OSPF3
`show ipv6 ospf` Displays the current OSPFv3 route redistribution settings. **Command mode**: All

Border Gateway Protocol Configuration

Border Gateway Protocol (BGP) is an Internet protocol that enables routers on a network to share routing information with each other and advertise information about the segments of the IP address space they can access within their network with routers on external networks. BGP allows you to decide what is the “best” route for a packet to take from your network to a destination on another network, rather than simply setting a default route from your border router(s) to your upstream provider(s). You can configure BGP either within an autonomous system or between different autonomous systems. When run within an autonomous system, it's called internal BGP (iBGP). When run between different autonomous systems, it's called external BGP (eBGP). BGP is defined in RFC 1771.

BGP commands enable you to configure the switch to receive routes and to advertise static routes, fixed routes and virtual server IP addresses with other internal and external routers. In the current IBM N/OS implementation, the RackSwitch G8264 does not advertise BGP routes that are learned from one iBGP *speaker* to another iBGP *speaker*.

BGP is turned off by default.

Note: Fixed routes are subnet routes. There is one fixed route per IP interface.

Table 283. Border Gateway Protocol Options

Command Syntax and Usage
`router bgp` Enter Router BGP configuration mode. **Command mode:** Global configuration
`neighbor` *<peer number (1-96)>* Configures each BGP *peer.* Each border router, within an autonomous system, exchanges routing information with routers on other external networks. To view command options, see page 401. **Command mode:** Router BGP
`as` *<0-65535>* Set Autonomous System number. **Command mode:** Router BGP
`asn4comp` Enables ASN4 to ASN2 compatibility. **Command mode:** Router BGP
`cluster-id` *<IP address>* Specifies the router’s Cluster ID used when operating as a route reflector. Route reflectors that are part of the same cluster (assigned to the same group of clients) must use identical Cluster IDs. **Command mode:** Router BGP
`no cluster-id` Removes the router’s Cluster ID. **Command mode:** Router BGP

Table 283. Border Gateway Protocol Options (continued)

Command Syntax and Usage
`[no] client-to-client reflection` Enables or disables client-to-client IBGP route reflection when operating as a route reflector. The default state is enabled. **Command mode:** Router BGP
`dscp` *<0-63>* Set the DSCP marking value. **Command mode:** Router BGP
`local-preference` *<0-4294967294>* Sets the local preference. The path with the higher value is preferred. When multiple peers advertise the same route, use the route with the shortest AS path as the preferred route if you are using eBGP, or use the local preference if you are using iBGP. **Command mode:** Router BGP
`maximum-paths` *<1-32>* Set maximum paths allowed for an external route. By default, BGP will install only one path to the IP routing table. **Command mode:** Router BGP
`maximum-paths ibgp` *<1-32>* Set maximum paths allowed for an internal route. By default, BGP will install only one path to the IP routing table. **Command mode:** Router BGP
`enable` Globally turns BGP on. **Command mode:** Router BGP
`no enable` Globally turns BGP off. **Command mode:** Router BGP
`show ip bgp` Displays the current BGP configuration. **Command mode:** All

BGP Peer Configuration

Use these commands to configure BGP peers, which are border routers that exchange routing information with routers on internal and external networks. The peer option is disabled by default.

Table 284. BGP Peer Configuration Options

Command Syntax and Usage
`neighbor` *<peer number>* `remote-address` *<IP address>* Defines the IP address for the specified peer (border router), using dotted decimal notation. The default address is 0.0.0.0. **Command mode:** Router BGP
`neighbor` *<peer number>* `remote-as` *<1-65535>* Sets the remote autonomous system number for the specified peer. **Command mode:** Router BGP
`[no] neighbor` *<peer number>* `route-reflector-client` Enables or disables the peer as a route reflector client. Configuring route reflector clients, implicitly sets up the local router as a route reflector. **Command mode:** Router BGP
`neighbor` *<1-16>* `update-source` {*<interface number>*|`loopback` *<1-5>*} Sets the source interface number for this peer. **Command mode:** Router BGP
`neighbor` *<peer number>* `timers hold-time` *<0, 3-65535>* Sets the period of time, in seconds, that will elapse before the peer session is torn down because the switch hasn't received a "keep alive" message from the peer. The default value is 180 seconds. **Command mode:** Router BGP
`neighbor` *<peer number>* `timers keep-alive` *<0, 1-21845>* Sets the keep-alive time for the specified peer, in seconds. The default value is 60 seconds. **Command mode:** Router BGP
`neighbor` *<peer number>* `advertisement-interval` *<1-65535>* Sets time, in seconds, between advertisements. The default value is 60 seconds. **Command mode:** Router BGP
`neighbor` *<peer number>* `retry-interval` *<1-65535>* Sets connection retry interval, in seconds. The default value is 120 seconds. **Command mode:** Router BGP
`neighbor` *<peer number>* `route-origination-interval` *<1-65535>* Sets the minimum time between route originations, in seconds. The default value is 15 seconds. **Command mode:** Router BGP

Table 284. BGP Peer Configuration Options (continued)

Command Syntax and Usage
`neighbor` *<peer number>* `time-to-live` Time-to-live (TTL) is a value in an IP packet that tells a network router whether or not the packet has been in the network too long and should be discarded. TTL specifies a certain time span in seconds that, when exhausted, would cause the packet to be discarded. The TTL is determined by the number of router hops the packet is allowed before it must be discarded. This command specifies the number of router hops that the IP packet can make. This value is used to restrict the number of "hops" the advertisement makes. It is also used to support multi-hops, which allow BGP peers to talk across a routed network. The default number is set at 1. **Note:** The TTL value is significant only to eBGP peers, for iBGP peers the TTL value in the IP packets is always 255 (regardless of the configured value). **Command mode:** Router BGP
`no neighbor` *<peer number>* `time-to-live` *<1-255>* Disables the TTL feature. **Command mode:** Router BGP
`neighbor` *<peer number>* `ttl-security hops` *<1-254>* Sets the minimum number of time-to-live (TTL) router hops an IP packet must make to not be discarded. **Command mode:** Router BGP
`no neighbor` *<peer number>* `ttl-security hops` Disables the TTL security feature. **Command mode:** Router BGP
`neighbor` *<peer number>* `route-map in` *<1-255>* Adds route map into in-route map list. **Command mode:** Router BGP
`neighbor` *<peer number>* `route-map out` *<1-255>* Adds route map into out-route map list. **Command mode:** Router BGP
`no neighbor` *<peer number>* `route-map in` *<1-255>* Removes route map from in-route map list. **Command mode:** Router BGP
`no neighbor` *<peer number>* `route-map out` *<1-255>* Removes route map from out-route map list. **Command mode:** Router BGP
`no neighbor` *<peer number>* `shutdown` Enables this peer configuration. **Command mode:** Router BGP

Table 284. BGP Peer Configuration Options (continued)

Command Syntax and Usage
`neighbor` *<peer number>* `shutdown` Disables this peer configuration. **Command mode:** Router BGP
`no neighbor` *<peer number>* Deletes this peer configuration. **Command mode:** Router BGP
`[no] neighbor` *<peer number>* `password` *<1-16 characters>* Configures the BGP peer password. **Command mode:** Router BGP
`[no] neighbor` *<peer number>* `passive` Enables or disables BGP passive mode, which prevents the switch from initiating BGP connections with peers. Instead, the switch waits for the peer to send an open message first. **Command mode:** Router BGP
`show ip bgp neighbor` [*<peer number>*] Displays the current BGP peer configuration. **Command mode:** All
`neighbor` *<peer number>* `next-hop-self` Enforces using the router's own IP address as next-hop attribute when sending BGP updates to the peer. Applicable only for EBGP routes. **Command mode:** Router BGP
`no neighbor` *<peer number>* `next-hop-self` Doesn't enforce using the router's own IP address as next-hop attribute when sending BGP updates to the peer. **Command mode:** Router BGP

BGP Peering Group Configuration

These commands enable you to configure BGP peering for a group of remote neighbors defined by a range of IP addresses. Each range can be configured as a subnet IP address. After a subnet range is configured for a BGP peer group and a TCP session is established for an IP address in that subnet range, a new BGP neighbor is dynamically created as a member of that group and inherits the configuration from the peer group.

Table 285. BGP Peering Group Configuration Options

Command Syntax and Usage
`[no] neighbor group` *<group number>* `name` *<1-32 characters>* Sets the name for the group. **Command mode:** Router BGP
`neighbor group` *<group number>* `listen range` *<IPv4 address> <IPv4 subnet mask >* Defines the range of IP addresses that will be accepted for the group. **Command mode:** Router BGP
`neighbor group` *<group number>* `remote-as` *<AS number (1-65535)>* `[alternate-as` *<AS number (1-65535)>*`]` Adds a remote access server (RAS) into the RAS list. **Command mode:** Router BGP
`[no] neighbor group` *<peer number>* `route-reflector-client` Enables or disables the group as a route reflector client. Configuring route reflector clients, implicitly sets up the local router as a route reflector. **Command mode:** Router BGP
`neighbor group` *<group number>* `listen limit` *<group limit (1-96)>* Sets the maximum number of BGP dynamic peers. **Command mode:** Router BGP
`neighbor group` *<group number>* `update-source` *<interface number (1-126)>* Sets the local IP interface. **Command mode:** Router BGP
`neighbor group` *<group number>* `update-source loopback` *<interface number (1-5)>* Sets the loopback interface number for this peering group. **Command mode:** Router BGP
`neighbor group` *<group number>* `timers hold-time` *<hold time (0, 3-65535)>* Sets the period of time, in seconds, that will elapse before the peering group session is torn down because the switch hasn't received a "keep alive" message from the peer. The default value is 180. **Command mode:** Router BGP

Table 285. BGP Peering Group Configuration Options (continued)

Command Syntax and Usage
neighbor group *<group number>* timers keep-alive *<keepalive time (0, 1-21845)>* Sets the keep-alive time for the specified peering group in seconds. The default value is 60. **Command mode:** Router BGP
neighbor group *<group number>* advertisement-interval *<min adv time (1-65535)>* Sets time, in seconds, between advertisements. The default value is 60 seconds. **Command mode:** Router BGP
neighbor group *<group number>* route-origin-interval *<min orig time (1-65535)>* Sets the minimum time between route originations, in seconds. The default value is 15 seconds. **Command mode:** Router BGP
neighbor group *<group number>* time-to-live *<number of router hops (1-255)>* Time-to-live (TTL) is a value in an IP packet that tells a network router whether or not the packet has been in the network too long and must be discarded. TTL specifies a certain time span in seconds that, when exhausted, would cause the packet to be discarded. The TTL is determined by the number of router hops the packet is allowed before it must be discarded. This command specifies the number of router hops that the IP packet can make. This value is used to restrict the number of “hops” the advertisement makes. It is also used to support multi-hops, which allow BGP peering groups to talk across a routed network. The default number is set at 1. **Note:** The TTL value is significant only to eBGP peering groups; for iBGP peering groups the TTL value in the IP packets is always 255 (regardless of the configured value). **Command mode:** Router BGP
no neighbor group *<group number>* time-to-live *<1-255>* Disables the TTL feature. **Command mode:** Router BGP
neighbor group *<group number>* ttl-security hops *<1-254>* Sets the minimum number of time-to-live (TTL) router hops an IP packet must make to not be discarded. **Command mode:** Router BGP
no neighbor group *<group number>* ttl-security hops Disables the TTL security feature. **Command mode:** Router BGP

Table 285. BGP Peering Group Configuration Options (continued)

Command Syntax and Usage
`neighbor group` *<group number>* `route-map in` *<route map ID (1-255)>* Adds route map into in-route map list. **Command mode:** Router BGP
`neighbor group` *<group number>* `route-map out` *<route map ID (1-255)>* Adds route map into out-route map list. **Command mode:** Router BGP
`[no] neighbor group` *<group number>* `route-map in` *<route map ID (1-255)>* Removes route map from in-route map list. **Command mode:** Router BGP
`[no] neighbor group` *<group number>* `route-map out` *<route map ID (1-255)>* Removes route map from out-route map list. **Command mode:** Router BGP
`[no] neighbor group` *<group number>* `password` Configures the BGP peer password. **Command mode:** Router BGP
`[no] neighbor group` *<group number>* `shutdown` Enables this peering group configuration. **Command mode:** Router BGP
`neighbor group` *<group number>* `shutdown` Disables this peering group configuration. **Command mode:** Router BGP
`no [no] neighbor group` *<group number>* Deletes this peering group configuration. **Command mode:** Router BGP
`neighbor group` *<group number>* `next-hop-self` Enforces using the router’s own IP address as next-hop attribute when sending BGP updates to the peering group. Applicable only for EBGP routes. **Command mode:** Router BGP

Table 285. BGP Peering Group Configuration Options (continued)

Command Syntax and Usage
`no neighbor group` *<group number>* `next-hop-self` Doesn't enforce using the router's own IP address as next-hop attribute when sending BGP updates to the peering group. **Command mode:** Router BGP
`show ip bgp neighbor group` [*<neighbor group number>*] Displays the current peering group configuration. **Command mode:** All

BGP Neighbor Redistribution Configuration

This menu enables you to redistribute BGP routes for a group of remote neighbors defined by a range of IP addresses.

Table 286. BGP Neighbor Redistribution Configuration Options

Command Syntax and Usage
`[no] neighbor group` *<group number>* `redistribute default-metric` *<1-4294967294>* Sets default metric of advertised routes. **Command mode:** Router BGP
[no] `neighbor group` *<group number>* `redistribute default-action` {`import`|`originate`|`redistribute`} Sets default route action. Defaults routes can be configured as import, originate, redistribute, or none. **None:** No routes are configured **Import:** Import these routes. **Originate:** The switch sends a default route to peers if it does not have any default routes in its routing table. **Redistribute:** Default routes are either configured through default gateway or learned through other protocols and redistributed to peer. If the routes are learned from default gateway configuration, you have to enable static routes since the routes from default gateway are static routes. Similarly, if the routes are learned from a certain routing protocol, you have to enable that protocol. **Command mode:** Router BGP
[no] `neighbor group` *<group number>* `redistribute rip` Enables or disables advertising RIP routes. **Command mode:** Router BGP
[no] `neighbor group` *<group number>* `redistribute ospf` Enables or disables advertising OSPF routes. **Command mode:** Router BGP

Table 286. BGP Neighbor Redistribution Configuration Options (continued)

Command Syntax and Usage
`[no] neighbor group` *<group number>* `redistribute fixed` Enables or disables advertising fixed routes. **Command mode:** Router BGP
`[no] neighbor group` *<group number>* `redistribute static` Enables or disables advertising static routes. **Command mode:** Router BGP
`show ip bgp neighbor group` *<group number>* `redistribute` Displays current redistribution configuration. **Command mode:** All except User EXEC

BGP Aggregation Configuration

These commands enable you to configure BGP aggregation to specify the routes/range of IP destinations a peer router accepts from other peers. All matched routes are aggregated to one route, to reduce the size of the routing table. By default, the first aggregation number is enabled and the rest are disabled.

Table 287. BGP Aggregation Configuration Options

Command Syntax and Usage
`aggregate-address` *<1-16> <IP address> <IP netmask>* Defines the starting subnet IP address for this aggregation, using dotted decimal notation. The default address is 0.0.0.0. **Command mode:** Router BGP
`aggregate-address` *<1-16>* `enable` Enables this BGP aggregation. **Command mode:** Router BGP
`no aggregate-address` *<1-16>* `enable` Disables this BGP aggregation. **Command mode:** Router BGP
`no aggregate-address` *<1-16>* Deletes this BGP aggregation. **Command mode:** Router BGP
`show ip bgp aggregate-address` [*<1-16>*] Displays the current BGP aggregation configuration. **Command mode:** All

MLD Global Configuration

Table 288 describes the commands used to configure global MLD parameters.

Table 288. MLD Global Configuration Commands

Command Syntax and Usage
`ipv6 mld` Enter MLD global configuration mode. **Command mode:** Global configuration
`default` Resets MLD parameters to their default values. **Command mode:** MLD
`enable` Globally turns MLD on. **Command mode:** MLD
`no enable` Globally turns MLD off. **Command mode:** MLD
`exit` Exit from MLD configuration mode. **Command mode:** MLD
`show ipv6 mld` Displays the current MLD configuration parameters. **Command mode:** All

MLD Interface Configuration

Table 289 describes the commands used to configure MLD parameters for an interface.

Table 289. MLD Interface Configuration Commands

Command Syntax and Usage
`ipv6 mld default` Resets MLD parameters for the selected interface to their default values. **Command mode:** Interface IP
`ipv6 mld dmrtr enable|disable` Enables or disables dynamic Mrouter learning on the interface. The default setting is disabled. **Command mode:** Interface IP
`ipv6 mld enable` Enables this MLD interface. **Command mode:** Interface IP
`no ipv6 mld enable` Disables this MLD interface. **Command mode:** Interface IP
`ipv6 mld llistnr` *<1-32>* Configures the Last Listener query interval. The default value is 1 second. **Command mode:** Interface IP
`ipv6 mld qintrval` *<2-65535>* Configures the interval for MLD Query Reports. The default value is 125 seconds. **Command mode:** Interface IP
`ipv6 mld qri` *<1000-65535>* Configures the interval for MLD Query Response Reports. The default value is 10,000 milliseconds. **Command mode:** Interface IP
`ipv6 mld robust` *<2-10>* Configures the MLD Robustness variable, which allows you to tune the switch for expected packet loss on the subnet. If the subnet is expected to be lossy (high rate of packet loss), increase the value. The default value is 2. **Command mode:** Interface IP

Table 289. MLD Interface Configuration Commands (continued)

Command Syntax and Usage
`ipv6 mld version` *<1-2>* Defines the MLD protocol version number. **Command mode:** Interface IP
`show ipv6 mld interface` *<interface number>* Displays the current MLD interface configuration. **Command mode:** All

IGMP Configuration

Table 290 describes the commands used to configure basic IGMP parameters.

Table 290. IGMP Configuration Options

Command Syntax and Usage
`ip igmp enable` Globally turns IGMP on. **Command mode:** Global configuration
`no ip igmp enable` Globally turns IGMP off. **Command mode:** Global configuration
`[no] ip igmp aggregate` Enables or disables IGMP Membership Report aggregation. **Command mode:** Global configuration
`show ip igmp` Displays the current IGMP configuration parameters. **Command mode:** All

The following sections describe the IGMP configuration options.

- "IGMP Snooping Configuration" on page 412
- "IGMP Relay Configuration" on page 414
- "IGMP Relay Multicast Router Configuration" on page 415
- "IGMP Static Multicast Router Configuration" on page 416
- "IGMP Filtering Configuration" on page 417
- "IGMP Advanced Configuration" on page 419
- "IGMP Querier Configuration" on page 420

IGMP Snooping Configuration

IGMP Snooping allows the switch to forward multicast traffic only to those ports that request it. IGMP Snooping prevents multicast traffic from being flooded to all ports. The switch learns which server hosts are interested in receiving multicast traffic, and forwards it only to ports connected to those servers.

Table 291 describes the commands used to configure IGMP Snooping.

Table 291. IGMP Snooping Configuration Options

Command Syntax and Usage
`ip igmp snoop mrouter-timeout` *<1-600>* Configures the timeout value for IGMP Membership Queries (mrouter). Once the timeout value is reached, the switch removes the multicast router from its IGMP table, if the proper conditions are met. The range is from 1 to 600 seconds. The default is 255 seconds. **Command mode:** Global configuration
`[no] ip igmp aggregate` Enables or disables IGMP Membership Report aggregation. **Command mode:** Global configuration
`ip igmp snoop source-ip` *<IP address>* Configures the source IP address used as a proxy for IGMP Group Specific Queries. **Command mode:** Global configuration
`ip igmp snoop vlan` *<VLAN number>* Adds the selected VLAN(s) to IGMP Snooping. **Command mode:** Global configuration
`no ip igmp snoop vlan` *<VLAN number>* Removes the selected VLAN(s) from IGMP Snooping. **Command mode:** Global configuration
`no ip igmp snoop vlan all` Removes all VLANs from IGMP Snooping. **Command mode:** Global configuration
`ip igmp snoop enable` Enables IGMP Snooping. **Command mode:** Global configuration
`no ip igmp snoop enable` Disables IGMP Snooping. **Command mode:** Global configuration

Table 291. IGMP Snooping Configuration Options (continued)

Command Syntax and Usage
`default ip igmp snoop` Resets IGMP Snooping parameters to their default values. **Command mode:** Global configuration
`show ip igmp snoop` Displays the current IGMP Snooping parameters. **Command mode:** All

IGMPv3 Configuration

Table 292 describes the commands used to configure IGMP version 3.

Table 292. IGMP Version 3 Configuration Options

Command Syntax and Usage
`ip igmp snoop igmpv3 sources` *<1-64>* Configures the maximum number of IGMP multicast sources to snoop from within the group record. Use this command to limit the number of IGMP sources to provide more refined control. The default value is 8. **Command mode:** Global configuration
`[no] ip igmp snoop igmpv3 v1v2` Enables or disables snooping on IGMP version 1 and version 2 reports. When disabled, the switch drops IGMPv1 and IGMPv2 reports. The default value is `enabled`. **Command mode:** Global configuration
`[no] ip igmp snoop igmpv3 exclude` Enables or disables snooping on IGMPv3 Exclude Reports. When disabled, the switch ignores Exclude Reports. The default value is `enabled`. **Command mode:** Global configuration
`ip igmp snoop igmpv3 enable` Enables IGMP version 3. The default value is `disabled`. **Command mode:** Global configuration
`no ip igmp snoop igmpv3 enable` Disables IGMP version 3. **Command mode:** Global configuration
`show ip igmp snoop igmpv3` Displays the current IGMP v3 Snooping configuration. **Command mode:** All except User EXEC

IGMP Relay Configuration

When you configure IGMP Relay, also configure the IGMP Relay multicast routers.

Table 293 describes the commands used to configure IGMP Relay.

Table 293. IGMP Relay Configuration Options

Command Syntax and Usage
`ip igmp relay enable` Enables IGMP Relay. **Command mode:** Global configuration
`no ip igmp relay enable` Disables IGMP Relay. **Command mode:** Global configuration
`ip igmp relay vlan` *<VLAN number>* Adds the VLAN to the list of IGMP Relay VLANs. **Command mode:** Global configuration
`no ip igmp relay vlan` *<VLAN number>* Removes the VLAN from the list of IGMP Relay VLANs. **Command mode:** Global configuration
`ip igmp relay report` *<0-150>* Configures the interval between unsolicited Join reports sent by the switch, in seconds. The default value is 10. **Command mode:** Global configuration
`show ip igmp relay` Displays the current IGMP Relay configuration. **Command mode:** All

IGMP Relay Multicast Router Configuration

Table 294 describes the commands used to configure multicast routers for IGMP Relay.

Table 294. IGMP Relay Mrouter Configuration Options

Command Syntax and Usage
`ip igmp relay mrouter` *<1-2>* `address` *<IP address>* Configures the IP address of the IGMP multicast router used for IGMP Relay. **Command mode:** Global configuration
`ip igmp relay mrouter` *<1-2>* `interval` *<1-60>* Configures the time interval between ping attempts to the upstream Mrouters, in seconds. The default value is 2. **Command mode:** Global configuration
`ip igmp relay mrouter` *<1-2>* `retry` *<1-120>* Configures the number of failed ping attempts required before the switch declares this Mrouter is down. The default value is 4. **Command mode:** Global configuration
`ip igmp relay mrouter` *<1-2>* `attempt` *<1-128>* Configures the number of successful ping attempts required before the switch declares this Mrouter is up. The default value is 5. **Command mode:** Global configuration
`ip igmp relay mrouter` *<1-2>* `version` *<1-2>* Configures the IGMP version (1 or 2) of the multicast router. **Command mode:** Global configuration
`ip igmp relay mrouter` *<1-2>* `enable` Enables the multicast router. **Command mode:** Global configuration
`no ip igmp relay mrouter` *<1-2>* `enable` Disables the multicast router. **Command mode:** Global configuration
`no ip igmp relay mrouter` *<1-2>* Deletes the multicast router from IGMP Relay. **Command mode:** Global configuration

IGMP Static Multicast Router Configuration

Table 295 describes the commands used to configure a static multicast router.

Note: When static Mrouters are used, the switch continues learning dynamic Mrouters via IGMP snooping. However, dynamic Mrouters may not replace static Mrouters. If a dynamic Mrouter has the same port and VLAN combination as a static Mrouter, the dynamic Mrouter is not learned.

Table 295. IGMP Static Multicast Router Configuration Options

Command Syntax and Usage
`ip igmp mrouter` *<port alias or number> <VLAN number> <version (1-3)>* Selects a port/VLAN combination on which the static multicast router is connected, and configures the IGMP version of the multicast router. **Command mode:** Global configuration
`no ip igmp mrouter` *<port alias or number> <VLAN number> <version (1-3)>* Removes a static multicast router from the selected port/VLAN combination. **Command mode:** Global configuration
`no ip igmp mrouter all` Removes all static multicast routers. **Command mode:** Global configuration
`clear ip igmp mrouter` Clears the multicast router port table. **Command mode:** Global configuration
`show ip igmp mrouter` Displays the current IGMP Static Multicast Router parameters. **Command mode:** All except User EXEC

IGMP Filtering Configuration

Table 296 describes the commands used to configure an IGMP filter.

Table 296. IGMP Filtering Configuration Options

Command Syntax and Usage
`ip igmp profile` *<1-16>* Configures the IGMP filter. **Command mode:** Global configuration To view command options, see page 417.
`ip igmp filtering` Enables IGMP filtering globally. **Command mode:** Global configuration
`no ip igmp filtering` Disables IGMP filtering globally. **Command mode:** Global configuration
`show ip igmp filtering` Displays the current IGMP Filtering parameters. **Command mode:** All

IGMP Filter Definition

Table 297 describes the commands used to define an IGMP filter.

Table 297. IGMP Filter Definition Options

Command Syntax and Usage
`ip igmp profile` *<1-16>* `range` *<IP address 1> <IP address 2>* Configures the range of IP multicast addresses for this filter. **Command mode:** Global configuration
`ip igmp profile` *<1-16>* `action {allow|deny}` Allows or denies multicast traffic for the IP multicast addresses specified. The default action is `deny`. **Command mode:** Global configuration
`ip igmp profile` *<1-16>* `enable` Enables this IGMP filter. **Command mode:** Global configuration
`no ip igmp profile` *<1-16>* `enable` Disables this IGMP filter. **Command mode:** Global configuration

Table 297. IGMP Filter Definition Options (continued)

Command Syntax and Usage
`no ip igmp profile` *<1-16>* Deletes this filter’s parameter definitions. **Command mode:** Global configuration
`show ip igmp profile` *<1-16>* Displays the current IGMP filter. **Command mode:** All

IGMP Filtering Port Configuration

Table 298 describes the commands used to configure a port for IGMP filtering.

Table 298. IGMP Filter Port Configuration Options

Command Syntax and Usage
`[no] ip igmp filtering` Enables or disables IGMP filtering on this port. **Command mode:** Interface port
`ip igmp profile` *<1-16>* Adds an IGMP filter to this port. **Command mode:** Interface port
`no ip igmp profile` *<1-16>* Removes an IGMP filter from this port. **Command mode:** Interface port
`show interface port` *<port alias or number>* `igmp-filtering` Displays the current IGMP filter parameters for this port. **Command mode:** All except User EXEC

IGMP Advanced Configuration

Table 295 describes the commands used to configure advanced IGMP parameters.

Table 299. IGMP Advanced Configuration Options

Command Syntax and Usage
`ip igmp query-interval` *<1-600>* Sets the IGMP router query interval, in seconds. The default value is 125. **Command mode:** Global configuration
`ip igmp robust` *<2-10>* Configures the IGMP Robustness variable, which allows you to tune the switch for expected packet loss on the subnet. If the subnet is expected to be lossy (high rate of packet loss), increase the value. The default value is 2. **Command mode:** Global configuration
`ip igmp timeout` *<1-255>* Configures the timeout value for IGMP Membership Reports (host). Once the timeout value is reached, the switch removes the host from its IGMP table, if the conditions are met. The range is from 1 to 255 seconds. The default is 10 seconds. **Command mode:** Global configuration
[no] `ip igmp fastleave` *<VLAN number>* Enables or disables Fastleave processing. Fastleave allows the switch to immediately remove a port from the IGMP port list, if the host sends a Leave message, and the proper conditions are met. This command is disabled by default. **Command mode:** Global configuration
[no] `ip igmp snoop rtralert` Enables or disables the Router Alert option in IGMP messages. **Command mode:** Global configuration

IGMP Querier Configuration

Table 300 describes the commands used to configure IGMP Querier.

Table 300. IGMP Querier Configuration Options

Command Syntax and Usage
`ip igmp querier vlan` *<VLAN number>* `source-ip` *<IP address>* Configures the IGMP source IP address for the selected VLAN. **Command mode:** Global configuration
`ip igmp querier vlan` *<VLAN number>* `max-response` *<1-256>* Configures the maximum time, in tenths of a second, allowed before responding to a Membership Query message. The default value is 100. By varying the Query Response Interval, an administrator may tune the burstiness of IGMP messages on the subnet; larger values make the traffic less bursty, as host responses are spread out over a larger interval. **Command mode:** Global configuration
`ip igmp querier vlan` *<VLAN number>* `query-interval` *<1-608>* Configures the interval between IGMP Query broadcasts. The default value is 125 seconds. **Command mode:** Global configuration
`ip igmp querier vlan` *<VLAN number>* `robustness` *<2-10>* Configures the IGMP Robustness variable, which is the number of times that the switch sends each IGMP message. The default value is 2. **Command mode:** Global configuration
`ip igmp querier vlan` *<VLAN number>* `election-type [ipv4|mac]` Sets the IGMP Querier election criteria as IP address or Mac address. The default setting is IPv4. **Command mode:** Global configuration
`ip igmp querier vlan` *<VLAN number>* `startup-interval` *<1-608>* Configures the Startup Query Interval, which is the interval between General Queries sent out at startup. **Command mode:** Global configuration
`ip igmp querier vlan` *<VLAN number>* `startup-count` *<1-10>* Configures the Startup Query Count, which is the number of IGMP Queries sent out at startup. Each Query is separated by the Startup Query Interval. The default value is 2. **Command mode:** Global configuration
`ip igmp querier vlan` *<VLAN number>* `version [v1|v2|v3]` Configures the IGMP version. The default version is `v3`. **Command mode:** Global configuration

Table 300. IGMP Querier Configuration Options (continued)

Command Syntax and Usage
`ip igmp querier enable` Enables IGMP Querier. **Command mode:** Global configuration
`no ip igmp querier enable` Disables IGMP Querier. **Command mode:** Global configuration
`show ip igmp querier vlan` *<VLAN number>* Displays IGMP Querier information for the selected VLAN. **Command mode:** Global configuration
`show ip igmp querier` Displays the current IGMP Querier parameters. **Command mode:** All

IKEv2 Configuration

Table 301 describes the commands used to configure IKEv2.

Table 301. IKEv2 Options

Command Syntax and Usage
`ikev2 retransmit-interval` *<1-20>* Sets the interval, in seconds, the timeout value in case a packet is not received by the peer and needs to be retransmitted. The default value is 20 seconds. **Command mode:** Global configuration
`[no] ikev2 cookie` Enables or disables cookie notification. **Command mode:** Global configuration
`show ikev2` Displays the current IKEv2 settings. **Command mode:** All

IKEv2 Proposal Configuration

Table 302 describes the commands used to configure an IKEv2 proposal.

Table 302. IKEv2 Proposal Options

Command Syntax and Usage
`ikev2 proposal` Enter IKEv2 proposal mode. **Command mode:** Global configuration
`encryption {3des|aes-cbc|des}` Configures IKEv2 encryption mode. The default value is `3des`. **Command mode:** IKEv2 proposal
`integrity {md5|sha1}` Configures the IKEv2 authentication algorithm type. The default value is `sha1`. **Command mode:** IKEv2 proposal
`group {1|2|5|14|24}` Configures the the DH group. The default group is `2`. **Command mode:** IKEv2 proposal

IKEv2 Preshare Key Configuration

Table 303 describes the commands used to configure IKEv2 preshare keys.

Table 303. IKEv2 Preshare Key Options

Command Syntax and Usage
`ikev2 preshare-key local` *<1-32 characters>* Configures the local preshare key. The default value is `ibm123`. **Command mode:** Global configuration
`ikev2 preshare-key remote` *<1-32 characters> <IPv6 address>* Configures the remote preshare key for the IPv6 address. **Command mode:** Global configuration
`show ikev2 preshare-key` Displays the current IKEv2 Preshare key settings. **Command mode:** Global configuration

IKEv2 Identification Configuration

Table 304 describes the commands used to configure IKEv2 identification.

Table 304. IKEv2 Identification Options

Command Syntax and Usage
`ikev2 identity local address` Configures the switch to use the supplied IPv6 address as identification. **Command mode:** Global configuration
`ikev2 identity local fqdn` *<1-32 characters>* Configures the switch to use the fully-qualified domain name (such as "example.com") as identification. **Command mode:** Global configuration
`ikev2 identity local email` *<1-32 characters>* Configures the switch to use the supplied email address (such as "xyz@example.com") as identification. **Command mode:** Global configuration
`show ikev2 identity` Displays the current IKEv2 identification settings. **Command mode:** All

IPsec Configuration

Table 305 describes the commands used to configure IPsec.

Table 305. IPsec Options

Command Syntax and Usage
`ipsec enable` Enables IPsec. **Command mode:** Global configuration
`no ipsec enable` Disables IPsec. **Command mode:** Global configuration
`show ipsec` Displays the current IPsec settings. **Command mode:** All

IPsec Transform Set Configuration

Table 306 describes the commands used to configure IPsec transforms.

Table 306. IPsec Transform Set Options

Command Syntax and Usage
`ipsec transform-set <1-10> {ah-md5|ah-sha1|esp-3des|esp-aes-cbc|esp-des|esp-md5|esp-null|esp|sha1}` Sets the AH or ESP authentication, encryption, or integrity algorithm. The available algorithms are as follows: – `ah-md5` – `ah-sha1` – `esp-3des` – `esp-aes-cbc` – `esp-des` – `esp-md5` – `esp-null` – `esp-sha1` **Command mode:** Global configuration
`ipsec transform-set <1-10> transport {ah-md5|ah-sha1|esp-3des|esp-aes-cbc|esp-des|esp-md5|esp-null|esp|sha1}` Sets transport mode and the AH or ESP authentication, encryption, or integrity algorithm. **Command mode:** Global configuration
`ipsec transform-set <1-10> tunnel {ah-md5|ah-sha1|esp-3des|esp-aes-cbc|esp-des|esp-md5|esp-null|esp|sha1}` Sets tunnel mode and the AH or ESP authentication, encryption, or integrity algorithm. **Command mode:** Global configuration
`no ipsec transform <1-10>` Deletes the transform set. **Command mode:** Global configuration
`show ipsec transform-set <1-10>` Displays the current IPsec Transform Set settings. **Command mode:** All

IPsec Traffic Selector Configuration

Table 307 describes the commands used to configure an IPsec traffic selector.

Table 307. IPsec Traffic Selector Options

Command Syntax and Usage

`ipsec traffic-selector` *<1-10>* `action {permit|deny}`
`{any|icmp|tcp} {`*<IPV6 address>*`|any}`
Sets the traffic-selector to permit or deny the specified type of traffic.
Command mode: Global configuration

`src` *<IPv6 address>*`|any` Sets the source IPv6 address. **Command mode:** Global configuration
`prefix` *<1-128>* Sets the destination IPv6 prefix length. **Command mode:** Global configuration
`dst` *<IPv6 address>*`|any` Sets the destination IP address. **Command mode:** Global configuration
`del` Deletes the traffic selector. **Command mode:** Global configuration
`cur` Displays the current IPsec Traffic Selector settings. **Command mode:** All

IPsec Dynamic Policy Configuration

Table 308 describes the commands used to configure an IPsec dynamic policy.

Table 308. IPsec Dynamic Policy Options

Command Syntax and Usage
`ipsec dynamic-policy` *<1-10>* Enter IPsec dynamic policy mode. **Command mode:** Global configuration
`peer` *<IPv6 address>* Sets the remote peer IP address. **Command mode:** IPsec dynamic policy
`traffic-selector` *<1-10>* Sets the traffic selector for the IPsec policy. **Command mode:** IPsec dynamic policy
`transform-set` *<1-10>* Sets the transform set for the IPsec policy. **Command mode:** IPsec dynamic policy
`sa-lifetime` *<120-86400>* Sets the IPsec SA lifetime in seconds. The default value is 86400 seconds. **Command mode:** IPsec dynamic policy
`pfs enable|disable` Enables/disables perfect forward security. **Command mode:** IPsec dynamic policy
`show ipsec dynamic-policy` *<1-10>* Displays the current IPsec dynamic policy settings. **Command mode:** All

IPsec Manual Policy Configuration

Table 309 describes the commands used to configure an IPsec manual policy.

Table 309. IPsec Manual Policy Options

Command Syntax and Usage
`ipsec manual-policy` *<1-10>* Enter IPsec manual policy mode. **Command mode:** Global configuration
`in-ah auth-key` *<key code (hexadecimal)>* Sets inbound Authentication Header (AH) authenticator key. **Note**: For manual policies, when peering with a third-party device, key lengths are fixed to 20 characters for SHA1 and 16 characters for MD5 encryption. **Command mode:** IPsec manual policy
`peer` *<IPv6 address>* Sets the remote peer IP address. **Command mode:** IPsec manual policy
`traffic-selector` *<1-10>* Sets the traffic selector for the IPsec policy. **Command mode:** IPsec manual policy
`transform-set` *<1-10>* Sets the transform set for the IPsec policy. **Command mode:** IPsec manual policy
`in-ah spi` *<256-4294967295>* Sets the inbound Authentication Header (AH) Security Parameter Index (SPI). **Note**: For manual policies, when peering with a third-party device, key lengths are fixed to 20 characters for SHA1 and 16 characters for MD5 encryption. **Command mode:** IPsec manual policy
`in-esp cipher-key` *<key code (hexadecimal)>* Sets the inbound Encapsulating Security Payload (ESP) cipher key. **Note**: For manual policies, when peering with a third-party device, key lengths are fixed to 8 characters for DES and to 24 characters for 3DES and AES-CBC encryption. **Command mode:** IPsec manual policy
`in-esp auth-key` *<key code (hexadecimal)>* Sets the inbound Encapsulating Security Payload (ESP) authenticator key. **Note**: For manual policies, when peering with a third-party device, key lengths are fixed to 8 characters for DES and to 24 characters for 3DES and AES-CBC encryption. **Command mode:** IPsec manual policy

Table 309. IPsec Manual Policy Options (continued)

Command Syntax and Usage
`in-esp auth-key spi` *<256-4294967295>* Sets the inbound Encapsulating Security Payload (ESP) Security Parameter Index (SPI). **Note**: For manual policies, when peering with a third-party device, key lengths are fixed to 20 characters for SHA1 and 16 characters for MD5 encryption. **Command mode:** IPsec manual policy
`out-ah auth-key` *<key code (hexadecimal)>* Sets the outbound Authentication Header (AH) authenticator key. **Note**: For manual policies, when peering with a third-party device, key lengths are fixed to 20 characters for SHA1 and 16 characters for MD5 encryption. **Command mode:** IPsec manual policy
`out-ah spi` *<256-4294967295>* Sets the outbound Authentication Header (AH) Security Parameter Index (SPI). **Note**: For manual policies, when peering with a third-party device, key lengths are fixed to 20 characters for SHA1 and 16 characters for MD5 encryption. **Command mode:** IPsec manual policy
`out-esp auth-key` *<key code (hexadecimal)>* Sets the outbound Encapsulating Security Payload (ESP) authenticator key. **Note**: For manual policies, when peering with a third-party device, key lengths are fixed to 8 characters for DES and to 24 characters for 3DES and AES-CBC encryption. **Command mode:** IPsec manual policy
`out-esp cipher-key` *<key code (hexadecimal)>* Sets the outbound Encapsulating Security Payload (ESP) cipher key. **Note**: For manual policies, when peering with a third-party device, key lengths are fixed to 8 characters for DES and to 24 characters for 3DES and AES-CBC encryption. **Command mode:** IPsec manual policy
`out-esp auth-key spi` *<256-4294967295>* Sets the outbound Encapsulating Security Payload (ESP) Security Parameter Index (SPI). **Note**: For manual policies, when peering with a third-party device, key lengths are fixed to 20 characters for SHA1 and 16 characters for MD5 encryption. **Command mode:** IPsec manual policy
`show ipsec manual-policy` *<1-10>* Displays the current IPsec manual policy settings. **Command mode:** All

Domain Name System Configuration

The Domain Name System (DNS) commands are used for defining the primary and secondary DNS servers on your local network, and for setting the default domain name served by the switch services. DNS parameters must be configured prior to using hostname parameters with the `ping`, `traceroute`, and `tftp` commands.

Table 310. Domain Name Service Options

Command Syntax and Usage
`[no] ip dns primary-server` *<IP address>* `[mgt-port|data-port]` You are prompted to set the IPv4 address for your primary DNS server, using dotted decimal notation. **Command mode:** Global configuration
`[no] ip dns secondary-server` *<IP address>* `[mgt-port|data-port]` You are prompted to set the IPv4 address for your secondary DNS server, using dotted decimal notation. If the primary DNS server fails, the configured secondary will be used instead. **Command mode:** Global configuration
`[no] ip dns ipv6 primary-server` *<IP address>* `[mgt-port|data-port]` You are prompted to set the IPv6 address for your primary DNS server, using hexadecimal format with colons. **Command mode:** Global configuration
`[no] ip dns ipv6 secondary-server` *<IP address>* `[mgt-port|data-port]` You are prompted to set the IPv6 address for your secondary DNS server, using hexadecimal format with colons. If the primary DNS server fails, the configured secondary will be used instead. **Command mode:** Global configuration
`ip dns ipv6 request-version {ipv4|ipv6}` Sets the protocol used for the first request to the DNS server, as follows: – IPv4 – IPv6 **Command mode:** Global configuration
`[no] ip dns domain-name` *<string>* Sets the default domain name used by the switch. For example: `mycompany.com` **Command mode:** Global configuration
`show ip dns` Displays the current Domain Name System settings. **Command mode:** All except User EXEC

Bootstrap Protocol Relay Configuration

The Bootstrap Protocol (BOOTP) Relay commands are used to allow hosts to obtain their configurations from a Dynamic Host Configuration Protocol (DHCP) server. The BOOTP configuration enables the switch to forward a client request for an IP address to DHCP/BOOTP servers with IP addresses that have been configured on the G8264.

BOOTP relay is turned off by default.

Table 311. Global BOOTP Relay Configuration Options

Command Syntax and Usage
`[no] ip bootp-relay server <1-5> address <IP address>` Sets the IP address of the selected global BOOTP server. **Command mode:** Global configuration
`ip bootp-relay enable` Globally turns on BOOTP relay. **Command mode:** Global configuration
`no ip bootp-relay enable` Globally turns off BOOTP relay. **Command mode:** Global configuration

BOOTP Relay Broadcast Domain Configuration

This menu allows you to configure a BOOTP server for a specific broadcast domain, based on its associated VLAN.

Table 312. BOOTP Relay Broadcast Domain Configuration Options

Command Syntax and Usage
`ip bootp-relay bcast-domain` *<1-10>* `vlan` *<VLAN number>* Configures the VLAN of the broadcast domain. Each broadcast domain must have a unique VLAN. **Command mode:** Global configuration
`ip bootp-relay bcast-domain` *<1-10>* `server` *<1-5>* `address` *<IPv4 address>* Sets the IP address of the BOOTP server. **Command mode:** Global configuration
`ip bootp-relay bcast-domain` *<1-10>* `enable` Enables BOOTP Relay for the broadcast domain. **Command mode:** Global configuration
`no ip bootp-relay bcast-domain` *<1-10>* `enable` Disables BOOTP Relay for the broadcast domain. When disabled, BOOTP Relay is performed by one of the global BOOTP servers. **Command mode:** Global configuration
`no ip bootp-relay bcast-domain` *<1-10>* Deletes the selected broadcast domain configuration. **Command mode:** Global configuration
`show ip bootp-relay` Displays the current parameters for the BOOTP Relay broadcast domain. **Command mode:** All

Option 82 Configuration

These commands allow you to configure DHCP option 82 information. The switch can use the following DHCP option 82 sub-options to allocate server addresses.

- Circuit ID: Identifies the host name or MAC addresses of the switch making the DHCP request.
- Remote ID: Identifies the port that receives the DHCP request.

DHCP Relay Agent (Option 82) is defined in RFC 3046.

Table 313. Option 82 Configuration Options

Command Syntax and Usage
`ip bootp-relay information enable` Turns BOOTP Option 82 on. **Command mode:** Global configuration
`[no] ip bootp-relay information enable` Turns BOOTP Option 82 off. **Command mode:** Global configuration
`ip bootp-relay information policy {keep|drop|replace}` Configures the DHCP re-forwarding policy, as follows: – **Keep**: Retains requests that contain relay information if the option 82 information is also present. – **Drop**: Discards requests that contain relay information if the option 82 information is also present. – **Replace**: Replace the relay information in requests that also contain option 82 information. **Command mode:** Global configuration
`show ip bootp-relay` Displays the current BOOTP Option 82 parameters. **Command mode:** All

VRRP Configuration

Virtual Router Redundancy Protocol (VRRP) support on the G8264 provides redundancy between routers in a LAN. This is accomplished by configuring the same virtual router IP address and ID number on each participating VRRP-capable routing device. One of the virtual routers is then elected as the master, based on a number of priority criteria, and assumes control of the shared virtual router IP address. If the master fails, one of the backup virtual routers will assume routing authority and take control of the virtual router IP address.

By default, VRRP is disabled. IBM N/OS has extended VRRP to include virtual servers as well, allowing for full active/active redundancy between switches. For more information on VRRP, see the “High Availability” chapter in the *IBM N/OS 7.6 Application Guide.*

Table 314. Virtual Router Redundancy Protocol Options

Command Syntax and Usage
`router vrrp` Enter Router VRRP configuration mode. **Command mode:** Global configuration
`holdoff` *<0-255>* Globally sets the time, in seconds, VRRP waits from when the master switch goes down until elevating a new switch to be the master switch. **Command mode:** Router VRRP
`enable` Globally enables VRRP on this switch. **Command mode:** Router VRRP
`no enable` Globally disables VRRP on this switch. **Command mode:** Router VRRP
`show ip vrrp` Displays the current VRRP parameters. **Command mode:** All

Virtual Router Configuration

These commands are used for configuring virtual routers for this switch. A virtual router is defined by its virtual router ID and an IP address. On each VRRP-capable routing device participating in redundancy for this virtual router, a virtual router will be configured to share the same virtual router ID and IP address.

Virtual routers are disabled by default.

Table 315. VRRP Virtual Router Configuration Options

Command Syntax and Usage
`virtual-router` <*1-128*> `virtual-router-id` <*1-128*> Defines the virtual router ID (VRID). This is used in conjunction with the [no] `virtual-router` <*VRID*> `address` <*IP address*> command below to define a virtual router on this switch. To create a pool of VRRP-enabled routing devices which can provide redundancy to each other, each participating VRRP device must be configured with the same virtual router. The VRID for standard virtual routers (where the virtual router IP address is not the same as any virtual server) can be any integer between 1 and *128*. The default value is 1. All VRID values must be unique within the VLAN to which the virtual router's IP interface belongs. **Command mode:** Router VRRP
[no] `virtual-router` <*1-128*> `address` <*IP address*> Defines the IP address for this virtual router using dotted decimal notation. This is used in conjunction with the preceding VRID to configure the same virtual router on each participating VRRP device. The default address is 0.0.0.0. **Command mode:** Router VRRP
`virtual-router` <*1-128*> `interface` <*interface number*> Selects a switch IP interface. If the IP interface has the same IP address as the `address` option, this switch is considered the "owner" of the defined virtual router. An owner has a special priority of 255 (highest) and will always assume the role of master router, even if it must pre-empt another virtual router which has assumed master routing authority. This pre-emption occurs even if the `preem` option below is disabled. The default value is 1. **Command mode:** Router VRRP
`virtual-router` <*1-128*> `priority` <*1-254*> Defines the election priority bias for this virtual server. The priority value can be any integer between 1 and 254. The default value is 100. During the master router election process, the routing device with the highest virtual router priority number wins. If there is a tie, the device with the highest IP interface address wins. If this virtual router's IP address is the same as the one used by the IP interface, the priority for this virtual router will automatically be set to 255 (highest). When priority tracking is used, this base priority value can be modified according to a number of performance and operational criteria. **Command mode:** Router VRRP

Table 315. VRRP Virtual Router Configuration Options (continued)

Command Syntax and Usage
`virtual-router <1-128> timers advertise <1-255>` Defines the time interval between VRRP master advertisements. This can be any integer between 1 and 255 seconds. The default value is 1. **Command mode:** Router VRRP
`virtual-router <1-128> timers preempt-delay-time <0-255>` Configures the preempt delay interval. This timer is configured on the VRRP Owner and prevents the switch from transitioning back to Master state until the preempt delay interval has expired. Ensure that the interval is long enough for OSPF or other routing protocols to converge. **Command mode:** Router VRRP
`[no] virtual-router <1-128> preemption` Enables or disables master preemption. When enabled, if this virtual router is in backup mode but has a higher priority than the current master, this virtual router will preempt the lower priority master and assume control. Note that even when `preemption` is disabled, this virtual router will always pre-empt any other master if this switch is the owner (the IP interface address and virtual router `addr` are the same). By default, this option is `enabled`. **Command mode:** Router VRRP
`[no] virtual-router <1-128> fast-advertise` Enables or disables Fast Advertisements. When enabled, the VRRP master advertisements interval is calculated in units of centiseconds, instead of seconds. For example, if `adver` is set to 1 and `fadver` is enabled, master advertisements are sent every .01 second. When you disable fast advertisement, the advertisement interval is set to the default value of 1 second. To support Fast Advertisements, set the interval between 20-100 centiseconds. **Command mode:** Router VRRP
`virtual-router <1-128> enable` Enables this virtual router. **Command mode:** Router VRRP
`no virtual-router <1-128> enable` Disables this virtual router. **Command mode:** Router VRRP
`no virtual-router <1-128>` Deletes this virtual router from the switch configuration. **Command mode:** Router VRRP
`show ip vrrp virtual-router <1-128>` Displays the current configuration information for this virtual router. **Command mode:** All except User EXEC

Virtual Router Priority Tracking Configuration

These commands are used for modifying the priority system used when electing the master router from a pool of virtual routers. Various tracking criteria can be used to bias the election results. Each time one of the tracking criteria is met, the priority level for the virtual router is increased by an amount defined through the VRRP Tracking commands.

Criteria are tracked dynamically, continuously updating virtual router priority levels when enabled. If the virtual router preemption option is enabled, this virtual router can assume master routing authority when its priority level rises above that of the current master.

Some tracking criteria apply to standard virtual routers, otherwise called “virtual interface routers.” A virtual *server* router is defined as any virtual router whose IP address is the same as any configured virtual server IP address.

Table 316. VRRP Priority Tracking Configuration Options

Command Syntax and Usage
[no] `virtual-router` <*1-128*> `track virtual-routers` When enabled, the priority for this virtual router will be increased for each virtual router in master mode on this switch. This is useful for making sure that traffic for any particular client/server pairing are handled by the same switch, increasing routing and load balancing efficiency. This command is disabled by default. **Command mode:** Router VRRP
[no] `virtual-router` <*1-128*> `track interfaces` When enabled, the priority for this virtual router will be increased for each other IP interface active on this switch. An IP interface is considered active when there is at least one active port on the same VLAN. This helps elect the virtual routers with the most available routes as the master. This command is disabled by default. **Command mode:** Router VRRP
[no] `virtual-router` <*1-128*> `track ports` When enabled, the priority for this virtual router will be increased for each active port on the same VLAN. A port is considered “active” if it has a link and is forwarding traffic. This helps elect the virtual routers with the most available ports as the master. This command is disabled by default. **Command mode:** Router VRRP
`show ip vrrp virtual-router` <*1-128*> `track` Displays the current configuration for priority tracking for this virtual router. **Command mode:** All except User EXEC

Virtual Router Group Configuration

Virtual Router Group commands are used for associating all virtual routers into a single logical virtual router, which forces all virtual routers on the G8264 to either be master or backup as a group. A virtual router is defined by its virtual router ID and an IP address. On each VRRP-capable routing device participating in redundancy for this virtual router, a virtual router will be configured to share the same virtual router ID and IP address.

Note: This option is required to be configured only when using at least two G8264s in a hot-standby failover configuration, where only one switch is active at any time.

Table 317. VRRP Virtual Router Group Configuration Options

Command Syntax and Usage
`group virtual-router-id` <*1-128*> Defines the virtual router ID (VRID). The VRID for standard virtual routers (where the virtual router IP address is not the same as any virtual server) can be any integer between 1 and 128. All VRID values must be unique within the VLAN to which the virtual router's IP interface (see `interface`) belongs. The default virtual router ID is 1. **Command mode:** Router VRRP
`group interface` <*interface number*> Selects a switch IP interface. The default switch IP interface number is 1. **Command mode:** Router VRRP
`group priority` <*1-254*> Defines the election priority bias for this virtual router group. This can be any integer between 1 and 254. The default value is 100. During the master router election process, the routing device with the highest virtual router priority number wins. If there is a tie, the device with the highest IP interface address wins. If this virtual router's IP address (`addr`) is the same as the one used by the IP interface, the priority for this virtual router will automatically be set to 255 (highest). When priority tracking is used, this base priority value can be modified according to a number of performance and operational criteria. **Command mode:** Router VRRP
`group advertisement` <*1-255*> Defines the time interval between VRRP master advertisements. This can be any integer between 1 and 255 seconds. The default is 1. **Command mode:** Router VRRP
`[no] group preemption` Enables or disables master pre-emption. When enabled, if the virtual router group is in backup mode but has a higher priority than the current master, this virtual router will pre-empt the lower priority master and assume control. Note that even when `preemption` is disabled, this virtual router will always pre-empt any other master if this switch is the owner (the IP interface address and virtual router address are the same). By default, this option is `enabled`. **Command mode:** Router VRRP

Table 317. VRRP Virtual Router Group Configuration Options (continued)

Command Syntax and Usage
`[no] group fast-advertise` Enables or disables Fast Advertisements. When enabled, the VRRP master advertisements interval is calculated in units of centiseconds, instead of seconds. For example, if `adver` is set to 1 and `fadver` is enabled, master advertisements are sent every .01 second. When you disable fast advertisement, the advertisement interval is set to the default value of 1 second. To support Fast Advertisements, set the interval between 20-100 centiseconds. **Command mode:** Router VRRP
`group enable` Enables the virtual router group. **Command mode:** Router VRRP
`no group enable` Disables the virtual router group. **Command mode:** Router VRRP
`no group` Deletes the virtual router group from the switch configuration. **Command mode:** Router VRRP
`show ip vrrp group` Displays the current configuration information for the virtual router group. **Command mode:** All except User EXEC

Virtual Router Group Priority Tracking Configuration

Note: If *Virtual Router Group Tracking* is enabled, then the tracking option will be available only under *group* option. The tracking setting for the other individual virtual routers will be ignored.

Table 318. Virtual Router Group Priority Tracking Configuration Options

Command Syntax and Usage
`[no] group track interfaces` When enabled, the priority for this virtual router will be increased for each other IP interface active on this switch. An IP interface is considered active when there is at least one active port on the same VLAN. This helps elect the virtual routers with the most available routes as the master. This command is disabled by default. **Command mode:** Router VRRP
`[no] group track ports` When enabled, the priority for this virtual router will be increased for each active port on the same VLAN. A port is considered "active" if it has a link and is forwarding traffic. This helps elect the virtual routers with the most available ports as the master. This command is disabled by default. **Command mode:** Router VRRP
`show ip vrrp group track` Displays the current configuration for priority tracking for this virtual router. **Command mode:** All except User EXEC

VRRP Interface Configuration

Note: The *interface* represents the IP interface on which authentication parameters must be configured.

These commands are used for configuring VRRP authentication parameters for the IP interfaces used with the virtual routers.

Table 319. VRRP Interface Options

Command Syntax and Usage
`interface` *<interface number>* `authentication` {`password`|`none`} Defines the type of authentication that will be used: `none` (no authentication) or `password` (password authentication). **Command mode:** Router VRRP
[`no`] `interface` *<interface number>* `password` *<password>* Defines a plain text password up to eight characters long. This password will be added to each VRRP packet transmitted by this interface when password authentication is chosen (see `interface authentication` above). **Command mode:** Router VRRP
`no interface` *<interface number>* Clears the authentication configuration parameters for this IP interface. The IP interface itself is not deleted. **Command mode:** Router VRRP
`show ip vrrp interface` *<interface number>* Displays the current configuration for this IP interface's authentication parameters. **Command mode:** All except User EXEC

VRRP Tracking Configuration

These commands are used for setting weights for the various criteria used to modify priority levels during the master router election process. Each time one of the tracking criteria is met (see "VRRP Virtual Router Priority Tracking Commands" on page 436), the priority level for the virtual router is increased by a defined amount.

Table 320. VRRP Tracking Configuration Options

Command Syntax and Usage
`tracking-priority-increment virtual-routers` *<0-254>* Defines the priority increment value (0 through 254) for virtual routers in master mode detected on this switch. The default value is 2. **Command mode:** Router VRRP
`tracking-priority-increment interfaces` *<0-254>* Defines the priority increment value for active IP interfaces detected on this switch. The default value is 2. **Command mode:** Router VRRP
`tracking-priority-increment ports` *<0-254>* Defines the priority increment value for active ports on the virtual router's VLAN. The default value is 2. **Command mode:** Router VRRP
`show ip vrrp tracking-priority-increment` Displays the current configuration of priority tracking increment values. **Command mode:** All except User EXEC

Note: These priority tracking options only define increment values. These options do not affect the VRRP master router election process until options under the VRRP Virtual Router Priority Tracking Commands (see page 436) are enabled.

Protocol Independent Multicast Configuration

Table 321. PIM Configuration Options

Command Syntax and Usage
`ip pim component <1-2>` Enter PIM component mode.
`ip pim regstop-ratelimit-period <0-2147483647>` Configures the register stop rate limit, in seconds. The default value is 5. **Command mode**: Global configuration
`[no] ip pim static-rp enable` Enables or disables static RP configuration. The default setting is `disabled`. **Command mode**: Global configuration
`[no] ip pim pmbr enable` Enables or disables PIM border router. The default setting is `disabled`. **Command mode**: Global configuration
`ip pim enable` Globally turns PIM on. **Command mode**: Global configuration
`no ip pim enable` Globally turns PIM off. **Command mode**: Global configuration
`clear ip pim mroute` Clears PIM multicast router entries. **Command mode**: Global configuration

PIM Component Configuration

Use these commands to configure PIM components.

Table 322. PIM Component Configuration Options

Command Syntax and Usage
`ip pim component <1-2>` Enter PIM component mode. **Command mode**: Global configuration
`mode {dense|sparse}` Configures the operational mode of the PIM router (dense or sparse). **Command mode**: PIM Component
`show ip pim component [<1-2>]` Displays the current PIM component configuration settings. **Command mode**: All

RP Candidate Configuration

Use these commands to configure a PIM router Rendezvous Point (RP) candidate.

Table 323. RP Candidate Configuration Options

Command Syntax and Usage
`rp-candidate rp-address` *<group multicast address> <group subnet mask> <IP address>* Adds an RP candidate. **Command mode**: PIM Component
`no rp-candidate rp-address` *<group multicast address> <group subnet mask> <IP address>* Removes the specified RP candidate. **Command mode**: PIM Component
`rp-candidate holdtime` *<0-255>* Configures the hold time of the RP candidate, in seconds. **Command mode**: PIM Component

RP Static Configuration

Use these commands to configure a static PIM router Rendezvous Point (RP).

Table 324. RP Static Configuration Options

Command Syntax and Usage
`rp-static rp-address` *<group multicast address> <group subnet mask> <IP address>* Adds a static RP. **Command mode**: PIM Component
`no rp-static rp-address` *<group multicast address> <group subnet mask>* Removes the specified static RP. **Command mode**: PIM Component

PIM Interface Configuration

Table 325. PIM Interface Configuration Options

Command Syntax and Usage
`interface ip` *<interface number>* Enter Interface IP mode. **Command mode**: Global Configuration
`ip pim hello-interval` *<0-65535>* Configures the time interval, in seconds, between PIM Hello packets. The default value is 30. **Command mode**: Interface IP
`ip pim join-prune-interval` *<0-65535>* Configures the interval between Join Prune messages, in seconds. The default value is 60. **Command mode**: Interface IP
`ip pim cbsr-preference` *<0-255>* Configures the candidate bootstrap router preference. **Command mode**: Interface IP
`ip pim component-id` *<1-2>* Defines the component ID for the interface. **Command mode**: Interface IP
`ip pim hello-holdtime` *<1-65535>* Configures the time period in seconds for which a neighbor is to consider this switch to be operative (up). The default value is 105. **Command mode**: Interface IP
`ip pim dr-priority` *<0-4294967294>* Configures the designated router priority. The default value is 1. **Command mode**: Interface IP
`ip pim override-interval` *<0-65535>* Configures the override interval for the router interface, in seconds. **Command mode**: Interface IP
`ip pim lan-delay` *<0-32767>* Configures the LAN delay value for the router interface, in seconds. **Command mode**: Interface IP
`[no] ip pim border-bit` Enables or disables the interface as a border router. The default setting is `disabled`. **Command mode**: Interface IP

Table 325. PIM Interface Configuration Options (continued)

Command Syntax and Usage
`[no] ip pim lan-prune-delay` Enables or disables LAN delay advertisements on the interface. The default setting is `disabled`. **Command mode**: Interface IP
`ip pim neighbor-addr` *<IP address>* `allow|deny` Allows or denies PIM access to the specified neighbor. You can configure a list of up to 72 neighbors that bypass the neighbor filter. Once you configure the interface to allow a neighbor, you can configure the interface to deny the neighbor. **Command mode**: Interface IP
`[no] ip pim neighbor-filter` Enables or disables the PIM neighbor filter on the interface. When enabled, this interface does not accept any PIM neighbors, unless specifically permitted using the following command: `ip pim neighbor-addr` *<IP address>* **Command mode**: Interface IP
`ip pim enable` Enables PIM on the interface. **Command mode**: Interface IP
`no ip pim enable` Disables PIM on the interface. **Command mode**: Interface IP
`show ip pim neighbor-filters` Displays the configured PIM neighbor filters. **Command mode**: All
`show ip pim interface [`*<interface number>*`|detail|loopback|port` *<port number>*`]` Displays the current PIM interface parameters. **Command mode**: All

IPv6 Default Gateway Configuration

The switch supports IPv6 default gateways, as follows:

- Gateway 1: data traffic
- Gateway 4: management port

Table 326 describes the IPv6 Default Gateway Configuration commands.

Table 326. IPv6 Default Gateway Configuration Options

Command Syntax and Usage
`ip gateway6 {1|} address` *<IPv6 address>* Configures the IPv6 address of the default gateway, in hexadecimal format with colons (such as 3001:0:0:0:0:0:abcd:12). **Command mode**: Global configuration
`[no] ip gateway6 {1|} enable` Enables or disables the default gateway. **Command mode**: Global configuration
`no ip gateway6 {1|}` Deletes the default gateway. **Command mode**: Global configuration
`show ipv6 gateway6 {1|}` Displays the current IPv6 default gateway configuration. **Command mode**: All

IPv6 Static Route Configuration

Table 327 describes the IPv6 static route configuration commands.

Table 327. IPv6 Static Route Configuration Options

Command Syntax and Usage
`ip route6` *<IPv6 address> <prefix length> <IPv6 gateway address>* [*<interface number>*] Adds an IPv6 static route. **Command mode**: Global configuration
`no ip route6` *<IPv6 address> <prefix length>* Removes the selected route. **Command mode**: Global configuration
`no ip route6` [`destination-address` *<IPv6 address>*| `gateway` *<default gateway address>*|`interface` *<1-128>*|`all`] Clears the selected IPv6 static routes. **Command mode**: Global configuration
`show ipv6 route static` Displays the current static route configuration. **Command mode**: All

IPv6 Neighbor Discovery Cache Configuration

Table 328 describes the IPv6 Neighbor Discovery cache configuration commands.

Table 328. IPv6 Neighbor Discovery Cache Configuration Options

Command Syntax and Usage
`ip neighbors` *<IPv6 address> <MAC address>* `vlan` *<VLAN number>* `port` *<port number or alias>* Adds a static entry to the Neighbor Discovery cache table. **Command mode**: Global configuration
`no ip neighbors` {*<IPv6 address>*|`all`} Deletes the selected entry from the static Neighbor Discovery cache table. **Command mode**: Global configuration
`no ip neighbors` [`all if`|`all interface port`|`all vlan` *<VLAN number>*|`all`] Clears the selected static entries in the Neighbor Discovery cache table. **Command mode**: Global configuration

IPv6 Path MTU Configuration

The following table describes the configuration options for Path MTU (Maximum Transmission Unit). The Path MTU cache can consume system memory and affect performance. These commands allow you to manage the Path MTU cache.

Table 329. IPv6 Path MTU Options

Command Syntax and Usage
`ip pmtu6 timeout 0|`*<10-100>* Sets the timeout value for Path MTU cache entries, in minutes. Enter 0 (zero) to set the timeout to infinity (no timeout). The default value is 10 minutes. **Command mode**: Global configuration
`clear ipv6 pmtu` Clears all entries in the Path MTU cache. **Command mode**: All Except User EXEC
`show ipv6 pmtu` Displays the current Path MTU configuration. **Command mode**: All

IPv6 Neighbor Discovery Prefix Configuration

The following table describes the Neighbor Discovery prefix configuration options. These commands allow you to define a list of prefixes to be placed in Prefix Information options in Router Advertisement messages sent from an interface.

Table 330. IPv6 Neighbor Discovery Prefix Options

Command Syntax and Usage
`interface ip` *<1-127>* Enters Interface IP mode. **Command mode**: Global configuration
`ipv6 nd prefix` {*<IPv6 prefix> <prefix length>*} `[no-advertise]` Adds a Neighbor Discovery prefix to the interface. The default setting is `enabled`. To disable the prefix and not advertise it in the Prefix Information options in Router Advertisement messages sent from the interface use the `no-advertise` option. Additional prefix options are listed below. **Command mode**: Interface IP
`no ipv6 nd prefix` [*<IPv6 prefix> <prefix length>*]|`interface`|`all` Removes a Neighbor Discovery prefix. If you specify an interface number, all prefixes for the interface are removed. **Command mode**: Interface IP

`ipv6 nd prefix` {*<IPv6 prefix> <prefix length>*}
`valid-lifetime` *<0-4294967295>* `[infinite`|`variable}`
`prefered-lifetime` *<0-4294967295>* `[infinite`|`variable}`
Configures the Valid Lifetime and (optionally) the Preferred Lifetime of the prefix, in seconds.
The Valid Lifetime is the length of time (relative to the time the packet is sent) that the prefix is valid for the purpose of on-link determination. The default value is 2592000.
The Preferred Lifetime is the length of time (relative to the time the packet is sent) that addresses generated from the prefix via stateless address autoconfiguration remain preferred. The default value is 604800.
Note: The Preferred Lifetime value must not exceed the Valid Lifetime value.
Command mode: Interface IP

`ipv6 nd prefix` {*<IPv6 prefix> <prefix length>*} `off-link` Disables the on-link flag. When enabled, the on-link flag indicates that this prefix can be used for on-link determination. When disabled, the advertisement makes no statement about on-link or off-link properties of the prefix. The default setting is `enabled`. To clear the off-link flag, omit the off-link parameter when you issue this command. **Command mode**: Interface IP

Table 330. IPv6 Neighbor Discovery Prefix Options (continued)

Command Syntax and Usage
`ipv6 nd prefix` {*<IPv6 prefix> <prefix length>*} `no-autoconfig` Disables the autonomous flag. When enabled, the autonomous flag indicates that the prefix can be used for stateless address configuration. The default setting is `enabled`. **Command mode**: Interface IP
`show ipv6 prefix` {*<interface number>*} Displays current Neighbor Discovery prefix parameters. **Command mode**: All

IPv6 Prefix Policy Table Configuration

The following table describes the configuration options for the IPv6 Prefix Policy Table. The Prefix Policy Table allows you to override the default address selection criteria.

Table 331. IPv6 Prefix Policy Table Options

Command Syntax and Usage
`ip prefix-policy` *<IPv6 prefix> <prefix length> <precedence (0-100)> <label (0-100)>* Adds a Prefix Policy Table entry. Enter the following parameters: – IPv6 address prefix – Prefix length – **Precedence**: The precedence is used to sort destination addresses. Prefixes with a higher precedence are sorted before those with a lower precedence. – **Label**: The label allows you to select prefixes based on matching labels. Source prefixes are coupled with destination prefixes if their labels match. **Command mode**: Global configuration
`no ip prefix-policy` *<IPv6 prefix> <prefix length> <precedence (0-100)> <label (0-100)>* Removes a prefix policy table entry. **Command mode**: Global configuration
`show ip prefix-policy` Displays the current Prefix Policy Table configuration. **Command mode**: All

IP Loopback Interface Configuration

An IP loopback interface is not connected to any physical port. A loopback interface is always accessible over the network.

Table 332. IP Loopback Interface Configuration Options

Command Syntax and Usage
`interface loopback` *<1-5>* Enter Interface loopback mode. **Command mode**: Global configuration
`no interface loopback` *<1-5>* Deletes the selected loopback interface. **Command mode**: Global configuration
`ip address` *<IP address>* Defines the loopback interface IP address. **Command mode**: Interface loopback
`ip netmask` *<subnet mask>* Defines the loopback interface subnet mask. **Command mode**: Interface loopback
`ip ospf area` *<area number>* Configures the OSPF area index used by the loopback interface. **Command mode**: Interface loopback
`[no] ip ospf enable` Enables or disables OSPF for the loopback interface. **Command mode**: Interface loopback
`enable` Enables the loopback interface. **Command mode**: Interface loopback
`no enable` Disables the loopback interface. **Command mode**: Interface loopback
`show interface loopback` *<1-5>* Displays the current IP loopback interface parameters. **Command mode**: All

Flooding VLAN Configuration Menu

Table 333. Flooding VLAN Menu Options

Command Syntax and Usage
`flood` Configures the switch to flood unregistered IP multicast traffic to all ports. The default setting is `enabled`. **Note:** If none of the IGMP hosts reside on the VLAN of the streaming server for a IPMC group, you must disable IGMP flooding to ensure that multicast data is forwarded across the VLANs for that IPMC group. **Command mode**: VLAN
`cpu` Configures the switch to forward unregistered IP multicast traffic to the MP, which adds an entry in the IPMC table, as follows: – If no Mrouter is present, drop subsequent packets with same IPMC. – If an Mrouter is present, forward subsequent packets to the Mrouter(s) on the ingress VLAN. The default setting is `enabled`. **Note**: If both `flood` and `cpu` are disabled, the switch drops all unregistered IPMC traffic. **Command mode**: VLAN
`[no] optflood` Enables or disables optimized flooding. When enabled, optimized flooding avoids packet loss during the learning period. The default setting is `disabled`. **Command mode**: VLAN
`show vlan <`*vlan number*`> information` Displays the current flooding parameters for the selected VLAN. **Command mode**: All

DHCP Snooping

DHCP Snooping provides security by filtering untrusted DHCP packets and by maintaining a binding table of trusted interfaces.

Table 334. DHCP Snooping Options

Command Syntax and Usage
`ip dhcp snooping vlan` *<VLAN number>* Adds the selected VLAN to DHCP Snooping. Member ports participate in DHCP Snooping. **Command mode**: Global configuration
`no ip dhcp snooping vlan` *<VLAN number>* Removes the selected VLAN from DHCP Snooping. **Command mode**: Global configuration
`ip dhcp snooping binding` *<MAC address>* `vlan` *<VLAN number>* *<IP address>* `port` *<port alias or number>* `expiry` *<lease>* Adds a manual entry to the binding table. **Command mode**: Global configuration
`no ip dhcp snooping binding` {*<MAC address>*|`all` `[interface port` *<port alias or number>*|`vlan` *<VLAN number>*`]`} Removes an entry from the binding table. **Command mode**: Global configuration
`ip dhcp snooping` Turns on DHCP Snooping. **Command mode**: Global configuration
`no ip dhcp snooping` Turns off DHCP Snooping. **Command mode**: Global configuration
`[no] ip dhcp snooping information option-insert` Enables or disables option 82 support for DHCP Snooping. When enabled, DHCP Snooping performs the following functions: – If a DHCP packet from a client contains option 82 information, the information is retained. – When DHCP Snooping forwards a DHCP packet from a client, option 82 information is added to the packet; – When DHCP snooping forward a DHCP packet from a server, option 82 information is removed from the packet. **Command mode**: Global configuration
`show ip dhcp snooping` Displays the current DHCP Snooping parameters. **Command mode**: All

Converged Enhanced Ethernet Configuration

Table 335 describes the Converged Enhanced Ethernet (CEE) configuration commands.

Table 335. CEE Configuration Options

Command Syntax and Usage
`cee enable` Globally turns CEE on. **Command mode**: Global configuration
`no cee enable` Globally turns CEE off. **Command mode**: Global configuration
`[no] cee iscsi enable` Enables or disables ISCSI TLV advertisements. **Command mode**: Global configuration
`show cee iscsi` Displays the current ISCSI TLV parameters. **Command mode**: All
`show cee` Displays the current CEE parameters. **Command mode**: All

ETS Global Configuration

Enhanced Transmission Selection (ETS) allows you to allocate bandwidth to different traffic types, based on 802.1p priority.

Note: ETS configuration supersedes the QoS 802.1p menu and commands. When ETS is enabled, you cannot configure the 802.1p options.

ETS Global Priority Group Configuration

Table 336 describes the global ETS Priority Group configuration options.

Table 336. Global ETS Priority Group Options

Command Syntax and Usage
`cee global ets priority-group pgid` *<0-7, 15>* `priority` *<802.1p priority (0-7)>* `bandwidth` *<bandwidth percentage (0, 10-100)>* Allows you to configure Priority Group parameters. You can enter the link bandwidth percentage allocated to the Priority Group, and also assign one or more 802.1p values to the Priority Group. **Note:** Priority Group 15 is a strict priority group and does not need bandwidth assigned to it. **Command mode**: Global configuration
`[no] cee global ets priority-group pgid` *<0-7, 15>* `description` *<1-31 characters>* Enter text that describes this Priority Group. **Command mode**: Global configuration
`cee global ets priority-group pgid` *<0-7, 15>* `priority` *<0-7>* Adds one or more 802.1p priority values to the Priority Group. Enter one value per line, null to end. **Command mode**: Global configuration
`show cee global ets priority-group` *<0-7, 15>* Displays the current global ETS Priority Group parameters. **Command mode**: All
`show cee global ets` Displays the current global ETS parameters. **Command mode**: All

Priority Flow Control Configuration

Priority-based Flow Control (PFC) enhances flow control by allowing the switch to pause traffic based on its 802.1p priority value, while allowing traffic at other priority levels to continue.

802.1p PFC Configuration

Table 338 describes the 802.1p Priority Flow Control (PFC) configuration options.

Table 337. PFC 802.1p Configuration Options

Command Syntax and Usage
`cee port` *<port alias, number, or range>* `pfc priority` *<0-7>* `enable` Enables Priority Flow Control on the selected 802.1p priority. **Note**: PFC can be enabled on 802.1p priority 3 and one other priority only. **Command mode**: Global configuration
`no cee port` *<port alias, number, or range>* `pfc priority` *<0-7>* `enable` Disables Priority Flow Control on the selected 802.1p priority. **Note**: PFC on 802.1p priority 3 cannot be disabled. **Command mode**: Global configuration
`[no] cee port` *<port alias, number, or range>* `pfc priority` *<0-7>* `description` *<1-31 characters>* Enter text to describe the priority value. **Command mode**: Global configuration
`show cee port` *<port alias, number, or range>* `pfc` Displays the current 802.1p Priority Flow Control configuration on the specified port or ports. **Command mode**: All
`show cee port` *<port alias, number, or range>* `pfc priority` *<0-7>* Displays the current 802.1p Priority Flow Control parameters. **Command mode**: All

DCBX Port Configuration

Table 338 describes the port DCB Capability Exchange Protocol (DCBX) configuration options.

Table 338. Port DCBX Configuration Options

Command Syntax and Usage
`[no] cee port` *<port alias, number, or range>* `dcbx app_proto advertise` Enables or disables DCBX Application Protocol advertisements of configuration data. When enabled, the Advertisement flag is set to 1 (advertise data to the peer device). **Command mode**: Global configuration
`[no] cee port` *<port alias, number, or range>* `dcbx app_proto willing` Enables or disables Application Protocol willingness to accept configuration data from the peer device. When enabled, the Willing flag is set to 1 (willing to accept data). **Command mode**: Global configuration
`[no] cee port` *<port alias, number, or range>* `dcbx ets advertiFse` Enables or disables DCBX ETS advertisements of configuration data. When enabled, the Advertisement flag is set to 1 (advertise data to the peer device). **Command mode**: Global configuration
`[no] cee port` *<port alias, number, or range>* `dcbx ets willing` Enables or disables ETS willingness to accept configuration data from the peer device. When enabled, the Willing flag is set to 1 (willing to accept data). **Command mode**: Global configuration
`[no] cee port` *<port alias, number, or range>* `dcbx pfc advertise` Enables or disables DCBX PFC advertisements of configuration data. When enabled, the Advertisement flag is set to 1 (advertise data to the peer device). **Command mode**: Global configuration
`[no] cee port` *<port alias, number, or range>* `dcbx pfc willing` Enables or disables PFC willingness to accept configuration data from the peer device. When enabled, the Willing flag is set to 1 (willing to accept data). **Command mode**: Global configuration
`no cee port` *<port alias, number, or range>* `dcbx enable` Disables DCBX on the port. **Command mode**: Global configuration
`cee port` *<port alias, number, or range>* `dcbx enable` Enables DCBX on the port. **Command mode**: Global configuration
`show cee port` *<port alias, number, or range>* `dcbx` Displays the current port DCBX parameters. **Command mode**: All

Fiber Channel over Ethernet Configuration

Fiber Channel over Ethernet (FCoE) transports Fiber Channel frames over an Ethernet fabric. The CEE features and FCoE features allow you to create a lossless Ethernet transport mechanism.

Table 339 describes the FCoE configuration options.

Table 339. FCoE Configuration Options

Command Syntax and Usage
`fcoe fips enable` Globally turns FIP Snooping on. **Command mode**: Global configuration
`no fcoe fips enable` Globally turns FIP Snooping off. **Command mode**: Global configuration
`[no] fcoe fips timeout-acl` Enables or disables ACL time-out removal. When enabled, ACLs associated with expired FCFs and FCoE connections are removed from the system. **Command mode**: Global configuration
`[no] fcoe fips automatic-vlan` Enables or disables automatic VLAN creation, based on response received from the connected device. **Command mode**: Global configuration
`show fcoe information` Displays the current FCoE parameters. **Command mode**: All

FIPS Port Configuration

FIP Snooping allows the switch to monitor FCoE Initialization Protocol (FIP) frames to gather discovery, initialization, and maintenance data. This data is used to automatically configure ACLs that provide FCoE connections and data security.

Table 340 describes the port Fiber Channel over Ethernet Initialization Protocol (FIP) Snooping configuration options.

Table 340. Port FIP Snooping Options

Command Syntax and Usage
`fcoe fips port` *<port alias or number>* `fcf-mode [auto|on|off]` Configures FCoE Forwarding (FCF) on the port, as follows: – `on`: Configures the port as a Fiber Channel Forwarding (FCF) port. – `off`: Configures the port as an FCoE node (ENode port). – `auto`: Automatically detect the configuration of the connected device, and configure this port to match. **Command mode**: Global configuration
`fcoe fips port` *<port alias or number>* `enable` Enables FIP Snooping on the port. The default setting is `enabled`. **Command mode**: Global configuration
`no fcoe fips port` *<port alias or number>* `enable` Disables FIP Snooping on the port. **Command mode**: Global configuration

Remote Monitoring Configuration

Remote Monitoring (RMON) allows you to monitor traffic flowing through the switch. The RMON MIB is described in RFC 1757.

The following sections describe the Remote Monitoring (RMON) configuration options.

- "RMON History Configuration" on page 460
- "RMON Event Configuration" on page 461
- "RMON Alarm Configuration" on page 462

RMON History Configuration

Table 341 describes the RMON History commands.

Table 341. RMON History Configuration Options

Command Syntax and Usage
`rmon history` *<1-65535>* `interface-oid` *<1-127 characters>* Configures the interface MIB Object Identifier. The IFOID must correspond to the standard interface OID, as follows: 1.3.6.1.2.1.2.2.1.1.x where x is the `ifIndex` **Command mode**: Global configuration
`rmon history` *<1-65535>* `requested-buckets` *<1-65535>* Configures the requested number of buckets, which is the number of discrete time intervals over which data is to be saved. The default value is 30. The maximum number of buckets that can be granted is 50. **Command mode**: Global configuration
`rmon history` *<1-65535>* `polling-interval` *<1-3600>* Configures the time interval over which the data is sampled for each bucket. The default value is 1800. **Command mode**: Global configuration
`rmon history` *<1-65535>* `owner` *<1-127 characters>* Enter a text string that identifies the person or entity that uses this History index. **Command mode**: Global configuration
`no rmon history` *<1-65535>* Deletes the selected History index. **Command mode**: Global configuration
`show rmon history` Displays the current RMON History parameters. **Command mode**: All

RMON Event Configuration

Table 342 describes the RMON Event commands.

Table 342. RMON Event Configuration Options

Command Syntax and Usage
`rmon event` *<1-65535>* `description` *<1-127 characters>* Enter a text string to describe the event. **Command mode**: Global configuration
`[no] rmon event` *<1-65535>* `type log|trap|both` Selects the type of notification provided for this event. For log events, an entry is made in the log table and sent to the configured syslog host. For trap events, an SNMP trap is sent to the management station. **Command mode**: Global configuration
`rmon event` *<1-65535>* `owner` *<1-127 characters>* Enter a text string that identifies the person or entity that uses this event index. **Command mode**: Global configuration
`no rmon event` *<1-65535>* Deletes the selected RMON Event index. **Command mode**: Global configuration
`show rmon event` Displays the current RMON Event parameters. **Command mode**: All

RMON Alarm Configuration

The alarm RMON group can track rising or falling values for a MIB object. The MIB object must be a counter, gauge, integer, or time interval. Each alarm index must correspond to an event index that triggers once the alarm threshold is crossed.

Table 343 describes the RMON alarm commands.

Table 343. RMON Alarm Configuration Options

Command Syntax and Usage
`rmon alarm` *<1-65535>* `oid` *<1-127 characters>* Configures an alarm MIB Object Identifier. **Command mode**: Global configuration
`rmon alarm` *<1-65535>* `interval` *<1-65535>* Configures the time interval over which data is sampled and compared with the rising and falling thresholds. The default value is 1800. **Command mode**: Global configuration
`rmon alarm` *<1-65535>* `sample abs|delta` Configures the method of sampling the selected variable and calculating the value to be compared against the thresholds, as follows: – `abs`—absolute value, the value of the selected variable is compared directly with the thresholds at the end of the sampling interval. – `delta`—delta value, the value of the selected variable at the last sample is subtracted from the current value, and the difference compared with the thresholds. **Command mode**: Global configuration
`rmon alarm` *<1-65535>* `alarm-type rising|falling|either` Configures the alarm type as rising, falling, or either (rising or falling). **Command mode**: Global configuration
`rmon alarm` *<1-65535>* `rising-limit` *<-2147483647 - 2147483647>* Configures the rising threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single event is generated. **Command mode**: Global configuration
`rmon alarm` *<1-65535>* `falling-limit` *<-2147483647 - 214748364)* Configures the falling threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single event is generated. **Command mode**: Global configuration

Table 343. RMON Alarm Configuration Options (continued)

Command Syntax and Usage
`rmon alarm` *<1-65535>* `rising-crossing-index` *<1-65535>* Configures the rising alarm event index that is triggered when a rising threshold is crossed. **Command mode**: Global configuration
`rmon alarm` *<1-65535>* `falling-crossing-index` *<1-65535>* Configures the falling alarm event index that is triggered when a falling threshold is crossed. **Command mode**: Global configuration
`rmon alarm` *<1-65535>* `owner` *<1-127 characters>* Enter a text string that identifies the person or entity that uses this alarm index. **Command mode**: Global configuration
`no rmon alarm` *<1-65535>* Deletes the selected RMON Alarm index. **Command mode**: Global configuration
`show rmon alarm` Displays the current RMON Alarm parameters. **Command mode**: All

Virtualization Configuration

Table 344 describes the virtualization configuration options.

Table 344. Virtualization Configuration Options

Command Syntax and Usage
`virt enable` Enables VMready. Before you enable VMready, you must define one or more server ports. See "Server Port Configuration" on page 273. **Command mode**: Global configuration
`no virt enable` Disables VMready. **Note**: This command deletes all configured VM groups. **Command mode**: Global configuration
`show virt` Displays the current virtualization parameters. **Command mode**: All

VM Policy Bandwidth Management

Table 345 describes the bandwidth management options for the selected VM. Use these commands to limit the bandwidth used by each VM.

Table 345. VM Bandwidth Management Options

Command Syntax and Usage
`virt vmpolicy vmbwidth [`*<MAC address>*|*<UUID>*|*<name>*|*<IP address>*|*<index number>*`] txrate` *<64-10000000>* *<max. burst (32-4096)>* *<ACL number>* The first value configures Committed Rate—the amount of bandwidth available to traffic transmitted from the VM to the switch, in megabits per second. Enter the value in multiples of 64. The second values configures the maximum burst size, in kilobits. Enter one of the following values: 32, 64, 128, 256, 512, 1024, 2048, 4096. The third value represents the ACL assigned to the transmission rate. The ACL is added automatically, in sequential order, if not specified by the user. If there are no available ACLs, the TXrate cannot be configured. Each TXrate configuration reduces the number of available ACLs by one. **Command mode:** Global configuration
`virt vmpolicy vmbwidth [`*<MAC address>*|*<UUID>*|*<name>*|*<IP address>*|*<index number>*`] rxrate` *<64-10000000>* The first value configures Committed Rate—the amount of bandwidth available to traffic transmitted from the switch to the VM, in kilobits per second. Enter the value in multiples of 64. The second values configures the maximum burst size, in Kilobits. Enter one of the following values: 32, 64, 128, 256, 512, 1024, 2048, 4096. **Command mode:** Global configuration
`[no] virt vmpolicy vmbwidth [`*<MAC address>*|*<UUID>*|*<name>*|*<IP address>*|*<index number>*`] bwctrl` Enables or disables bandwidth control on the VM policy. **Command mode:** Global configuration
`[no] virt vmpolicy vmbwidth [`*<MAC address>*|*<UUID>*|*<name>*|*<IP address>*|*<index number>*`]` Deletes the bandwidth management settings from this VM policy. **Command mode:** Global configuration
`show virt vmpolicy vmbandwidth [`*<MAC address>*|*<UUID>*|*<name>*|*<IP address>*|*<index number>*`]` Displays the current VM bandwidth management parameters. **Command mode:** All

Virtual NIC Configuration

Table 346 describes the Virtual NIC (vNIC) configuration options.

Table 346. Virtual NIC Options

Command Syntax and Usage
`vnic enable` Globally turns vNIC on. **Command mode**: Global configuration
`no vnic enable` Globally turns vNIC off. **Command mode**: Global configuration
`show vnic` Displays the current vNIC parameters. **Command mode**: Global configuration

vNIC Port Configuration

Table 347 describes the Virtual NIC (vNIC) port configuration options.

Table 347. vNIC Port Configuration Options

Command Syntax and Usage
`vnic port` *<port alias or number>* `index` *<1-4>* Enters vNIC Configuration mode. **Note**: This command is valid for internal server ports only. **Command mode**: Global configuration
`bandwidth` *<1-100>* Configures the maximum bandwidth allocated to this vNIC, in increments of 100 Mbps. For example: – 1 = 100 Mbps – 10 = 1000 Mbps **Command mode**: vNIC configuration
`enable` Enables the vNIC. **Command mode**: vNIC configuration
`no enable` Disables the vNIC. **Command mode**: vNIC configuration

Virtual NIC Group Configuration

Table 348 describes the Virtual NIC (vNIC) Group configuration options.

Table 348. vNIC Group Configuration Options

Command Syntax and Usage
`vnic vnicgroup` *<1-32>* Enters vNIC Group Configuration mode. **Command mode:** Global Configuration
`vlan` *<VLAN number>* Assigns a VLAN to the vNIC Group. **Command mode:** vNIC Group configuration
`[no] failover` Enables or disables uplink failover for the vNIC Group. Uplink Failover for the vNIC Group will disable only the affected vNIC links on the port. Other port functions continue to operate normally. The default setting is `disabled`. **Command mode:** vNIC Group configuration
`member` *<vNIC number>* Adds a vNIC to the vNIC Group. The vNIC ID is comprised of the port number and the vNIC number. For example: `1.1` **Command mode:** vNIC Group configuration
`no member` *<vNIC number>* Removes the selected vNIC from the vNIC Group. **Command mode:** vNIC Group configuration
`port` *<port number or alias>* Adds the selected switch port to the vNIC Group. **Command mode:** vNIC Group configuration
`no port` *<port number or alias>* Removes the selected switch port from the vNIC Group. **Command mode:** vNIC Group configuration
`trunk` *<trunk number>* Adds the selected trunk group to the vNIC Group. **Command mode:** vNIC Group configuration
`no trunk` *<trunk number>* Removes the selected trunk group from the vNIC Group. **Command mode:** vNIC Group configuration

Table 348. vNIC Group Configuration Options (continued)

Command Syntax and Usage
`enable` Enables the vNIC Group. **Command mode:** vNIC Group configuration
`no enable` Disables the vNIC Group. **Command mode:** vNIC Group configuration
`no vnic vnicgroup` <*1-32*> Deletes the selected vNIC Group. **Command mode:** Global configuration
`show vnicgroup` Displays the current vNIC Group parameters. **Command mode:** All

VM Group Configuration

Table 349 describes the VM group configuration options.A VM group is a collection of members, such as VMs, ports, or trunk groups. Members of a VM group share certain properties, including VLAN membership, ACLs (VMAP), and VM profiles.

Table 349. VM Group Configuration Options

Command Syntax and Usage
`virt vmgroup` *<1-1024>* `vlan` *<VLAN number>* Assigns a VLAN to this VM group. If you do not assign a VLAN to the VM group, the switch automatically assigns the first unused VLAN when adding a port or a VM to the VM Group. **Note**: If you add a VM profile to this group, the group will use the VLAN assigned to the profile. **Command mode:** Global configuration
`[no] virt vmgroup` *<1-1024>* `vmap` *<VMAP number>* `serverports`|`non-serverports` Assigns the selected VLAN Map to this group. You can choose to limit operation of the VLAN Map to server ports only or non-server ports only. If you do not select a port type, the VMAP is applied to the entire VM Group. For more information about configuring VLAN Maps, see "VMAP Configuration" on page 308. **Command mode:** Global configuration
`[no] virt vmgroup` *<1-1024>* `tag` Enables or disables VLAN tagging on ports in this VM group. **Command mode:** Global configuration
`virt vmgroup` *<1-1024>* `vm [`*<MAC address>*|*<UUID>*|*<name>*|*<IP address>*|*<index number>*`]` Adds a VM to the VM group. Enter a unique identifier to select a VM. The UUID and name parameters apply only if Virtual Center information is configured (`virt vmware vcspec`). The VM index number is found in the VM information dump (`show virt vm`). **Note**: If the VM is connected to a port that is contained within the VM group, do not add the VM to the VM group. **Command mode:** Global configuration
`no virt vmgroup` *<1-1024>* `vm [`*<MAC address>*|*<UUID>*|*<name>*|*<IP address>*|*<index number>*`]` Removes a VM from the VM group. Enter a unique identifier to select a VM. The UUID and name parameters apply only if Virtual Center information is configured (`virt vmware vcspec`). The VM index number is found in the VM information dump (`show virt vm`). **Command mode:** Global configuration

Table 349. VM Group Configuration Options (continued)

Command Syntax and Usage
`virt vmgroup` *<1-1024>* `profile` *<profile name (1-39 characters)>* Adds the selected VM profile to the VM group. **Note:** This command can only be used if the VM group is empty (that is, it only has a profile assigned). **Command mode:** Global configuration
`no virt vmgroup` *<1-1024>* `profile` Removes the VM profile assigned to the VM group. **Note:** This command can only be used if the VM group is empty (only has the profile assigned). **Command mode:** Global configuration
`virt vmgroup` *<1-1024>* `port` *<port alias or number>* Adds the selected port to the VM group. **Note**: A port can be added to a VM group only if no VMs on that port are members of the VM group. **Command mode:** Global configuration
`no virt vmgroup` *<1-1024>* `port` *<port alias or number>* Removes the selected port from the VM group. **Command mode:** Global configuration
`virt vmgroup` *<1-1024>* `portchannel` *<trunk number>* Adds the selected trunk group to the VM group. **Command mode:** Global configuration
`no virt vmgroup` *<1-1024>* `portchannel` *<trunk number>* Removes the selected trunk group from the VM group. **Command mode:** Global configuration
`virt vmgroup` *<1-1024>* `key` *<1-65535>* Adds an LACP *admin key* to the VM group. LACP trunks formed with this *admin key* will be included in the VM group. **Command mode:** Global configuration
`no virt vmgroup` *<1-1024>* `key` *<1-65535>* Removes an LACP *admin key* from the VM group. **Command mode:** Global configuration
`virt vmgroup` *<1-1024>* `stg` *<STG number>* Assigns the VM group to a Spanning Tree Group (STG). **Command mode:** Global configuration

Table 349. VM Group Configuration Options (continued)

Command Syntax and Usage
`virt vmgroup <1-1024> validate [basic|advanced]` Enables MAC address spoof prevention for the specified VM group. Default setting is disabled. – `basic` validation ensures lightweight port-based protection by cross-checking the VM MAC address, switch port and switch ID between the switch and the hypervisor. Applicable for “trusted” hypervisors, which are not susceptible to duplicating or reusing MAC addresses on virtual machines. – `advanced` validation ensures heavyweight VM-based protection by cross-checking the VM MAC address, VM UUID, switch port and switch ID between the switch and the hypervisor. Applicable for “untrusted” hypervisors, which are susceptible to duplicating or reusing MAC addresses on virtual machines. **Command mode:** Global configuration
`no virt vmgroup <1-1024> validate` Disables MAC address spoof prevention for the specified VM group. **Command mode:** Global configuration
`no virt vmgroup <1-1024>` Deletes the VM group. **Command mode:** Global configuration
`show virt vmgroup <1-1024>` Displays the current VM group parameters. **Command mode:** All

VM Check Configuration

Table 350 describes the VM Check validation options used for MAC address spoof prevention.

Table 350. VM Check Configuration Options

Command Syntax and Usage
`virt vmcheck acls max` *<1-256>* Configures the maximum number of ACLs that can be set up for MAC address spoofing prevention in advanced validation mode. Default value is 50. **Command mode:** Global configuration
`no virt vmcheck acls` Disables ACL-based MAC address spoofing prevention in advanced validation mode. **Command mode:** Global configuration
`virt vmcheck action basic {link|log}` Sets up action taken when detecting MAC address spoofing in basic validation mode: – `link` registers a syslog entry and disables the corresponding switch port – `log` registers a syslog entry Default setting is `link`. **Command mode:** Global configuration
`virt vmcheck action advanced {acl|link|log}` Sets up action taken when detecting MAC address spoofing in advanced validation mode: – `acl` registers a syslog entry and installs an ACL to drop traffic incoming on the corresponding switch port originating from the spoofed MAC address – `link` registers a syslog entry and disables the corresponding switch port – `log` registers a syslog entry Default setting is `acl`. **Command mode:** Global configuration
`[no] virt vmcheck trust` *<ports>* Enables or disables trusted ports for VM communication. By default, all ports are disabled. **Command mode:** Global configuration
`show virt vmcheck` Displays the current VM Check settings. See page 116 for sample output. **Command mode:** Global configuration

VM Profile Configuration

Table 351 describes the VM Profiles configuration options.

Table 351. VM Profile Configuration Options

Command Syntax and Usage
`virt vmprofile` *<profile name (1-39 characters)>* Defines a name for the VM profile. The switch supports up to 32 VM profiles. **Command mode:** Global configuration
`no virt vmprofile` *<profile name (1-39 characters)>* Deletes the selected VM profile. **Command mode:** Global configuration
`virt vmprofile edit` *<profile name (1-39 characters)>* `vlan` *<VLAN number>* Assigns a VLAN to the VM profile. **Command mode:** Global configuration
`[no] virt vmprofile edit` *<profile name (1-39 characters)>* `shaping` [*<average (1-1000000000)> <burst (1-1000000000)> <peak (1-1000000000)>*] Configures traffic shaping parameters implemented in the hypervisor, as follows: – Average traffic, in Kilobits per second – Maximum burst size, in Kilobytes – Peak traffic, in Kilobits per second – Delete traffic shaping parameters. **Command mode:** Global configuration
`[no] virt vmprofile edit` *<profile name (1-39 characters)>* `eshaping` [*<average (1-1000000000)> <burst (1-1000000000)> <peak (1-1000000000)>*] Configures traffic egress shaping parameters implemented in the hypervisor, as follows: – Average traffic, in Kilobits per second – Maximum burst size, in Kilobytes – Peak traffic, in Kilobits per second – Delete traffic shaping parameters. **Command mode:** Global configuration
`show virt vmprofile` [*<profile name>*] Displays the current VM Profile parameters. **Command mode:** All

VMWare Configuration

Table 352 describes the VMware configuration options. When you configure the VMware Virtual Center, the VM Agent module in the switch can perform advanced functionality by communicating with the VMware management console. The Virtual Center provides VM and Host names, IP addresses, Virtual Switch and port group information. The VM Agent on the switch communicates with the Virtual Center to synchronize VM profiles between the switch and the VMware virtual switch.

Table 352. VM Ware Configuration Options

Command Syntax and Usage
`virt vmware hbport` *<1-65535>* Configures the UDP port number used for heartbeat communication from the VM host to the Virtual Center. The default value is port 902. **Command mode:** Global configuration
`[no] virt vmware vcspec [`*<IP address>*`|[`*<username>*` noauth]` Defines the Virtual Center credentials on the switch. Once you configure the Virtual Center, VM Agent functionality is enabled across the system. You are prompted for the following information: – IP address of the Virtual Center – User name and password for the Virtual Center – Whether to authenticate the SSL security certificate (yes or no) **Command mode:** Global configuration
`virt vmware hello [enable|haddr` *<IP_address>*`|hport` *<port_no>*`|htimer` *<1-60>*`]` Configures CDP (Ciscoz Discovery Protocol) advertisements sent periodically to VMware ESX hypervisors. Exchanging CDP message with ESX hypervisors facilitates MAC address spoof prevention. Default setting is disabled. – `enable` enables CDP advertisements transmission. – `haddr` advertises a specific IP address instead of the default 0.0.0.0 IP. – `hport` enables ports on which CDP advertisements are sent. – `htimer` sets the number of seconds between successive CDP advertisements. Default value is 30. **Command mode:** Global configuration
`no virt vmware hello [enable|hport` *<port_no>*`]` Disables CDP advertisement transmissions completely or only on specific ports. **Command mode**: Global configuration
`show virt vmware` Displays the current VMware parameters. **Command mode:** All

Miscellaneous VMready Configuration

You can pre-configure MAC addresses as VM Organization Unique Identifiers (OUIs). These configuration commands are only available using the IBM N/OS CLI and the Miscellaneous VMready Configuration Menu. Table 352 describes the VMready configuration options.

Table 353. VMready Configuration Options

Command Syntax and Usage
`virt vmrmisc oui` *<3 byte VM MAC OUI> <Vendor Name>* Adds a MAC OUI. **Command mode:** Global configuration
`no virt vmrmisc oui` *<3 byte VM MAC OUI>* Removes a MAC OUI. **Command mode:** Global configuration
`show virt oui` Displays all the configured MAC OUIs. **Command mode:** Global configuration
`virt vmrmisc lmac` Enables the switch to treat locally administered MAC addresses as VMs. **Command mode:** Global configuration
`no virt vmrmisc lmac` Disables the switch from treating locally administered MAC addresses as VMs. **Command mode:** Global configuration

Edge Virtual Bridge VSI Type Database Configuration

You can configure your switch to use Edge Virtual Bridging (EVB). Table 352 describes the EVB VSI Type Database configuration options.

Table 354. Edge Virtual Bridge Configuration Options

Command Syntax and Usage
`virt evb vsidb` *<VSIDB_number>* Enter Virtual Station Interface Database configuration mode. **Command mode:** Global configuration
`virt evb update vsidb` *<VSIDB_number>* Update VSI types from the VSI database. **Command mode**: All
`clear virt evb vsidb` *<VSIDB_number>* Clears local VSI types cache. **Command mode**: Privileged EXEC
`clear virt evb vsi` Clears VSI database associations. **Command mode**: Privileged EXEC
`host` *<IP address>* Sets the Virtual Station Interface Type database manager IP address. **Command mode:** VSI Database
`port` *<1-65534>* Sets the Virtual Station Interface Type database manager port. **Command mode:** VSI Database
`filename` *<URI path>* Sets the Virtual Station Interface Type database document name. **Command mode:** VSI Database
`filepath` *<URI path>* Sets the Virtual Station Interface Type database document path. **Command mode:** VSI Database
`update-interval` *<5-300>* Sets the Virtual Station Interface Type database update interval in seconds. A value of “0” disables periodic updates. **Command mode:** VSI Database
`show virt evb vsitypes [mgrid` *<0-255>* | `typeid` *<1-16777215>* | `version` *<0-255>* Displays the current Virtual Station Interface Type database parameters. **Command mode:** All

Table 354. Edge Virtual Bridge Configuration Options (continued)

Command Syntax and Usage
`show virt evb vsidb <VSIDB_number>` Displays the current Virtual Station Interface database information. **Command mode:** All
`no virt evb vsidb <VSIDB_number>` Resets the Virtual Station Interface Type database information to the default values. **Command mode:** Global configuration

Edge Virtual Bridge VSI Type Profile Configuration

Table 355 describes the Virtual Station Interface Type profile configuration options.

Table 355. Edge Virtual Bridge VSI Type Profile Configuration Options

Command Syntax and Usage
`virt evb profile <profile_number>` Enter Virtual Station Interface type profile configuration mode. **Command mode:** Global configuration
`[no] reflective-relay` Enables or disables VEPA mode (Reflective Relay capability). **Command mode:** EVB Profile
`[no] vsi-discovery` Enables or disables VSI Discovery (ECP and VDP). **Command mode:** EVB Profile
`no virt evb profile <profile_number>` Deletes the specified EVB profile. **Command mode:** Global configuration
`show virt evb profile [<1-16>]` Displays the current EVB profile parameters. **Command mode:** All
`evb profile <1-16>` Applies the specified EVB profile for the port. Automatically enables LLDP, EVB, and TLV on the corresponding port. **Command mode:** Interface port
`no evb profile` Resets EVB profile for the port. Automatically disables LLDP, EVB, and TLV on the corresponding port. **Command mode:** Interface port

OpenFlow Configuration

OpenFlow is an open interface used to control the forwarding plane in compatible switches and routers remotely, from an external controller. The RackSwitch G8264 can function as either a Hybrid or OpenFlow-only switch:

- In Hybrid mode (default), an OpenFlow pipeline can be set up to run in parallel to the normal Ethernet switching pipeline. The two pipelines are completely separate, each with its own dedicated ports and confined packet flows.
- In OpenFlow-only mode, the normal Ethernet switching capabilities are disabled, and the RackSwitch G8264 behaves as a pure OpenFlow switch.

Table 356 describes the OpenFlow configuration options.

Table 356. OpenFlow Configuration Options

Command Syntax and Usage
`boot profile openflow` Starts the switch in OpenFlow-only mode on reboot. **Command mode:** Global configuration
`boot profile default` Starts the switch in Hybrid mode on reboot. This is the default setting. **Command mode:** Global configuration
`[no] openflow enable` Enables or disables OpenFlow. **Note**: The following features are not supported when OpenFlow is enabled: ACL, VNIC egress, VMready VMAP, FCOE, IPv6, IPMC, ECN, PVID and MACL. **Command mode:** Global configuration
`[no] openflow edgeport` *<port_numbers>* Enables or disables the selected port as an OpenFlow edge port (outside port). Edge ports are usually connected to servers. The default setting is disabled. **Note**: Learning is turned on and flood blocking is turned on in OpenFlow edge ports. **Command mode**: Global configuration
`openflow fdb-priority` *<1-65535>* Configures a priority value to map flows with matching priority to FDB entries, if the flow uses destination MAC address and VLAN as the matching qualifier and single port as the action. The default value is 1000. **Note**: When you issue this command, all registered flow entries are cleared. **Command mode**: Global configuration
`no openflow fdb-priority` Resets priority value required for FDB flows to the default value of 1000. **Command mode:** Global configuration

Table 356. OpenFlow Configuration Options (continued)

Command Syntax and Usage
`openflow fdb-timeout` *<1-300>* Configures a time interval in seconds for periodically clearing dynamically learned FDB entries on edge ports. Default value is disabled. **Command mode**: Global configuration
`no openflow fdb-timeout` Disables periodical clearing of dynamically learned FDB entries on edge ports. **Command mode**: Global configuration
`[no] openflow fdb-aging` Enables or disables periodical clearing of dynamically learned FDB entries on a specific port. Default value is disabled on OpenFlow edge ports. **Command mode**: Interface port
`[no] openflow static-station-move` Enables or disables forwarding frames that have source MAC addresses conflicting with entries in the static FDB table. This enables equal cost multi-path routing and use cases where IPS and Firewall devices forward packets without changing the source MAC address. Default value is disabled. **Command mode**: Interface port
`openflow instance` *<1-4>* Enters OpenFlow Instance command mode for the specified instance ID. **Command mode**: Global configuration, OpenFlow Instance
`no openflow instance` *<1-4>* Deletes the instance and clears flow table and statistics for the specified instance ID. **Command mode:** Global configuration, OpenFlow Instance
`[no] openflow mgmtport` *<ports>* Enables or disables OpenFlow management for the selected port. Use OpenFlow management ports to communicate with an OpenFlow Controller. In Hybrid mode, controllers can also connect to the switch using legacy ports. The default setting is `disabled`. **Command mode**: Global configuration

Table 356. OpenFlow Configuration Options (continued)

Command Syntax and Usage
`show openflow [flow-allocation	information	statistics	table]` Displays the current OpenFlow configuration.For more information, see page 104. – `flow-allocation` displays the configured, current and maximum number of flows for each OpenFlow instance. For more information, see page 104. – `information` displays the configuration for each OpenFlow instance. For more information, see page 105. – `statistics` displays traffic statistics for each OpenFlow instance. For more information see page 198. – `table` displays the basic and emergency flow tables for each OpenFlow instance. For more information, see page 106 **Command mode:** All
`show openflow instance <`*1-4*`> [information	statistics	table]` Displays OpenFlow information for the specified instance ID: – `information` displays the instance configuration – `statistics` displays traffic statistics – `table` displays the basic and emergency flow tables **Command mode:** All
`clear openflow {statistics	table [basic	emergency]}` Clears OpenFlow data for all instances: – The `statistics` option clears traffic statistics. – The `table` option clears all basic and emergency OpenFlow tables. • The `basic` option clears only the basic OpenfFlow tables. • The `emergency` option clears only the emergency OpenFlow tables. **Command mode:** Privileged EXEC
`clear openflow instance <`*1-4*`> {statistics	table [basic	emergency]}` Clears OpenFlow data for the specified instance ID: – The `statistics` option clears traffic statistics. – The `table` option clears all basic and emergency OpenFlow tables. • The `basic` option clears only the basic OpenfFlow table. • The `emergency` option clears only the emergency OpenFlow table. **Command mode:** Privileged EXEC
`[no] buffer` Enables or disables buffering support for OpenFlow packets. The default setting is `disabled`. **Command mode**: OpenFlow Instance

Table 356. OpenFlow Configuration Options (continued)

Command Syntax and Usage
`connect-retry` *<1-8>* Configures the maximum number of attempts to establish connection to a controller, before assuming the controller is down. The default value is 4. **Command mode**: OpenFlow Instance
`no connect-retry` Resets the `connect-retry` value to 4. **Command mode**: OpenFlow Instance
`controller` *<1-4>* `address` *<ip_address>* `[data-port | mgt-port]` Configures the IP address of the OpenFlow Controller. You may specify the port to use for data transfer: data port (`data-port`) or management port (`mgt-port`). By default, the system uses the management port. **Command mode:** OpenFlow Instance
`controller` *<1-4>* `port` *<TCP port number (1-65535)>* Configures the TCP port used for communication with the Controller. The default port is 6633. **Command mode:** OpenFlow Instance
`no controller` *<1-4>* Deletes the selected controller from the specified instance ID. **Command mode**: OpenFlow Instance
`dpid` *<hex string>* Applies an 8 byte Datapath ID to the instance, which enables equal cost multi-path routing in an OpenFlow environment. The default value is the instance ID followed by the switch MAC. **Command mode**: OpenFlow Instance
`no dpid` Resets the instance's Datapath ID to the default value (instance ID followed by the switch MAC). **Command mode**: OpenFlow Instance
`echo-reply-timeout` *<2-65535>* Configures the duration in seconds the switch will wait to receive an echo reply from the controller, before assuming failure. The default value is 15. **Note:** The `echo-reply-timeout` value must be lower than the `echo-request-interval` value. **Command mode**: OpenFlow Instance
`no echo-reply-timeout` Resets the `echo-reply-timeout` to the default value of 15. **Command mode**: OpenFlow Instance

Table 356. OpenFlow Configuration Options (continued)

Command Syntax and Usage
`echo-request-interval` *<5-65535>* Configures the maximum duration in seconds the switch will keep sending echo requests to a non-responsive controller. The default value is 30. **Note:** The `echo-request-interval` value must be higher than the `echo-reply-timeout` value. **Command mode**: OpenFlow Instance
`no echo-request-interval` Resets the `echo-request-interval` value to the default value of 30. **Command mode**: OpenFlow Instance
`emergency [timeout` *<0-3600>*`]` Forces the instance in emergency mode. The `timeout` parameter configures the duration in seconds after which the emergency mode expires. The default value is 30. **Command mode**: OpenFlow Instance
`no emergency [timeout]` Brings the instance out of emergency mode. The `timeout` parameter resets the emergency mode duration to the default value of 30. **Command mode:** OpenFlow Instance
`[no] enable` Enables or disables the instance. When disabling an instance, its flow tables and statistics are cleared. **Command mode**: OpenFlow Instance
`max-flow-acl` *<0-750/1000>* Enables or disables the maximum flow ACL option, which ensures a dedicated maximum number of ACL flows are available for the instance. The maximum number of entries is 750 in Hybrid mode and 1000 in OpenFlow Only mode. The total number of 750/1000 entries is shared between instances. By default, `max-flow-acl` is set to 0, allowing instances to dynamically access the available ACL flow slots until depletion. Setting `max-flow-acl` manually limits the number of ACL flow slots available for other instances by the corresponding value. **Command mode**: OpenFlow Instance
`max-flow-mcast-fdb` *<0-4096>* Enables or disables the maximum flow multicast FDB option, which ensures a dedicated maximum number of FDB multicast flows are available for the instance. The total number of 4096 entries is shared between instances. By default, `max-flow-mcast-fdb` is set to 0, allowing instances to dynamically access the available FDB multicast flow slots until depletion. Setting `max-flow-mcast-fdb` manually limits the number of FDB multicast flow slots available for other instances by the corresponding value. **Command mode:** OpenFlow Instance

Table 356. OpenFlow Configuration Options (continued)

Command Syntax and Usage
`max-flow-ucast-fdb` *<0-123904>* Enables or disables the maximum flow unicast FDB option, which ensures a dedicated maximum number of FDB unicast flows available for the instance. The total number of 123904 entries is shared between instances. By default, `max-flow-ucast-fdb` is set to 0, allowing instances to dynamically access the available FDB unicast flow slots until depletion. Setting `max-flow-ucast-fdb` manually limits the number of FDB unicast flow slots available for other instances by the corresponding value. **Command mode:** OpenFlow Instance
`no max-flow-acl` Sets the instance's maximum number of ACL based flows to the default value of 0 (dynamic allocation). **Command mode:** OpenFlow Instance
`no max-flow-mcast-fdb` Sets the instance's maximum number of FDB based multicast flows to the default value of 0 (dynamic allocation). **Command mode:** OpenFlow Instance
`no max-flow-ucast-fdb` Sets the instance's maximum number of FDB based unicast flows to the default value of 0 (dynamic allocation). **Command mode:** OpenFlow Instance
`[no] member` *<ports>* Enables or disables port usage by the OpenFlow instance for data traffic. **Command mode**: OpenFlow Instance
`min-flow-timeout` *<0-300>* Sets the minimum number of seconds after which a flow can be cleared from the instance's tables. Default value is 0, meaning controller provided values are used instead. **Command mode**: OpenFlow Instance
`no min-flow-timeout` Sets the number of seconds after which a flow can be cleared from the instance's tables to the default value of 0 (controller provided values). **Command mode**: OpenFlow Instance

Static Flows Configuration

Static flows are ACL OpenFlow entries set up manually from the CLI by the administrator. Static flows cannot be deleted/modified by OpenFlow controllers and will continue to function when the switch goes into emergency mode. Even if they qualify as FDB entries based on their settings, static flows are always stored as ACL entries. A total of maximum 750 static flows pool is shared between all OpenFlow instances.

Table 357 describes the static flow configuration options.

Table 357. Static Flows Configuration Options

Command Syntax and Usage
`static-table add index <1-750> match WORD actions WORD [options WORD] priority <0-65535>` Adds a static flow entry to the instance. **Command mode:** OpenFlow Instance
`static-table modify index <1-750> match WORD actions WORD [options WORD] priority <0-65535>` Overwrites a static flow entry. **Command mode:** OpenFlow Instance
`static-table remove index <1-750>` Deletes a static flow entry. **Command mode:** OpenFlow Instance
`clear openflow table static` Deletes all static flow entries. **Command mode:** Global configuration

The following table describes the available matching qualifiers

Table 358. Static Flow Matching Qualifiers

Qualifier	**Value**
ingress-port	Port of instance
src-mac	Source MAC address
dst-mac	Destination MAC address
vlan-id	VLAN identifier (0-4095 + 65535 (untagged))
vlan-priority	802.1p Priority Code Point (0-7)
src-ip	Source IP address
dst-ip	Destination IP address
src-port	L4 source port (0-65536)
dst-port	L4 destination port (0-65535)
ether-type	"arp"/"0806" or "ip"/"0800" or (hex-value <= 65535)
protocol	"tcp" or "udp" or 0-255
tos	IP Type of Service (0-255)

Table 358. Static Flow Matching Qualifiers (continued)

Qualifier	**Value**
type	"request" or "reply" (can be set only if ether type is ARP)
all	Applicable to all traffic

The following table describes the available actions

Table 359. Static Flow Actions

Action	**Value**
out-put	"all","in-port","flood","controller" or a valid port
set-src-mac	Change source MAC address
set-dst-mac	Change destination MAC address
strip-vlan-id	Remove VLAN identifier
set-vlan-priority	Set 802.1p priority code point value (0-7)
set-nw-tos	Set IP Type of Service (0-255)
drop	Drop packet
max-len	Maximum length to send to controller

Precision Time Protocol Configuration

Precision Time Protocol (PTP) allows high accuracy clock synchronization between a networked master clock and compliant network hosts. The RackSwitch G8264 supports two PTP modes:

- Ordinary slave clock - Synchronizes the Real Time Clock (RTC) with PTP master clocks detected on the network.
- End-to-End transparent clock - Allows PTP traffic to pass through without affecting the RTC, while updating the correction fields for event packets.

Table 360. Precision Time Protocol Configuration Options

Command Syntax and Usage
`[no] ptp ordinary enable` Enables or disables PTP ordinary slave clock mode. In this mode, if a PTP master clock is detected on the network, the RTC is synchronized with it. If no master clock is detected, the RTC is not affected. Default setting is disabled. **Note:** Enabling PTP ordinary slave clock mode disables NTP settings and system time clock manual settings. **Command mode:** Global configuration
`[no] ptp transparent enable` Enables or disables PTP End-to-End transparent clock mode. In this mode, incoming PTP packets are forwarded based on routing rules currently in place for the PTP domain’s multicast address (within the 224.0.1.129 - 224.0.1.132 range). On egress, PTP packet timestamps are updated based on the time spent between ingress and egress. Default setting is disabled. **Command mode:** Global configuration
`no ptp` Disables both PTP ordinary slave clock mode and PTP End-to-End transparent clock mode. **Command mode:** Global configuration
`ip ptp source-interface loopback` *<1-5>* Loopback interface used as source IP address for delay-request packets sent during synchronization with the master clock in ordinary slave mode. By default, the interface with the lowest index from the master clock’s VLAN is used. **Command mode:** Global configuration
`no ip ptp source-interface loopback` Sets source IP address for delay-request packets sent during synchronization with the master clock in ordinary slave mode to the interface with the lowest index from the master clock’s VLAN. **Command mode**: Global configuration

Table 360. Precision Time Protocol Configuration Options (continued)

Command Syntax and Usage
`[no] ptp` Enables or disables PTP on the current port. Disabled ports will not support PTP even if PTP is globally enabled. Default setting is enabled. **Note:** PTP is not supported on management ports. **Command mode**: Interface port
`show ptp [counters]` Displays current PTP settings. The `counters` option displays PTP packet counters. See page 229 for details. **Command mode**: All
`show interface port` *<port alias or number>* `ptp-counters` Displays Precision Time Protocol statistics for the port. See page 229 for details. **Command mode**: All
`clear ptp counters` Resets PTP packet counters. **Command mode**: Privileged EXEC

Configuration Dump

The dump program writes the current switch configuration to the terminal screen. To start the dump program, at the prompt, enter:

```
Router(config)# show running-config
```

The configuration is displayed with parameters that have been changed from the default values. The screen display can be captured, edited, and placed in a script file, which can be used to configure other switches through a Telnet connection. When using Telnet to configure a new switch, paste the configuration commands from the script file at the command line prompt of the switch. The active configuration can also be saved or loaded via FTP/TFTP, as described on page 490.

Saving the Active Switch Configuration

When the `copy running-config` {`ftp`|`tftp`} command is used, the switch's active configuration commands (as displayed using `show running-config`) will be uploaded to the specified script configuration file on the FTP/TFTP server. To start the switch configuration upload, at the prompt, enter:

```
Router(config)# copy running-config ftp
```

or

```
Router(config)# copy running-config tftp
```

The switch prompts you for the server address and filename.

Note: The output file is formatted with line-breaks but no carriage returns—the file cannot be viewed with editors that require carriage returns (such as Microsoft Notepad).

Note: If the FTP/TFTP server is running SunOS or the Solaris operating system, the specified configuration file must exist prior to executing the `copy running-config` command and must be writable (set with proper permission, and not locked by any application). The contents of the specified file will be replaced with the current configuration data.

Restoring the Active Switch Configuration

When the `copy {ftp|tftp} running-config` command is used, the active configuration will be replaced with the commands found in the specified configuration file. The file can contain a full switch configuration or a partial switch configuration.

To start the switch configuration download, at the prompt, enter:

```
Router(config)# copy ftp running-config
```

or

```
Router(config)# copy tftp running-config
```

The switch prompts you for the server address and filename.

USB Copy

If a USB drive is inserted into the USB port, you can copy files from the switch to the USB drive, or from the USB drive to the switch. You also can boot the switch using software or configuration files found on the USB drive (see “USB Boot Configuration” on page 509).

Copy to USB

Use the following command to copy a file from the switch to the USB drive:

```
usbcopy tousb <filename> {boot|image1|active|syslog|crashdump}
```

Command mode: Privileged EXEC

In this example, the active configuration file is copied to a directory on the USB drive:

```
G8264(config)# usbcopy tousb a_folder/myconfig.cfg active
```

Copy from USB

Use the following command to copy a file from the USB drive to the switch:

```
usbcopy fromusb <filename> {boot|image1|active}
```

Command mode: Privileged EXEC

In this example, the active configuration file is copied from a directory on the USB drive:

```
G8264(config)# usbcopy fromusb a_folder/myconfig.cfg active
```

The new file replaces the current file.

Note: Do not use two consecutive dot characters (..). Do not use a slash character (/) to begin a filename.

Chapter 5. Operations Commands

Operations commands generally affect switch performance immediately, but do not alter permanent switch configurations. For example, you can use Operations commands to immediately disable a port (without the need to apply or save the change), with the understanding that when the switch is reset, the port returns to its normally configured operation.

These commands enable you to alter switch operational characteristics without affecting switch configuration.

Table 361. General Operations Commands

Command Syntax and Usage
`password` *<1-128 characters>* Allows the user to change the password. You must enter the current password in use for validation. The switch prompts for a new password between 1-128 characters. **Command Mode**: Privileged EXEC
`access tnetsshc` Closes all open Telnet and SSH connections. **Command Mode**: Global configuration
`console-log` Enables or disables session console logging. **Command Mode**: Privileged EXEC
`clear logging` Clears all Syslog messages. **Command Mode**: Privileged EXEC
`ntp send` Allows the user to send requests to the NTP server. **Command Mode**: Privileged EXEC
`clear openflow table [basic|emergency|static]` Clears OpenFlow tables. – The `basic` option clears only the basic OpenFlow table – The `emergency` option clears only the emergency OpenFlow table – The `static` option clears only the static Openflow table **Command Mode**: Privileged EXEC

Operations-Level Port Commands

Operations-level port options are used for temporarily disabling or enabling a port, and for re-setting the port.

Table 362. Port Operations

Command Syntax and Usage
`interface port` *<port number or alias>* `dot1x init` Reinitializes 802.1x access control on the port. **Command Mode**: Privileged EXEC
`interface port` *<port number or alias>* `dot1x re-authenticate` Immediately starts reauthentication on the port. **Command Mode**: Privileged EXEC
`[no] interface port` *<port number or alias>* `rmon` Temporarily enables or disables remote monitoring of the port. The port will be returned to its configured operation mode when the switch is reset. **Command Mode**: Privileged EXEC
`no interface port` *<port number or alias>* `shutdown` Temporarily enables the port. The port will be returned to its configured operation mode when the switch is reset. **Command Mode**: Privileged EXEC
`interface port` *<port number or alias>* `shutdown` Temporarily disables the port. The port will be returned to its configured operation mode when the switch is reset. **Command Mode**: Privileged EXEC
`interface port` *<port number or alias>* `learning` Temporarily enables FDB learning on the port. **Command Mode**: Privileged EXEC
`no interface port` *<port number or alias>* `learning` Temporarily disables FDB learning on the port. **Command Mode**: Privileged EXEC
`show interface port` *<port number or alias>* `operation` Displays the port interface operational state. **Command Mode**: Privileged EXEC

Operations-Level FCoE Commands

Fiber Channel over Ethernet (FCoE) operations commands are listed in the following table.

Table 363. FCoE Operations

Command Syntax and Usage
`no fcoe fips fcf` <*FCF MAC address*> [<*vlan number*>] Deletes the selected FCoE Forwarder (FCF) and any associated ACLs. **Command Mode**: Privileged EXEC

Operations-Level VRRP Commands

Operations-level VRRP commands are listed in the following table.

Table 364. Virtual Router Redundancy Operations

Command Syntax and Usage
`router vrrp backup {`*<virtual router number (1-128)>*`|group}` Forces the specified master virtual router on this switch into backup mode. This is generally used for passing master control back to a preferred switch once the preferred switch has been returned to service after a failure. When this command is executed, the current master gives up control and initiates a new election by temporarily advertising its own priority level as 0 (lowest). After the new election, the virtual router forced into backup mode by this command will resume master control in the following cases: – This switch owns the virtual router (the IP addresses of the virtual router and its IP interface are the same) – This switch’s virtual router has a higher priority and preemption is enabled. – There are no other virtual routers available to take master control. **Command Mode**: Privileged EXEC

Operations-Level BGP Commands

Table 365. IP BGP Operations

Command Syntax and Usage
`router bgp start` <*peer number*> Starts the peer session. **Command Mode**: Privileged EXEC
`router bgp stop` <*peer number*> Stops the peer session. **Command Mode**: Privileged EXEC
`show ip bgp state` Displays the current BGP operational state. **Command Mode**: Privileged EXEC

VMware Operations

Use these commands to perform minor adjustments to the VMware operation. Use these commands to perform Virtual Switch operations directly from the switch. Note that these commands require the configuration of Virtual Center access information (`virt vmware vcspec`).

Table 366. VMware Operations

Command Syntax and Usage
`virt vmware pg [`*<Port Group name> <host ID> <VSwitch name> <VLAN number> <shaping-enabled> <average-Kbps> <burst-KB> <peak-Kbps>*`]` Adds a Port Group to a VMware host. You are prompted for the following information: – Port Group name – VMware host ID (Use host UUID, host IP address, or host name.) – Virtual Switch name – VLAN ID of the Port Group – Whether to enable the traffic-shaping profile (`1` or `0`). If you choose `1` (yes), you are prompted to enter the traffic shaping parameters. **Command Mode**: Privileged EXEC
`virt vmware vsw` *<host ID> <Virtual Switch name>* Adds a Virtual Switch to a VMware host. Use one of the following identifiers to specify the host: – UUID – IP address – Host name **Command Mode**: Privileged EXEC
`no virt vmware pg` *<Port Group name> <host ID>* Removes a Port Group from a VMware host. Use one of the following identifiers to specify the host: – UUID – IP address – Host name **Command Mode**: Privileged EXEC
`no virt vmware vsw` *<host ID> <Virtual Switch name>* Removes a Virtual Switch from a VMware host. Use one of the following identifiers to specify the host: – UUID – IP address – Host name **Command Mode**: Privileged EXEC

Table 366. VMware Operations (continued)

Command Syntax and Usage
`virt vmware export` *<VM profile name> <VMware host ID> <Virtual Switch name>* Exports a VM Profile to a VMware host. Use one of the following identifiers to specify each host: – UUID – IP address – Host name You may enter a Virtual Switch name, or enter a new name to create a new Virtual Switch. **Command Mode**: Privileged EXEC
`virt vmware scan` Performs a scan of the VM Agent, and updates VM information. **Command Mode**: Privileged EXEC
`virt vmware vmacpg` *<MAC address> <Port Group name>* Changes a VM NIC's configured Port Group. **Command Mode**: Privileged EXEC
`virt vmware updpg` *<Port Group name> <host ID> <VLAN number>* `[`*<shaping enabled> <average (1-1000000000)> <burst (1-1000000000)> <peak (1-1000000000)>*`]` Updates a VMware host's Port Group parameters. Use one of the following identifiers for the host ID: – UUID – IP address – Host name Enter the traffic shaping parameters as follows: – Shaping enabled – Average traffic, in Kilobits per second – Maximum burst size, in Kilobytes – Peak traffic, in Kilobits per second Delete traffic shaping parameters. **Command Mode**: Privileged EXEC

VMware Distributed Virtual Switch Operations

Use these commands to administer a VMware Distributed Virtual Switch (dvSwitch).

Table 367. VMware dvSwitch Operations (/oper/virt/vmware/dvswitch)

Command Syntax and Usage
`virt vmware dvswitch add` *<datacenter name> <dvSwitch name> <dvSwitch version>* Adds the specified dvSwitch to the specified DataCenter. **Command Mode**: Privileged EXEC
`virt vmware dvswitch del` *<datacenter name> <dvSwitch name>* Removes the specified dvSwitch from the specified DataCenter.
`virt vmware dvswitch addhost` *<dvSwitch name> <host UUID* | *IP address* | *host name>* Adds the specified host to the specified dvSwitch. Use one of the following identifiers to specify the host: – UUID – IP address – Host name **Command Mode**: Privileged EXEC
`virt vmware dvswitch remhost` *<dvSwitch name> <host UUID* | *IP address* | *host name>* Removes the specified host from the specified dvSwitch. Use one of the following identifiers to specify the host: – UUID – IP address – Host name **Command Mode:** Privileged EXEC
`virt vmware dvswitch addUplink` *<dvSwitch name> <host ID> <uplink name>* Adds the specified physical NIC to the specified dvSwitch uplink ports. **Command Mode**: Privileged EXEC
`virt vmware dvswitch remUplink` *<dvSwitch name> <host ID> <uplink name>* Removes the specified physical NIC from the specified dvSwitch uplink ports. **Command Mode**: Privileged EXEC

VMware Distributed Port Group Operations

Use these commands to administer a VMware distributed port group.

Table 368. VMware Distributed Port Group Operations (/oper/virt/vmware/dpg)

Command Syntax and Usage
`virt vmware dpg add` *<port group name> <dvSwitch name> <VLAN ID>* [`ishaping` *<bandwidth> <burst size> <peak bandwidth>*] [`eshaping` *<bandwidth> <burst size> <peak bandwidth>*] Adds the specified port group to the specified dvSwitch. You may enter the following parameters: – `ishaping`: Enables ingress shaping. Supply the following information: • average bandwidth in KB per second • burst size in KB • peak bandwidth in KB per second – `eshaping`: Enables engress shaping. Supply the following information: • average bandwidth in KB per second • burst size in KB • peak bandwidth in KB per second
`virt vmware dpg vmac` *<VNIC MAC> <port group name>* Adds the specified VM NIC to the specified port group.
`virt vmware dpg update` *<port group name> <dvSwitch name> <VLAN ID (1-4094)>* [`ishaping` *<bandwidth> <burst size> <peak bandwidth>*] [`eshaping` *<bandwidth> <burst size> <peak bandwidth>*] Updates the specified port group on the specified dvSwitch. You may enter the following parameters: – `ishaping`: Enables ingress shaping. Supply the following information: • average bandwidth in KB per second • burst size in KB • peak bandwidth in KB per second – `eshaping`: Enables egress shaping. Supply the following information: • average bandwidth in KB per second • burst size in KB • peak bandwidth in KB per second
`virt vmware dpg del` *<port group name> <dvSwitch name>* Removes the specified port group from the specified dvSwitch.

Chapter 6. Boot Options

To use the Boot Options commands, you must be logged in to the switch as the administrator. The Boot Options commands provide options for:

- Selecting a switch software image to be used when the switch is next reset
- Selecting a configuration block to be used when the switch is next reset
- Downloading or uploading a new software image to the switch via FTP/TFTP

In addition to the Boot commands, you can use a Web browser or SNMP to work with switch image and configuration files. To use SNMP, refer to “Working with Switch Images and Configuration Files” in the *Command Reference*.

The boot options are discussed in the following sections.

Stacking Boot Options

The Stacking Boot options are used to define the role of the switch in a stack: either as the Master that controls the stack, or as a participating Member switch. Options are available for loading stack software to individual Member switches, and to configure the VLAN that is reserved for inter-switch stacking communications.

You must enable Stacking and reset the switch to enter Stacking mode. When the switch enters Stacking mode, the Stacking configuration menu appears. For more information, see “Stacking Switch Configuration” on page 285.

Table 369 lists the Boot Stacking command options.

Table 369. Boot Stacking Options

Command Syntax and Usage
`boot stack mode [master|member]` Configures the Stacking mode for the selected switch. **Command mode:** Global configuration
`boot stack higig-trunk` *<list of ports>* Configures the ports used to connect the switch to the stack. Enter only 10Gb or 40Gb external ports. **Command mode:** Global configuration
`boot stack vlan` *<VLAN number>* `[`*<1-16>*`|all|backup|master]` Configures the VLAN used for Stacking control communication. This can be applied for: – a specific unit `<1-16>` – `all` units – `backup` unit – `master` unit **Command mode:** Global configuration

Table 369. Boot Stacking Options (continued)

Command Syntax and Usage
`default boot stack [master|backup|`*<csnum (1-8)>*`|all]` Resets the Stacking boot parameters to their default values. **Command mode:** Global configuration
`boot stack push-image {image1|image2|boot}` Pushes the selected software file from the master to the selected switch. **Command mode:** Global configuration
`boot stack enable` Enables the switch stack. **Command mode:** Global configuration
`no boot stack enable` Disables the switch stack. **Command mode:** Global configuration
`show boot stack [master|backup|`*<csnum (1-8)>*`|all]` Displays current Stacking boot parameters. **Command mode:** All

When in stacking mode, the following stand-alone features are not supported:

- Active Multi-Path Protocol (AMP)
- SFD
- sFlow port monitoring
- Uni-Directional Link Detection (UDLD)
- Port flood blocking
- BCM rate control
- Link Layer Detection Protocol (LLDP)
- Private VLANs
- RIP
- OSPF and OSPFv3
- IPv6
- Virtual Router Redundancy Protocol (VRRP)
- Loopback Interfaces
- Router IDs
- Route maps
- Border Gateway Protocol (BGP)
- MAC address notification
- Static MAC address adding
- Static multicast
- Static routes
- MSTP and RSTP settings for CIST, Name, Rev, and Maxhop
- IGMP Relay and IGMPv3
- Virtual NICs

Switch menus and commands for unsupported features may be unavailable, or may have no effect on switch operation.

Scheduled Reboot of the Switch

This feature allows the switch administrator to schedule a reboot to occur at a particular time in future. This feature is particularly helpful if the user needs to perform switch upgrades during off-peak hours. You can set the reboot time, cancel a previously scheduled reboot, and check the time of the current reboot schedule.

Table 370. Scheduled Reboot Options

Command Syntax and Usage

`boot schedule` *<day> <time (hh:mm)>*
Configures the switch reset time. The following options are valid for the `day` value:
`monday`
`tuesday`
`wednesday`
`thursday`
`friday`
`saturday`
`sunday`
Command Mode: Global configuration

`no boot schedule` Cancels the switch reset time. **Command Mode**: Global configuration
`show boot` Displays the current switch reboot schedule. **Command Mode**: All except User EXEC

Netboot Configuration

Netboot allows the switch to automatically download its configuration file over the network during switch reboot, and apply the new configuration. Upon reboot, the switch includes the following options in its DHCP requests:

- Option 66 (TFTP server address)
- Option 67 (file path)

If the DHCP server returns the information, the switch initiates a TFTP file transfer, and loads the configuration file into the active configuration block. As the switch boots up, it applies the new configuration file. Note that the option 66 TFTP server address must be specified in IP-address format (host name is not supported).

If DHCP is not enabled, or the DHCP server does not return the required information, the switch uses the manually-configured TFTP server address and file path.

Table 371. Netboot Options

Command Syntax and Usage
`boot netboot enable` Enables Netboot. When enabled, the switch boots into factory-default configuration, and attempts to download a new configuration file. **Command Mode**: Global configuration
`no boot netboot enable` Disables Netboot. **Command Mode**: Global configuration
`[no] boot netboot tftp` *<IP address>* Configures the IP address of the TFTP server used for manual configuration. This server is used if DHCP is not enabled, or if the DHCP server does not return the required information. **Command Mode**: Global configuration
`[no] boot netboot cfgfile` *<1-31 characters>* Defines the file path for the configuration file on the TFTP server. For example: `/directory/sub/config.cfg` **Command Mode**: Global configuration
`show boot` Displays the current Netboot parameters. **Command Mode**: All

Forwarding Mode Configuration

This feature configures the switch Layer 2 packet forwarding methodology to either Cut-Through or Store-and-Forward.

Table 372. Forwarding Mode Options

Command Syntax and Usage
`boot forwarding-mode {cut-through|store-and-forward}` Configures the Layer 2 packet forwarding methodology: – In `cut-through` mode, packets are forwarded immediately after the destination MAC address in the packet header is examined, without reading the rest of the packet. This reduces latency, but may propagate potentially corrupted packets. – In `store-and-forward` mode, the switch examines the entire packet and compares the Cyclic-Redundancy-Check (CRC) field against its own Frame-Check-Sequence (FCS) computation. The switch then drops corrupted packets and forwards only intact packets. The default value is `cut-through`. You must reboot the switch for this change to take effect. **Command Mode**: Global configuration

Configuration

This feature configures the switch .

Table 373. Machine Type Model Configuration

Command Syntax and Usage
`boot mtm` *<MTM code>* Configures the switch’s machine type model (MTM) value. MTMs are applied on reset and persist over firmware upgrades: **Command Mode**: Global configuration

QSFP Port Configuration

Table 374. QSFP Port Options

Command Syntax and Usage
`boot qsfp-40gports` *<1, 5, 9, 13>* Enables 40GbE mode on the selected QSFP+ ports. When enabled, each QSFP+ port is set as a single 40GbE port. You must reboot the switch for this change to take effect. **Command Mode**: Global configuration
`no boot qsfp-40gports` *<1, 5, 9, 13>* Disables 40GbE mode on the selected QSFP+ ports. When disabled, each QSFP+ port is configured to breakout into four 10GbE ports. You must reboot the switch for this change to take effect. **Command Mode**: Global configuration
`show boot qsfp-port-modes` Displays the current QSFP parameters. **Command Mode**: All

USB Boot Configuration

USB Boot allows you to boot the switch with a software image file, boot file, or configuration file that resides on a USB drive inserted into the USB port. Use the following command to enable or disable USB Boot:

```
[no] boot usbboot enable
```

Command mode: Global configuration

When enabled, the switch checks the USB port when it is reset. If a USB drive is inserted into the port, the switch checks the drive for software and image files. If a valid file is present on the USB drive, the switch loads the file and boots using the file.

The following list describes the valid file names, and describes the switch behavior when it recognizes them. The file names must be exactly as shown, or the switch will not recognize them.

- `RS8264_Boot.img`
  The switch replaces the current boot image with the new image, and boots with the new image.
- `RS8264_OS.img`
  The switch boots with the new software image. The existing images are not affected.
- `RS8264_replace1_OS.img`
  The switch replaces the current software image1 with the new image, and boots with the new image.
- `RS8264_replace2_OS.img`
  The switch replaces the current software image2 with the new image, and boots with the new image.
- `RS8264.cfg`
  The switch boots with the new configuration file. The existing configuration files (active and backup) are not affected.
- `RS8264_replace.cfg`
  The switch replaces the active configuration file with the new file, and boots with the new file. This file takes precedence over any other configuration files that may be present on the USB drive.

If more than one valid file is present, the switch loads all valid files and boots with them. For example, you may simultaneously load a new boot file, image file, and configuration file from the USB drive.

The switch ignores any files that do not match the valid file names or that have the wrong format.

You also can copy files to and from the USB drive. See “USB Copy” on page 491.

Updating the Switch Software Image

The switch software image is the executable code running on the RackSwitch G8264. A version of the image ships with the switch, and comes pre-installed on the device. As new versions of the image are released, you can upgrade the software running on your switch.

Click on software updates. Use the following command to determine the current software version: `show boot`

Upgrading the software image on your switch requires the following:

- Loading the new image onto a FTP or TFTP server on your network
- Transferring the new image from the FTP or TFTP server to your switch
- Selecting the new software image to be loaded into switch memory the next time the switch is reset

Loading New Software to Your Switch

The switch can store up to two different software images, called `image1` and `image2`, as well as boot software, called `boot`. When you load new software, you must specify where it should be placed: either into `image1`, `image2`, or `boot`.

For example, if your active image is currently loaded into `image1`, you would probably load the new image software into `image2`. This lets you test the new software and reload the original active image (stored in `image1`), if needed.

To load a new software image to your switch, you need the following:

- The image or boot software loaded on a FTP/TFTP server on your network
- The hostname or IP address of the FTP/TFTP server
- The name of the new software image or boot file

Note: The DNS parameters must be configured if specifying hostnames.

When the above requirements are met, use the following procedure to download the new software to your switch.

1. In Privileged EXEC mode, enter the following command:

```
Router# copy {ftp|tftp} {image1|image2|boot-image}
```

2. Select a port to use for downloading the image

```
Port type [DATA|MGT]:
```

3. Enter the hostname or IP address of the FTP or TFTP server.

```
Address or name of remote host: <IP address or hostname>
```

4. Enter the name of the new software file on the server.

```
Source file name: <filename>
```

   The exact form of the name will vary by server. However, the file location is normally relative to the FTP or TFTP directory (usually `tftpboot`).

5. Enter your username and password for the server, if applicable.

```
User name: {<username>|<Enter>}
```

6. The system prompts you to confirm your request.

Next, select a software image to run, as described in the following section.

Selecting a Software Image to Run

You can select which software image (`image1` or `image2`) you want to run in switch memory for the next reboot.

1. In Global Configuration mode, enter:

```
Router(config)# boot image {image1|image2}
```

2. Enter the name of the image you want the switch to use upon the next boot.

   The system informs you of which image set to be loaded at the next reset:

```
Next boot will use switch software image1 instead of image2.
```

Uploading a Software Image from Your Switch

You can upload a software image from the switch to a FTP or TFTP server.

1. In Privileged EXEC mode, enter:

```
Router# copy {image1|image2|boot-image} {ftp|tftp}
```

2. Select a port type to use for uploading the image.

```
Port type [DATA|MGT]:
```

3. Enter the name or the IP address of the FTP or TFTP server:

```
Address or name of remote host: <IP address or hostname>
```

4. Enter the name of the file into which the image will be uploaded on the FTP or TFTP server:

```
Destination file name: <filename>
```

5. Enter your username and password for the server, if applicable.

```
User name: {<username>|<Enter>}
```

6. The system then requests confirmation of what you have entered. To have the file uploaded, enter `Y`.

```
image2 currently contains Software Version 6.6.0
 that was downloaded at  0:23:39 Thu Jan  3, 2011.
Upload will transfer image2 (2788535 bytes) to file "image1"
 on FTP/TFTP server 1.90.90.95.
Confirm upload operation (y/n) ? y
```

Selecting a Configuration Block

When you make configuration changes to the RackSwitch G8264, you must save the changes so that they are retained beyond the next time the switch is reset. When you perform a save operation (`copy running-config startup-config`), your new configuration changes are placed in the *active* configuration block. The previous configuration is copied into the *backup* configuration block.

There is also a *factory* configuration block. This holds the default configuration set by the factory when your RackSwitch G8264 was manufactured. Under certain circumstances, it may be desirable to reset the switch configuration to the default. This can be useful when a custom-configured RackSwitch G8264 is moved to a network environment where it will be re-configured for a different purpose.

In Global Configuration mode, use the following command to set which configuration block you want the switch to load the next time it is reset:

```
Router (config)# boot configuration-block {active|backup|factory}
```

Setting an Entitlement Serial Number

To improve customer technical support, your customer support representative can assign your switch an Entitlement Serial Number (ESN) at the time you request support. The ESN can be conveniently stored on the switch using the following command:

```
RS8264(config)# boot esn <Entitlement Serial Number>
```

The ESN helps to locate your switch’s identifying information when you call technical support for help in future.

Resetting the Switch

You can reset the switch to make your software image file and configuration block changes occur.

Note: Resetting the switch causes the Spanning Tree Group to restart. This process can be lengthy, depending on the topology of your network.

Enter the following command to reset (reload) the switch:

```
>> Router# reload
```

You are prompted to confirm your request.

```
Reset will use software "image2" and the active config block.
>> Note that this will RESTART the Spanning Tree,
>> which will likely cause an interruption in network service.
Confirm reload (y/n) ?
```

Accessing the IBM N/OS CLI

The default command-line interface for the G8264 is the ISCLI. To access the IBM N/OS CLI, enter the following command from the ISCLI:

```
Router(config)# boot cli-mode ibmos-cli
```

To access the ISCLI, enter the following command from the IBM N/OS CLI and reset the G8264:

```
Main# boot/mode iscli
```

Users can select the CLI mode upon login, if the following ISCLI command is enabled:

```
Router(config)# boot cli-mode prompt
```

Only an administrator connected through the CLI can view and enable the `prompt` command. When `prompt` is enabled, the first user to log in can select the CLI mode. Subsequent users must use the selected CLI mode, until all users have logged out.

Changing the Switch Profile

The IBM N/OS software for the G8264 can be configured to operate in different modes for different deployment scenarios. The deployment profile changes some of the basic switch behavior, shifting switch resources to optimize capacity levels to meet the needs of different types of networks. For more information about deployment profiles, see the IBM N/OS 7.6 *Application Guide*.

To change the deployment profile, select the new profile and reset the G8264. Use the following command to select a new profile:

```
Router(config)# boot profile {default | acl | ipmc-opt | openflow}
```

Using the Boot Management Menu

The Boot Management menu allows you to switch the software image, reset the switch to factory defaults, or to recover from a failed software download.

You can interrupt the boot process and enter the Boot Management menu from the serial console port. When the system displays Memory Test, press **<Shift B>**. The Boot Management menu appears.

```
Resetting the System ...
Memory Test ..............................

Boot Management Menu
1 - Change booting image
2 - Change configuration block
3 - Xmodem download
4 - Exit

Please choose your menu option: 1
Current boot image is 1. Enter image to boot: 1 or 2: 2
Booting from image 2
```

The Boot Management menu allows you to perform the following actions:

- To change the booting image, press 1 and follow the screen prompts.
- To change the configuration block, press 2, and follow the screen prompts.
- To perform an Xmodem download, press 3 and follow the screen prompts.
- To exit the Boot Management menu, press 4. The booting process continues.

Recovering from a Failed Upgrade

Use the following procedure to recover from a failed software upgrade.

1. Connect a PC to the serial port of the switch.
2. Open a terminal emulator program that supports XModem Download (for example, HyperTerminal, CRT, PuTTY) and select the following serial port characteristics:
   – Speed: 9600 bps
   – Data Bits: 8
   – Stop Bits: 1
   – Parity: None
   – Flow Control: None
3. Boot the switch and access the Boot Management menu by pressing **<Shift B>** while the Memory Test is in progress and the dots are being displayed.
4. Select **3** for **Xmodem download**. When you see the following message, change the Serial Port characteristics to 115200 bps:

```
## Switch baudrate to 115200 bps and press ENTER ...
```

5. Press <**Enter>** to set the system into download accept mode. When the readiness meter displays (a series of “C” characters), start XModem on your terminal emulator.

6. Select the Boot Image to download. The XModem initiates the file transfer. When the download is complete, a message similar to the following is displayed:

```
yzModem - CRC mode, 62494(SOH)/0(STX)/0(CAN) packets, 6 retries

Extracting images ... Do *NOT* power cycle the switch.

**** VMLINUX ****

Un-Protected 10 sectors

Erasing Flash............. done

Writing to Flash.............done

Protected 10 sectors

**** RAMDISK ****

Un-Protected 44 sectors

Erasing Flash............................................... done

Writing to Flash...............................................done

Protected 44 sectors

**** BOOT CODE ****

Un-Protected 8 sectors

Erasing Flash........... done

Writing to Flash...........done

Protected 8 sectors
```

7. When you see the following message, change the Serial Port characteristics to 9600 bps:

```
## Switch baudrate to 9600 bps and press ESC ...
```

8. Press the Escape key (<**Esc>**) to re-display the Boot Management menu.
9. Select **3** to start a new **XModem Download**. When you see the following message, change the Serial Port characteristics to 115200 bps:

```
## Switch baudrate to 115200 bps and press ENTER ...
```

10. Press <**Enter>** to continue the download.

11. Select the OS Image to download. The XModem initiates the file transfer. When the download is complete, a message similar to the following is displayed:

```
yzModem - CRC mode, 27186(SOH)/0(STX)/0(CAN) packets, 6 retries

Extracting images ... Do *NOT* power cycle the switch.

**** Switch OS ****


Please choose the Switch OS Image to upgrade [1|2|n] :
```

12. Select the image number to load the new image (1 or 2). It is recommended that you select 1. A message similar to the following is displayed:

```
Switch OS Image 1 ...

Un-Protected 27 sectors

Erasing Flash.............................. done

Writing to Flash..............................done

Protected 27 sectors
```

13. When you see the following message, change the Serial Port characteristics to 9600 bps:

```
## Switch baudrate to 9600 bps and press ESC ...
```

14. Press the Escape key (<**Esc>**) to re-display the Boot Management menu.

    Select **4** to exit and boot the new image.

Chapter 7. Maintenance Commands

The maintenance commands are used to manage dump information and forward database information. They include debugging commands to help with troubleshooting.

Dump information contains internal switch state data that is written to flash memory on the RackSwitch G8264 after any one of the following occurs:

- The watchdog timer forces a switch reset. The purpose of the watchdog timer is to reboot the switch if the switch software freezes.
- The switch detects a hardware or software problem that requires a reboot.

To use the maintenance commands, you must be logged in to the switch as the administrator.

Table 375. General Maintenance Commands

Command Syntax and Usage
`show flash-dump-uuencode` Displays dump information in uuencoded format. For details, see page 540. **Command mode:** All
`copy flash-dump tftp {data|mgt}` Saves the system dump information via TFTP. For details, see page 541. **Command mode:** Privileged EXEC
`copy` *<switch filename>* `tftp address` *<TFTP server address>* `filename` *<filename on TFTP server>* Saves a file via TFTP.sC **Command mode:** Privileged EXEC
`clear flash-dump` Clears dump information from flash memory. **Command mode:** Privileged EXEC
`copy log tftp {data|mgt}` Saves the system log file (SYSLOG) via TFTP. **Command mode:** Privileged EXEC
`clear log` Clears the system log file (SYSLOG). **Command mode:** Privileged EXEC

Table 375. General Maintenance Commands (continued)

Command Syntax and Usage
`show tech-support [l2|l3|link|port]` Dumps all G8264 information, statistics, and configuration. You can log the output (`tsdmp`) into a file. To filter the information, use the following options: – `l2` displays only Layer 2-related information – `l3` displays only Layer 3-related information – `link` displays only link status-related information – `port` displays only port-related information **Command mode:** All except User EXEC
`copy tech-support tftp {data|mgt}` Redirects the technical support dump (tsdmp) to an external TFTP server. **Command mode:** Privileged EXEC
`copy tech-support ftp {data|mgt}` Redirects the technical support dump (tsdmp) to an external FTP server. **Command mode:** Privileged EXEC

Forwarding Database Maintenance

The Forwarding Database commands can be used to view information and to delete a MAC address from the forwarding database or to clear the entire forwarding database. This is helpful in identifying problems associated with MAC address learning and packet forwarding decisions.

Table 376. FDB Manipulation Options

Command Syntax and Usage
`show mac-address-table address` *<MAC address>* Displays a single database entry by its MAC address. Enter the MAC address using one of the following formats: – `xx:xx:xx:xx:xx:xx` (such as `08:00:20:12:34:56`) – `xxxxxxxxxxxx` (such as `080020123456`) **Command mode:** All
`show mac-address-table interface port` *<port number or alias>* Displays all FDB entries for a particular port. **Command mode:** All
`show mac-address-table vlan` *<VLAN number>* Displays all FDB entries on a single VLAN. **Command mode:** All
`show mac-address-table multicast` Displays all Multicast MAC entries in the FDB. **Command mode:** All
`show mac-address-table static` Displays static entries in the FBD. **Command mode:** All except User EXEC
`no mac-address-table {static|multicast} {all|`*<MAC address> <VLAN number>*} Removes static FDB entries. **Command mode:** Global configuration
`clear mac-address-table` Clears the entire Forwarding Database from switch memory. **Command mode:** Privileged EXEC

Debugging Commands

The Miscellaneous Debug Commands display trace buffer information about events that can be helpful in understanding switch operation. You can view the following information using the debug commands:

- Events traced by the Management Processor (MP)
- Events traced to a buffer area when a reset occurs

If the switch resets for any reason, the MP trace buffer is saved into the snap trace buffer area. The output from these commands can be interpreted by Technical Support personnel.

Table 377. Miscellaneous Debug Options

Command Syntax and Usage
`debug debug-flags` This command sets the flags that are used for debugging purposes. **Command mode:** Privileged EXEC

`debug mp-trace`
Displays the Management Processor trace buffer. Header information similar to the following is shown:
`MP trace buffer at 13:28:15 Fri May 25, 2001; mask: 0x2ffdf748`
The buffer information is displayed after the header.
Command mode: Privileged EXEC

`debug dumpbt` Displays the backtrace log. **Command mode:** Privileged EXEC
`debug mp-snap` Displays the Management Processor snap (or post-mortem) trace buffer. This buffer contains information traced at the time that a reset occurred. **Command mode:** Privileged EXEC
`clear flash-config` Deletes all flash configuration blocks. **Command mode:** Privileged EXEC
`debug pstat` *<port alias or number>* Displays all port statistics for the selected port. **Command mode:** Privileged EXEC
`[no] debug lacp packet` Enables/disables debugging for Link Aggregation Control Protocol (LACP) packets on all ports running LACP. By default, LACP debugging is disabled. **Command mode:** Privileged EXEC

Table 377. Miscellaneous Debug Options

Command Syntax and Usage
`[no] debug spanning-tree bpdu [receive|transmit]` Enables/disables debugging for Spanning Tree Protocol (STP) Bridge Protocol Data Unit (BPDU) frames sent or received. The following parameters are available: – `receive` filters only BPDU frames received – `transmit` filters only BPDU frames sent By default, STP BPDU debugging is disabled. **Command mode**: Privileged EXEC

IPsec Debugging

Tabxlx describes the IPsec debugging commands.

Table 378. IPsec Debugging Options

Command Syntax and Usage
`[no] debug sec all` Enables or disables all IP security debug messages. **Command mode:** Privileged EXEC
`[no] debug sec crypto` Enables or disables all IP security cryptographic debug messages. **Command mode:** Privileged EXEC
`[no] debug sec ike` Enables or disables all IP security IKEv2 debug messages. **Command mode:** Privileged EXEC
`[no] debug sec ipsec` Enables or disables all IPsec debug messages. **Command mode:** Privileged EXEC
`[no] debug sec info` Displays the current security debug flag. **Command mode:** Privileged EXEC

BGP Debugging

Table 379 describes the IPsec debugging commands.

Table 379. BGP Debugging Options

Command Syntax and Usage
`[no] debug bgp` Enables or disables all BGP debug messages for all existing peers. **Command mode:** Privileged EXEC
`[no] debug bgp` *<IP address>* Enables or disables all BGP debug messages for the specified BGP neighbor. **Command mode:** Privileged EXEC
`[no] debug bgp in|out` Enables or disables all inbound or outbound BGP debug messages. **Command mode:** Privileged EXEC
`[no] debug bgp` *<IP address>* `in|out` Enables or disables all inbound or outbound BGP debug messages for the specified BGP neighbor. **Command mode:** Privileged EXEC
`show debug bgp` Displays the current BGP debug setting. **Command mode:** All

OpenFlow Debugging

Table 382. describes the OpenFlow debugging commands.

Table 380. OpenFlow Debug Options

Command Syntax and Usage
`debug openflow-filter [`*1-1024*`]` Displays generic information for all OpenFlow filter groups or detailed information for a specific filter. **Command mode:** Privileged EXEC
`debug openflow` *<0-4>* Sets severity level for OpenFlow debug messages: – `0-EMERG` Indicates the System is unusable – `1-ALERT` Indicates action should be taken immediately – `2-CRIT` Indicates critical conditions – `3-ERR` Indicates error conditions or errored operations – `4-WARNING` Indicates warning conditions **Command mode:** Privileged EXEC
`debug openflow-cfg` *<0-4294967295> <0-4294967295>* [*<0-4294967295>*] Debug OpenFlow. This command is reserved for Technical Support Personnel **Command mode**: Privileged EXEC

DCBX Maintenance

Table 381 describes the DCBX maintenance commands.

Table 381. DCBX Maintenance Commands

Command Syntax and Usage
`show cee information dcbx port` *<port alias or number>* Displays DCBX feature information for the selected port. **Command mode:** All
`show cee information dcbx port` *<port alias or number>* `app_proto` Displays DCBX application protocol state-machine information. **Command mode:** All
`show cee information dcbx port` *<port alias or number>* `ets` Displays DCBX ETS state-machine information. **Command mode:** All
`show cee information dcbx port` *<port alias or number>* `pfc` Displays DCBX PFC state-machine information. **Command mode:** All
`show cee information dcbx port` *<port alias or number>* `control` Displays information about the Control state machine for the selected port. **Command mode:** All
`show cee information dcbx port` *<port alias or number>* `feature` Displays information about the Feature state machine for the selected port. **Command mode:** All
`show dcbx transmit` Displays the Type-Length-Value (TLV) list transmitted in the DCBX TLV for the selected port. **Command mode:** All
`show dcbx receive` Displays the Type-Length-Value (TLV) list received in the DCBX TLV for the selected port. **Command mode:** All

LLDP Cache Manipulation

Table 382 describes the LLDP cache manipulation commands.

Table 382. LLDP Cache Manipulation Options

Command Syntax and Usage
`show lldp port` *<port alias or number>* Displays Link Layer Discovery Protocol (LLDP) port information. **Command mode:** All
`show lldp receive` Displays information about the LLDP receive state machine. **Command mode:** All
`show lldp transmit` Displays information about the LLDP transmit state machine. **Command mode:** All
`show lldp remote-device [`*<1-256>*`|detail`**]** Displays information received from LLDP -capable devices. For more information, see page 39. **Command mode:** All
`show lldp` Displays all LLDP information. **Command mode:** All
`clear lldp` Clears the LLDP cache. **Command mode:** Privileged EXEC

ARP Cache Maintenance

Table 383 describes the ARP cache maintenance commands.

Table 383. Address Resolution Protocol Maintenance Options

Command Syntax and Usage
`show ip arp find` *<IP address>* Shows a single ARP entry by IP address. **Command mode:** All
`show ip arp interface port` *<port number or alias>* Shows ARP entries on selected ports. **Command mode:** All
`show ip arp vlan` *<VLAN number>* Shows ARP entries on a single VLAN. **Command mode:** All
`show ip arp reply` Shows the list of IP addresses which the switch will respond to for ARP requests. **Command mode:** All
`show ip arp` Shows all ARP entries. **Command mode:** All
`clear arp` Clears the entire ARP list from switch memory. **Command mode:** Privileged EXEC

Note: To display all or a portion of ARP entries currently held in the switch, you can also refer to “ARP Information” on page 59.

BGP Maintenance

Table 383 describes the BGP information commands.

Table 384. Border Gateway Protocol Maintenance Options

Command Syntax and Usage
`show ip bgp debugging in|out` Displays inbound or outbound BGP debugging updates. **Command mode:** All
`show ip bgp debugging` *<IP address>* `in|out [last]` Displays inbound or outbound BGP debugging updates for the specified neighbor. If `last` is specified, displays the results starting with the last entry first. **Command mode:** All
`show ip bgp debugging ignored` Shows all BGP information for routers that have been ignored. **Command mode:** All
`show ip bgp debugging` *<IP address>* `ignored [last]` Displays BGP information for routers that have been ignored by the specified neighbor. If `last` is specified, displays the results starting with the last entry first. **Command mode:** All
`show ip bgp debugging` *<IP address>* `[last]` Displays all BGP debugging entries for the specified neighbor. If `last` is specified, displays the results starting with the last entry first. **Command mode:** All
`show ip bgp debugging [last]` Displays all BGP debugging entries. If `last` is specified, displays the results starting with the last entry first. **Command mode:** All
`show ip bgp information` Displays the BGP routing table. **Command mode:** All
`show ip bgp information` *<IP address>* Displays the BGP routing table for the specified neighbor. **Command mode:** All
`clear ip bgp debug-log` Clears the entire BGP debug log from switch memory. **Command mode:** Privileged EXEC

IP Route Manipulation

Table 385 describes the IP route manipulation commands.

Table 385. IP Route Manipulation Options

Command Syntax and Usage
`debug route-map pbr` Enables policy-based routing debugging. **Command mode:** Privileged EXEC
`show ip route address` *<IP address>* Shows a single route by destination IP address. **Command mode:** All
`show ip route gateway` *<IP address>* Shows routes to a default gateway. **Command mode:** All
`show ip route type {indirect|direct|local|broadcast|martian|multicast}` Shows routes of a single type. For a description of IP routing types, see Table 40 on page 58 **Command mode:** All
`show ip route tag {fixed|static|address|rip|ospf|broadcast|martian|multicast}` Shows routes of a single tag. For a description of IP routing tags, see Table 41 on page 58 **Command mode:** All
`show ip route interface` *<IP interface>* Shows routes on a single interface. **Command mode:** All
`show ip route` Shows all routes. **Command mode:** All
`clear ip route` Clears the route table from switch memory. **Command mode:** Privileged EXEC

Note: To display all routes, you can also refer to "IP Routing Information" on page 57.

IGMP Snooping Maintenance

Table 386 describes the IGMP Snooping maintenance commands.

Table 386. IGMP Multicast Group Maintenance Options

Command Syntax and Usage
`show ip igmp groups address` *<IP address>* Displays a single IGMP multicast group by its IP address. **Command mode:** All
`show ip igmp groups vlan` *<VLAN number>* Displays all IGMP multicast groups on a single VLAN. **Command mode:** All
`show ip igmp groups interface port` *<port number or alias>* Displays all IGMP multicast groups on selected ports. **Command mode:** All
`show ip igmp groups portchannel` *<trunk number>* Displays all IGMP multicast groups on a single trunk group. **Command mode:** All
`show ip igmp groups detail` *<IP address>* Displays detailed information about a single IGMP multicast group. **Command mode:** All
`show ip igmp groups` Displays information for all multicast groups. **Command mode:** All
`clear ip igmp groups` Clears the IGMP group table. **Command mode:** Privileged EXEC

IGMP Multicast Routers Maintenance

Table 387 describes the maintenance commands for IGMP multicast routers (Mrouters).

Table 387. IGMP Multicast Router Maintenance Commands

Command Syntax and Usage
`show ip igmp mrouter vlan` *<VLAN number>* Displays IGMP Mrouter information for a single VLAN. **Command mode:** All
`show ip igmp mrouter` Displays information for all Mrouters. **Command mode:** All
`show ip igmp mrouter information` Displays IGMP snooping information for all Mrouters. **Command mode:** All
`show ip igmp snoop igmpv3` Displays IGMPv3 snooping information. **Command mode:** All
`show ip igmp relay` Displays IGMP relay information. **Command mode:** All
`show ip igmp querier vlan` *<VLAN number>* Displays IGMP querier information for a single VLAN. **Command mode:** All
`clear ip igmp mrouter` Clears the IGMP Mrouter port table. **Command mode:** Privileged EXEC

MLD Multicast Group Maintenance

Table 388 describes the maintenance commands for MLD multicast group maintenance.

Table 388. MLD Multicast Group Maintenance Commands

Command Syntax and Usage
`groups` Displays all MLD groups.
`find` *<IPv6 address>* Shows a single MLD group by its IP address.
`vlan` *<VLAN number>* Shows all MLD groups on a single VLAN.
`port` *<port alias or number>* Shows all MLD groups on a single port.
`trunk` *<trunk number>* Displays all MLD groups on a single trunk group.
`if` *<interface number>* Shows MLD interface information.
`mrclear` Clears dynamic MLD multicast router group tables from switch memory.
`grclear` Clears dynamic MLD registered group tables from switch memory.
`clear` Clears dynamic MLD group tables from switch memory.
`show ip igmp mrouter vlan` *<VLAN number>* Displays IGMP Mrouter information for a single VLAN. **Command mode:** All
`show ip igmp mrouter` Displays information for all Mrouters. **Command mode:** All
`clear ip igmp mrouter` Clears the IGMP Mrouter port table. **Command mode:** Privileged EXEC

LACP Maintenance

Table 389 describes the maintenance commands for LACP.

Table 389. LACP Maintenance Commands

Command Syntax and Usage
`qos protocol-packet-control packet-queue-map` *<packet queue number>* `lacp` Send an LACP Marker packet (for debugging only). **Command mode:** All

IPv6 Neighbor Discovery Cache Manipulation

Table 390 describes the IPv6 Neighbor Discovery cache manipulation commands.

Table 390. IPv6 Neighbor Discovery Cache Manipulation Options

Command Syntax and Usage
`show ipv6 neighbors find` *<IPv6 address>* Shows a single IPv6 Neighbor Discovery cache entry by IP address. **Command mode:** All
`show ipv6 neighbors interface port` *<port number or alias>* Shows IPv6 Neighbor Discovery cache entries on a single port. **Command mode:** All
`show ipv6 neighbors vlan` *<VLAN number>* Shows IPv6 Neighbor Discovery cache entries on a single VLAN. **Command mode:** All
`show ipv6 neighbors static` Shows static IPv6 Neighbor Discovery cache entries. **Command mode:** All
`show ipv6 neighbors` Shows all IPv6 Neighbor Discovery cache entries. **Command mode:** All
`clear ipv6 neighbors` Clears all IPv6 Neighbor Discovery cache entries from switch memory. **Command mode:** Privileged EXEC

IPv6 Route Maintenance

Table 391 describes the IPv6 route maintenance commands.

Table 391. IPv6 Route Maintenance Options

Command Syntax and Usage
`show ipv6 route address` *<IPv6 address>* Show a single route by destination IP address. **Command mode:** All
`show ipv6 route gateway` *<IPv6 gateway number>* Show routes to a single gateway. **Command mode:** All
`show ipv6 route interface` *<interface number>* Show routes on a single IP interface. **Command mode:** All
`show ipv6 route type {connected|static|ospf}` Show routes of a single type. **Command mode:** All
`show ipv6 route static` Show static IPv6 routes. **Command mode:** All
`show ipv6 route summary` Shows a summary of IPv6 route information. **Command mode:** All
`show ipv6 route` Shows all IPv6 routes. **Command mode:** All
`clear ipv6 route` Clears all IPv6 routes. **Command mode:** Privileged EXEC

Uuencode Flash Dump

Using this command, dump information is presented in uuencoded format. This format makes it easy to capture the dump information as a file or a string of characters.

If you want to capture dump information to a file, set your communication software on your workstation to capture session data prior to issuing the `show flash-dump-uuencode` command. This will ensure that you do not lose any information. Once entered, the `show flash-dump-uuencode` command will cause approximately 23,300 lines of data to be displayed on your screen and copied into the file.

Using the `show flash-dump-uuencode` command, dump information can be read multiple times. The command does not cause the information to be updated or cleared from flash memory.

Note: Dump information is not cleared automatically. In order for any subsequent dump information to be written to flash memory, you must manually clear the dump region. For more information on clearing the dump region, see page 542.

To access dump information, enter:

```
Router# show flash-dump-uuencode
```

The dump information is displayed on your screen and, if you have configured your communication software to do so, captured to a file. If the dump region is empty, the following appears:

```
No FLASH dump available.
```

TFTP or FTP System Dump Put

Use these commands to `put` (save) the system dump to a TFTP or FTP server.

Note: If the TFTP/FTP server is running SunOS or the Solaris operating system, the specified `copy flash-dump tftp` (or `ftp`) file must exist *prior* to executing the `copy flash-dump tftp` command (or `copy flash-dump tftp`), and must be writable (set with proper permission, and not locked by any application). The contents of the specified file will be replaced with the current dump data.

To save dump information via TFTP, enter:

```
Router# copy flash-dump tftp <server filename>
```

You are prompted for the TFTP server IP address or hostname, and the *filename* of the target dump file.

To save dump information via FTP, enter:

```
Router# copy flash-dump ftp  <server filename>
```

You are prompted for the FTP server IPv4 address or hostname, your *username* and *password*, and the *filename* of the target dump file.

Clearing Dump Information

To clear dump information from flash memory, enter:

```
Router# clear flash-dump
```

The switch clears the dump region of flash memory and displays the following message:

```
FLASH dump region cleared.
```

If the flash dump region is already clear, the switch displays the following message:

```
FLASH dump region is already clear.
```

Unscheduled System Dumps

If there is an unscheduled system dump to flash memory, the following message is displayed when you log on to the switch:

```
Note: A system dump exists in FLASH. The dump was saved
      at 13:43:22 Wednesday January 30, 2011. Use show flash-dump
      uuencode to
      extract the dump for analysis and clear flash-dump to
      clear the FLASH region. The region must be cleared
      before another dump can be saved.
```

Appendix A. IBM N/OS System Log Messages

The RackSwitch G8264 (G8264) uses the following syntax when outputting system log (syslog) messages:

<Time stamp><Log Label>`IBMOS`*<Thread ID>* : *<Message>*

The following parameters are used:

- *<Timestamp>*

  The time of the message event is displayed in the following format:

  <month (3 characters)> <day> <hour (1-24)> : *<minute>* : *<second>*

  For example: `Aug 19 14:20:30`
- <*Log Label*>

  The following types of log messages are recorded: `LOG_CRIT`, `LOG_WARNING`, `LOG_ALERT`, `LOG_ERR`, `LOG_NOTICE`, and `LOG_INFO`
- *<Thread ID>*

  This is the software thread that reports the log message. For example: `stg`, `ip`, `console`, `telnet`, `vrrp`, `system`, `web server`, `ssh`, `bgp`
- *<Message>*: The log message

Following is a list of potential syslog messages. To keep this list as short as possible, only the *<Thread ID>* and *<Message>* are shown. The messages are sorted by *<Log Label>*.

Where the *<Thread ID>* is listed as `mgmt`, one of the following may be shown: `console`, `telnet`, `web server`, or `ssh`.

LOG_ALERT

Thread	LOG_ALERT Message
	Possible buffer overrun attack detected!
BGP	session with *<IP address>* failed (bad event:<*event*>)
BGP	session with *<IP address>* failed *<reason>* Reasons: • Connect Retry Expire • Holdtime Expire • Invalid • Keepalive Expire • Receive KEEPALIVE • Receive NOTIFICATION • Receive OPEN • Receive UPDATE • Start • Stop • Transport Conn Closed • Transport Conn Failed • Transport Conn Open • Transport Fatal Error
BGP	session with *<IP address>* failed *<reason type>* : *<reason>* Reason Types: • FSM Error • Hold Timer Expired • Message Header Error • OPEN Message Error • UPDATE Message Error Reasons: • AS Routing Loop • Attr Flags Error • Attr Length Error • Auth Failure • Bad BGP Identifier • Bad HoldTime • Bad Length • Bad Peer AS • Bad Type • Conn Not Synced • Invalid Network Field • Invalid NEXTHOP Attr • Invalid ORIGIN Attr • Malformed AS_PATH • Malformed Attr List • Missing Well Known Attr • None • Optional Attr Error • Unrecognized Well Known Attr • Unsupported Opt Param • Unsupported Version
HOTLINKS	LACP trunk *<trunk ID>* and *<trunk ID>* formed with admin key *<key>*
IP	cannot contact default gateway *<IP address>*
IP	cannot contact gateway <IP address>
IP	Dynamic Routing table is full
IP	Route table full

Thread	**LOG_ALERT Message (continued)**
MGMT	Maximum number of login failures (*<threshold>*) has been exceeded.
oflow	Openflow VLAN *<VLAN>* with Instance *<OpenFlow ID>* deleted
oflow	Openflow VLAN *<VLAN>* with Instance *<OpenFlow ID>* became Normal VLAN
oflow	Management port is configured to connect CONTROLLER
oflow	One of the data ports configured to connect CONTROLLER
oflow	OpenFlow *<OpenFlow ID>*: Exit emergency mode
oflow	Openflow *<OpenFlow ID>*: Failed to establish connection with controller *<1-4> <IP address>*
oflow	FDB table full. Could not add FDB entry to Openflow Flow Table
oflow	ACL table full. Could not add ACL entry for Openflow Flow Table
oflow	Openflow *<OpenFlow ID>*: No Controller Available for Connection
oflow	OpenFlow *<OpenFlow ID>*: MGMT: Exit emergency mode
oflow	Openflow *<OpenFlow ID>*: Enter emergency mode
oflow	Openflow *<OpenFlow ID>*: Enter emergency mode with infinite timeout
oflow	OpenFlow *<OpenFlow ID>*: Failed to receive Hello Message from Controller
oflow	OpenFlow *<OpenFlow ID>*: Version Negotiation Failed
oflow	OpenFlow *<OpenFlow ID>*: *<port>* administratively disabled by controller
oflow	OpenFlow *<OpenFlow ID>*: *<port>* administratively enabled by controller
oflow	Memory not available. Could not add flow entry to Openflow Flow Table
oflow	Flow Limit reached. Could not add Flow entry to Flow Table
oflow	Maximum permitted flow entries reached
oflow	WARNING! with Openflow enabled, Switch legacy features are not supported
OSPF	Interface IP *<IP address>*, Interface State {Down | Loopback | Waiting | P To P | DR | BackupDR | DR Other}: Interface down detached
OSPF	LS Database full: likely incorrect/missing routes or failed neighbors
OSPF	Neighbor Router ID *<router ID>*, Neighbor State {Down | Attempt | Init | 2 Way | ExStart | Exchange | Loading | Full | Loopback | Waiting | P To P | DR | BackupDR | DR Other}

Thread	**LOG_ALERT Message (continued)**
OSPF	OSPF Route table full: likely incorrect/missing routes
RMON	Event.*<description>*
STP	CIST new root bridge
STP	CIST topology change detected
STP	CIST, interface port *<port>* [moved into|leave from] loop-inconsistent state
STP	CIST, interface port *<port>* [moved into|leave from] root-inconsistent state
STP	Fast Forward port *<port>* active, putting port into forwarding state
STP	New preferred Fast Uplink port *<port>* active for STG *<STG>*, {restarting | canceling} timer
STP	own BPDU received from port *<port>*
STP	Port *<port>*, [putting port|leaving from] into loop-inconsistent state
STP	Port *<port>*, [putting port|leaving from] into root-inconsistent state
STP	Port *<port>*, putting port into blocking state
STP	Preferred STG *<STG>* Fast Uplink port has gone down. Putting secondary Fast Uplink port *<port>* into forwarding
STP	Setting STG *<STG>* Fast Uplink primary port *<port>* forwarding and backup port *<port>* blocking
STP	STG *<STG>* preferred Fast Uplink port *<port>* active. Waiting *<seconds>* seconds before switching from port *<port>*
STP	STG *<STG>* root port *<port>* has gone down. Putting backup Fast Uplink port *<port>* into forwarding
STP	STG *<STG>*, interface port *<port>* [moved into|leave from] loop-inconsistent state
STP	STG *<STG>*, interface port *<port>* [moved into|leave from] root-inconsistent state
STP	STG *<STG>*, new root bridge
STP	STG *<STG>*, topology change detected
STP	Too many BPDUs flooded in VLAN *<VLAN>*. Some of them will be discarded!
SYSTEM	Ingress PVST+ BPDU's spotted from port *<port>*
SYSTEM	LACP trunk *<trunk ID>* and *<trunk ID>* formed with admin key <key>
VLAG	vLAG Health check is Down
VLAG	vLAG Health check is Up

Thread	LOG_ALERT Message (continued)
VLAG	vLAG ISL down
VLAG	vLAG ISL is up
VLAG	vLAG on LACP key *<key>* is [up|down]
VLAG	vLAG on portchannel *<trunk ID>* is [up|down]
VRRP	Received <x> virtual routers instead of <y>
VRRP	received errored advertisement from *<IP address>*
VRRP	received incorrect addresses from *<IP address>*
VRRP	received incorrect advertisement interval <interval> from *<IP address>*
VRRP	received incorrect VRRP adver type from *<IP address>*
VRRP	received incorrect VRRP authentication type from *<IP address>*
VRRP	received incorrect VRRP password from *<IP address>*
VRRP	VRRP : received incorrect IP addresses list from *<IP address>*

LOG_CRIT

Thread	LOG_CRIT Message
SSH	can't allocate memory in load_MP_INT()
SSH	currently not enough resource for loading RSA {private | public key}
SYSTEM	System memory is at *<n>* percent

LOG_ERR

Thread	LOG_ERR Message
CFG	Can't assign a port with same protocol to different VLANs.
CFG	Configuration file is EMPTY
CFG	Configuration is too large
CFG	Default VLAN cannot be a private-VLAN.
CFG	Error writing active config to FLASH! Configuration is too large
CFG	Error writing active config to FLASH! Unknown error
CFG	ERROR: Cannot enable/disable RMON for Mgmt Port *<port>*
CFG	ERROR: More than <maximum> VLAN(s) in downstream
CFG	Error writing active config to FLASH! Another save is in progress
CFG	Maximum allowed number (30) of Alarm groups have already been created.
CFG	Maximum allowed number (30) of Event groups have already been created.
CFG	Maximum allowed number (5) of History groups have already been created.
CFG	Need to enable port's tag for tagging pvlan.
CFG	Overflow! Port has more than 16 protocols.
CFG	Port is not for this protocol.
CFG	Switch rem port fails when disable {protocol | vlan}.
CFG	TFTP {Copy|cfgRcv} attempting to redirect a previously redirected output
CFG	WARN: Have not defined protocol type for VLAN *<VLAN>* Protocol *<protocol>*!
DCBX	Duplicate DCBX Application Protocol Sub-TLV detected on port *<port>*
DCBX	Duplicate DCBX Control Sub-TLV detected on port *<port>*
DCBX	Duplicate DCBX PFC Sub-TLV detected on port *<port>*
DCBX	Duplicate DCBX PG Sub-TLV detected on port *<port>*
DCBX	Duplicate DCBX VNIC Sub-TLV detected on port *<port>*
ETS	The internal COS7 is used for stack communication; hence the ETS priority group 7 is not available.
IP6	EXCEPTIONAL CASE Trying to create IP6 Interface after the Ip6Shutdown

Thread	**LOG_ERR Message (continued)**
IP6	Ip6SetAddr(failed):if=*<interface>*, rc=*<reason code>*
IP6	IPv6 route table full
IP6	ipv6_add_interface_immediate: Buffer Non Linear for ip6_cfa_params
IP6	ipv6_add_nbrcache_immediate: Buffer Non Linear for ip6_cfa_params
IP6	ipv6_add_prefix_immediate: Buffer Non Linear for ip6_cfa_params
IP6	ipv6_rem_prefix_immediate: Buffer Non Linear for ip6_cfa_params
IP6	ipv6_rem_route_immediate: Buffer Non Linear for ip6_cfa_params
IP6	ipv6_vlan_change_immediate: Buffer Non Linear for ip6_cfa_params
LLDP	Error: Port *<port>* has the PVID *<PVID>* that is different from the PVID *<PVID>* configured on the peer
LLDP	Port *<port>*: Cannot add new entry. MSAP database is full!
MGMT	Apply is issued by another user. Try later
MGMT	cannot contact {primary | secondary} DNS server *<IP address>* - {Mgmt | Ext-mgt} port unavailable
MGMT	Critical Error. Failed to add Interface *<interface>*
MGMT	Critical Error. Failed to {add | attach} Loopback Interface *<interface>*
MGMT	Critical Erro. Failed to detach Loopback Interface *<interface>*
MGMT	Diff is issued by another user. Try later
MGMT	Dump is issued by another user. Try later
MGMT	Error: Apply not done
MGMT	Error: Pushed {image1 | image2} size *<bytes>* bigger than the capacity *<maximum bytes>*.
MGMT	Error: Invalid {image1 | image2}
MGMT	Error: Pushed {image1 | image2} size *<bytes>* bigger than the capacity *<maximum bytes>*.
MGMT	Error: Save not done.
MGMT	Firmware download failed (insufficient memory
MGMT	Invalide CRC value. Boot image rejected
MGMT	Revert Apply is issued by another user. Try later
MGMT	Revert is issued by another user. Try later.

Thread	LOG_ERR Message (continued)
MGMT	Save is issued by another user. Try later
MGT	You are attempting to load an image that has been corrupted or belongs to another switch type. Please verify you have the correct file for this switch and try again. [Error: Invalid header magic value <value>.] Boot image rejected
NTP	unable to listen to NTP port
PFC	PFC can be enabled on 2 priorities only - priority 3 and one other priority.
RMON	Maximum {Alarm | Event | History} groups exceeded when trying to add group *<group>* via SNMP
STP	Cannot set "{Hello Time | Max Age | Forward Delay | Aging}" (Switch is in MSTP mode)
SYSTEM	Error: BOOTP Offer was found incompatible with the other IP interfaces
SYSTEM	Error: DHCP Offer was found invalid by ip configuration checking; please see system log for details.
SYSTEM	I2C device *<ID>* *<description>* set to access state *<state>* [from CLI]
SYSTEM	Not enough memory!
SYSTEM	Port *<port>* disabled. Link params(speed/mode) mismatch with *<trunk name>* *<trunk ID>*
SYSTEM	Port *<port>* disabled. Same LACP admin_key with port "PORT_INT_*<port>* rent link params(speed/mode)"
SYSTEM	{PortChannel | Trunk group} creation failed for {IntPortChannel | PortChannel | Internal Trunk group | Trunk group} *<trunk ID>*. Only *<maximum trunks>* {PortChannels | Trunk groups} supported by hardware.
VRRP	Virtual Router Group is disabled due to no enabled virtual routers.

LOG_INFO

Thread	**LOG_INFO Message**
	System log cleared by user *<username>*.
	System log cleared via SNMP.
HOTLINKS	"Error" is set to "{Active | Standby}"
HOTLINKS	"Learning" is set to "{Active | Standby}"
HOTLINKS	"None" is set to "{Active | Standby}"
HOTLINKS	"Side Max" is set to "{Active | Standby}"
HOTLINKS	has no "{Side Max | None | Learning | Error}" interface
MGMT	/* Config changes at <time> by *<username>* */ *<config diff>* /* Done */
MGMT	*<username>* ejected from BBI
MGMT	*<username>*(*<user type>*) {logout | ejected | idle timeout | connection closed} from {Console | Telnet/SSH}
MGMT	*<username>*(*<user type>*) login {on Console | from host *<IP address>*}
MGMT	boot image changed
MGMT	boot kernel download completed. Now writing to flash.
MGMT	boot kernel downloaded {from host *<hostname>* | via browser}, filename too long to be displayed, software version *<version>*
MGMT	boot kernel downloaded from host *<hostname>*, file'*<filename>*', software version *<version>*
MGMT	boot kernel Firmware uploaded.
MGMT	Can't downgrade to image with only single flash support
MGMT	Could not revert unsaved changes
MGMT	Download already currently in progress. Try again later via {Browser | BBI}
MGMT	Error: Static FDB entry on inexistent VLAN
MGMT	Error in setting the new config
MGMT	Failed to allocate buffer for diff track.
MGMT	Firmware download failed to {invalid image | image1 | image2 | boot kernel | undefined | SP boot kernel}
MGMT	Firmware downloaded to {invalid image | image1 | image2 | boot kernel | undefined | SP boot kernel}.
MGMT	Flash dump successfully tftp'd to *<hostname>*:*<filename>*

Thread	**LOG_INFO Message (continued)**
MGMT	FLASH ERROR - invalid address used
MGMT	Flash Read Error. Failed to read flash into holding structure. Quitting
MGMT	Flash Write Error
MGMT	Flash Write Error. Failed to allocate buffer. Quitting
MGMT	Flash Write Error. Trying again
MGMT	image1 | 2 download completed. Now writing to flash.
MGMT	image1 | 2 downloaded {from host *<hostname>* | via browser}, filename too long to be displayed, software version *<version>*
MGMT	image1 | 2 downloaded from host *<hostname>*, file'*<filename>*', software version *<version>*
MGMT	image1|2 Firmware uploaded.
MGMT	Incorrect image being loaded
MGMT	Invalid diff track address. Continuing with apply()
MGMT	Invalid image being loaded for this switch type
MGMT	invalid image download completed. Now writing to flash.
MGMT	invalid image downloaded {from host *<hostname>* | via browser}, filename too long to be displayed, software version *<version>*
MGMT	invalid image downloaded from host *<hostname>*, file '*<filename>*', software version *<version>*
MGMT	invalid image Firmware uploaded.
MGMT	NETBOOT: Config successfully downloaded and applied from *<hostname>*:*<filename>*
MGMT	New config set
MGMT	new configuration applied [from BBI | EM | NETBOOT | SCP | SNMP | Stacking Master]
MGMT	new configuration saved from {BBI | BladeOS | ISCLI | SNMP}
MGMT	Revert failed: configuration is dumped or modified by another user.
MGMT	scp*<username>*(*<user type>*) {logout | ejected | idle timeout | connection closed} from {Console | Telnet/SSH}
MGMT	scp*<username>*(*<user type>*) login {on Console | from host *<IP address>*}
MGMT	SP boot kernel download completed. Now writing to flash.
MGMT	SP boot kernel downloaded {from host *<hostname>* | via browser}, filename too long to be displayed, software version *<version>*

Thread	LOG_INFO Message (continued)
MGMT	SP boot kernel downloaded from host *<hostname>*, file '*<filename>*', software version *<version>*
MGMT	SP boot kernel Firmware uploaded.
MGMT	Starting Firmware download for {invalid image | image1 | image2 | boot kernel | undefined | SP boot kernel}.
MGMT	Static FDB entry on disabled VLAN
MGMT	Static FDB entry on invalid VLAN
MGMT	Tech support dump failed
MGMT	Tech support dump successfully tftp'd to *<hostname>*:*<filename>*
MGMT	Two Phase Apply Failed in Creating Backup Config Block.
MGMT	Unable to do revert apply. The current configuration is in ISCLI format, it needs to be saved in IBMOS format.
MGMT	undefined download completed. Now writing to flash.
MGMT	undefined downloaded {from host *<hostname>* | via browser}, filename too long to be displayed, software version *<version>*
MGMT	undefined downloaded from host *<hostname>*, file '*<filename>*', software version *<version>*
MGMT	undefined Firmware uploaded.
MGMT	unsaved changes reverted [from BBI | from SNMP]
MGMT	Unsupported GBIC {accepted | refused}
MGMT	user {SNMP user | *<username>*} ejected from BBI
MGMT	Watchdog has been {enabled | disabled}
MGMT	Watchdog timeout interval is now *<seconds>* seconds)
MGMT	Wrong config file type
NETCONF	*<username>* (*<user level>*) connection closed from address via NETCONF over *<connection type>*
NETCONF	*<username>* (<*user level*>) login from host *<IP address>* via NETCONF over *<connection type>*
oflow	OpenFlow *<OpenFlow ID>*: Connection established with controller *<1-4> <IP address>*
oflow	Openflow Statistics Cleared
oflow	Openflow Flowtable Cleared
oflow	OpenFlow *<OpenFlow ID>*: Connection lost with controller *<1-4> <IP address>*
RMON	RMON {alarm | event | history} index *<ID>* was deleted via SNMP

Thread	**LOG_INFO Message (continued)**
RMON	SNMP configuration for RMON {alarm | event | history} index *<ID>* applied
SSH	*<username>*(*<user type>*) {logout | ejected | idle timeout | connection closed} from {Console | Telnet/SSH}
SSH	*<username>*(*<user type>*) login {on Console | from host *<IP address>*}
SSH	Error in setting the new config
SSH	New config set
SSH	scp*<username>*(*<user type>*) {logout | ejected | idle timeout | connection closed} from {Console | Telnet/SSH}
SSH	scp*<username>*(*<user type>*) login {on Console | from host *<IP address>*}
SSH	server key autogen {starts | completes}
SSH	Wrong config file type
SYSTEM	booted version *<version>* from Flash image *<image>*, {active | backup | factory} config block
SYSTEM	FDB Learning {DISABLED | ENABLED} for port *<port>*
SYSTEM	Insert another transceiver or change configuration and manually enable port *<port>*
TFTP	Successfully sent {boot image | image1 | mage2} to switch *<MAC adress>*

LOG_NOTICE

Thread	LOG_NOTICE Message
	<minutes> {minute|minutes} until scheduled reboot
	ARP table is full.
	Current config successfully tftp'd *<filename>* from *<hostname>*
	Current config successfully tftp'd to *<hostname>*: *<filename>*
	ECMP route configured, Gateway health check enabled
	More than one trunk found for LACP adminkey *<adminkey>*. Static MAC entry *<index>* was added only to trunk *<trunk number>*.
	Number of COSqs has been changed since boot. Save and reset the switch to activate the new configuration.
	Port *<port>* mode is changed to full duplex for 1000 Mbps operation.
	scheduled switch reboot
	switch reset at *<time>* has been canceled
	switch reset scheduled at *<time>*
	Warning: DHCP on IF *<interface>* will be disabled
8021X	Could not create failover checkpoint record for port *<port>*
8021X	Logoff request on port *<port>*
8021X	Port *<port>* {assigned to|removed from} vlan *<VLAN>*
8021X	RADIUS server *<IP address>* auth response for port *<port>* has an invalid Tunnel-Type value (*<tunnel type>*); should be 13 for VLAN assignment
8021X	RADIUS server *<IP address>* auth response for port *<port>* has an invalid Tunnel-Medium-Type value (*<tunnel type>*); should be 6 for VLAN assignment
8021X	RADIUS server *<IP address>* auth response for port *<port>* is missing one or more tunneling attributes for VLAN assignment
8021X	RADIUS server *<IP address>* auth response has a VLAN id (*<VLAN>*) of a reserved VLAN and cannot be assigned to port *<port>*
8021X	RADIUS server *<IP address>* auth response has a VLAN id (*<VLAN>*) of a non-existent or disabled VLAN, and cannot be assigned to port *<port>*
8021X	RADIUS server *<IP address>* auth response has an invalid VLAN id (*<VLAN>*) and cannot be assigned to port *<port>*

Thread	LOG_NOTICE Message (continued)
BGP	bad authentication received / no authentication received / authentication receive error from *<IP address>*
BGP	session established with *<IP address>*
CONSOLE	RADIUS: authentication timeout. Retrying...
CONSOLE	RADIUS: failed to contact primary | secondary server
CONSOLE	RADIUS: No configured RADIUS server
CONSOLE	RADIUS: trying alternate server...
DCBX	Detected DCBX peer on port *<port>*
DCBX	Feature "{DCBX | ETS | PFC | App Proto | VNIC | ETS}" not supported by peer on port *<port>*
DCBX	LLDP [TX &] RX are disabled on port *<port>*
DCBX	LLDP TX is disabled on port *<port>*
DCBX	Not able to detect DCBX peer on port *<port>*
DCBX	Peer on port port stopped responding to DCBX message
FCOE	Failed to create FCOE vlan *<VLAN>*
FCOE	FCF *<MAC address>* has been removed.
FCOE	FCF *<MAC address>* is now operational.
FCOE	FCOE connection between VN_PORT *<MAC address>* and FCF *<MAC address>* {has been established | is down}.
FCOE	FCOE vlan *<VLAN>* created.
FCOE	Port *<port>* has been added to the FCOE vlan *<VLAN>*.
FCOE	VN_PORT *<MAC address>* has been reassigned, the old connection will be deleted.
HOTLINKS	"Error" is set to "Standby | Active"
HOTLINKS	"Learning" is set to "Standby | Active"
HOTLINKS	"None" is set to "Standby | Active"
HOTLINKS	"Side Max" is set to "Standby | Active"
HOTLINKS	has no "{Side Max | None | Learning | Error}" interface
IP	cannot contact multicast router *<IP address>*
IP	Either Route or Arp table is full. Please check GEA L3 statistics (/stat/l3/gea) to verify.
IP	IGMP - {L3 IPMC | L3 IPv4 Multicas | Backup UP groups | Backup DOWN groups | IGMP groups | IPMC} table is full!

Thread	LOG_NOTICE Message (continued)
IP	IGMP - V1 timer is running for group *<IP address>*, vlan *<VLAN>*[, port *<port>*] Ignored leave!
IP	L3 table is full. Please check GEA L3 statistics (/stat/l3/gea) to verify.
IP	mrouter *<IP address>* has been disabled or deleted
IP	multicast router *<IP address>* operational
IP	On Vlan *<VLAN>* IGMP version updated to *<version>*
IP	Received {IGMPv1 | IGMPv2} query from *<IP address>*
IP	VLAN *<VLAN>* is not in the igmp relay list. Mrouter *<IP address>* will be down
IP	Warning: DHCP on IF *<interface>* will be disabled
IP	Warning: Enabling dhcp will delete IP interface *<interface>* and IP gateway *<gateway>*'s configurations.
IP	Warning: gateway (*<gateway>*) will be deleted
LACP	All supported trunks already created. Port *<port>* will be disabled by LACP.
LACP	LACP is {up | down} on port *<port>*
LINK	link {down | up} on port *<port>*
LINK	Port *<port>* disabled by PVST Protection
MGMT	*<username>* automatically logged out from BBI because changing of authentication type
MGMT	*<username>*(*<user type>*) {logout | ejected | idle timeout | connection closed} from {BBI | Console | Telnet/SSH}
MGMT	*<username>*(*<user type>*) login {on Console | from host *<IP address>* | from BBI}
MGMT	ACL *<old number>* from old configuration file moved to ACL *<new number>* in new configuration file
MGMT	Authentication failed for backdoor.
MGMT	Authentication failed for backdoor. Password incorrect!
MGMT	Authentication failed for backdoor. Telnet disabled!
MGMT	boot config block changed
MGMT	boot image changed
MGMT	boot mode changed
MGMT	Boot profile changed
MGMT	enable password changed

Thread	LOG_NOTICE Message (continued)
MGMT	Error in setting the new config
MGMT	Failed login attempt via {BBI | TELNET} from host *<IP address>*.
MGMT	Failed login attempt via the CONSOLE
MGMT	FLASH Dump cleared from BBI
MGMT	Log msg no. *<x>*
MGMT	Membership for Port *<port>* in vlan *<VLAN>* is not effective while the port is assigned with PVID *<PVID>* by 802.1x
MGMT	MGTA | B Gateway *<IP address>* not in the same subnet as the Mgt IP *<IP address>*/*<netmask>*
MGMT	New config set
MGMT	new configuration saved from ISCLI
MGMT	New Management IP Address *<IP address>* configured
MGMT	packet-buffer statistics cleared
MGMT	PANIC command from CLI
MGMT	PASSWORD FIX-UP MODE IN USE
MGMT	Password for {oper | operator} changed by {SNMP user | *<username>*}, notifying admin to save.
MGMT	Port *<port>* remains untagged while it is assigned PVID <PVID> by 802.1x
MGMT	QSFP: Port *<port>* changed to {10G|40G}, from {BBI|SNMP|CLI}.
MGMT	RADIUS server timeouts
MGMT	RADIUS: authentication timeout. Retrying...
MGMT	RADIUS: failed to contact {primary|secondary} server
MGMT	RADIUS: No configured RADIUS server
MGMT	RADIUS: trying alternate server...
MGMT	scp*<username>*(*<user type>*) {logout | ejected | idle timeout | connection closed} from {Console | Telnet/SSH}
MGMT	scp*<username>*(*<user type>*) login {on Console | from host *<IP address>*}
MGMT	second syslog host changed to {this host | *<IP address>*}
MGMT	selectable [boot] mode changed
MGMT	STP BPDU statistics cleared
MGMT	switch reset from CLI

Thread	LOG_NOTICE Message (continued)
MGMT	syslog host changed to {this host | *<IP address>*}
MGMT	System clock set to <time>.
MGMT	System date set to <date>.
MGMT	Terminating BBI connection from host *<IP address>*
MGMT	User *<username>* deleted by {SNMP user | *<username>*}.
MGMT	User *<username>* is {deleted | disabled} and will be ejected by {SNMP user | *<username>*}
MGMT	User {oper | operator} is disabled and will be ejected by {SNMP user | *<username>*}.
MGMT	Wrong config file type
NETCONF	*<username>* (*<user level>*) connection closed from address via NETCONF over *<connection type>*
NETCONF	*<username>* (<*user level>*) login from host *<IP address>* via NETCONF over *<connection type>*
NTP	System clock updated
OSPF	Neighbor Router ID *<router ID>*, Neighbor State {Down | Loopback | Waiting | P To P | DR | BackupDR | DR Other | Attempt | Init | 2 Way | ExStart | Exchange | Loading | Full}
OSPFV3	Link state database is FULL.Ignoring LSA.
OSPFV3	nbr *<router ID>* changes state from {DOWN | ATTEMPT | INIT | 2WAY | EXSTART | EXCHANGE | LOADING | FULL} to {DOWN | ATTEMPT | INIT | 2WAY | EXSTART | EXCHANGE | LOADING | FULL}[, Neighbor Down: {Interface down or detached | Dead timer expired}]
OSPFV3	virtual link nbr *<router ID>* changes state from {DOWN | ATTEMPT | INIT | 2WAY | EXSTART | EXCHANGE | LOADING | FULL} to {DOWN | ATTEMPT | INIT | 2WAY | EXSTART | EXCHANGE | LOADING | FULL}[, Neighbor Down: {Interface down or detached | Dead timer expired}]
SERVER	link {down | up} on port *<port>*
SSH	(remote disconnect msg)
SSH	*<username>*(*<user type>*) {logout | ejected | idle timeout | connection closed} from {Console | Telnet/SSH}
SSH	*<username>*(*<user type>*) login {on Console | from host *<IP address>*}
SSH	Error in setting the new config
SSH	Failed login attempt via SSH
SSH	New config set

Thread	**LOG_NOTICE Message (continued)**
SSH	scp*<username>*(*<user type>*) {logout | ejected | idle timeout | connection closed} from {Console | Telnet/SSH}
SSH	scp*<username>*(*<user type>*) login {on Console | from host *<IP address>*}
SSH	Wrong config file type
SYSTEM	*<SPF name>* TX Fault - *<SFP type>* is DISABLED
SYSTEM	*<SPF name>* UnApproved - *<SFP type>* is DISABLED
SYSTEM	*<SFP type>* inserted at port *<port>* is UNAPPROVED ! Device is DISABLED.
SYSTEM	Address for interface *<interface>* ignored because of mismatch.
SYSTEM	BOOTP Offer (continue): Domain name: *<domain>*
SYSTEM	BOOTP Offer (continue): Host name: *<host>*
SYSTEM	BOOTP Offer (continue): Primary DNS: *<IP address>*, Secondary DNS: *<IP address>*
SYSTEM	Change fiber GIG port *<port>* mode to full duplex
SYSTEM	Change fiber GIG port *<port>* speed to 1000
SYSTEM	Changed ARP entry for IP *<IP address>* to: MAC <MAC address>, Port *<port>*, VLAN *<VLAN>*
SYSTEM	Could not add L2 multicast entry! L2 table is full.
SYSTEM	ECMP route gateway *<IP address>* [via if *<interface>*] is {down | up}
SYSTEM	Enable auto negotiation for copper GIG port: *<port>*
SYSTEM	Fan Fault {Detected | Cleared}. Fan <fan number> RPM <RPM value>
SYSTEM	Fan Failure Warning Cleared
SYSTEM	I2C device <ID> <description> set to access state <state> [from CLI]
SYSTEM	L2 table is full!
SYSTEM	Mask for interface *<interface>* ignored because of mismatch.
SYSTEM	**** MAX TEMPERATURE (*<temperature>*) ABOVE FAIL THRESH ****
SYSTEM	**** MAX TEMPERATURE (*<temperature>*) ABOVE WARN THRESH ****
SYSTEM	**** PLATFORM THERMAL SHUTDOWN ****
SYSTEM	Port *<port>* disabled
SYSTEM	Port *<port>* disabled by BPDU Guard

Thread	**LOG_NOTICE Message (continued)**
SYSTEM	Port *<port>* disabled by OAM (unidirectional | TX-RX Loop)
SYSTEM	Port *<port>* disabled by UDLD (unknown | unidirectional | bidirectional | TX-RX loop | neighbor mismatch)
SYSTEM	Port *<port>* disabled due to reason code *<reason code>*
SYSTEM	Power Fault {Cleared | Detected} - <number>
SYSTEM	Power Supply Warning Cleared
SYSTEM	rebooted (*<reason>*)[, administrator logged in] Reason: • Boot watchdog reset • console PANIC command • console RESET KEY • hard reset by SNMP • hard reset by WEB-UI • hard reset from console • hard reset from Telnet • low memory • MM Cycled Power Domain • power cycle • Reset Button was pushed • reset by SNMP • reset by WEB-UI • reset from console • reset from EM • reset from Telnet/SSH • scheduled reboot • SMS-64 found an over-voltage • SMS-64 found an under-voltage • software ASSERT • software PANIC • software VERIFY • Telnet PANIC command • unknown reason • watchdog timer
SYSTEM	Received BOOTP Offer: IP: *<IP address>*, Mask: <netmask>, Broadcast *<IP address>*, GW: *<IP address>*
SYSTEM	Received DHCP Offer: IP: *<IP address>*, Mask: *<netmask>* Broadcast *<IP address>*, GW: *<IP address>*
SYSTEM	server with MAC address *<MAC address>* was {added to | removed from} network
SYSTEM	Static route gateway *<IP address>* is {down | up}
SYSTEM	Warning: Fan Failure
SYSTEM	Warning: Power Supply Disconnected or Failure
SYSTEM	Watchdog threshold changed from <old value> to <new value> seconds
SYSTEM	Watchdog timer has been enabled
TEAMING	error, action is undefined
TEAMING	is down, but teardown is blocked
TEAMING	is down, control ports are auto disabled
TEAMING	is up, control ports are auto controlled

Thread	LOG_NOTICE Message (continued)
VLAN	Default VLAN can not be deleted
VM	*<IP address>* moved from {port *<port>* | trunk IT *<trunk ID>*} to {port *<port>* | trunk IT *<trunk ID>*}
VM	MAC address *<MAC address>* moved from {port *<port>* | trunk IT *<trunk ID>*} to {port *<port>* | trunk IT *<trunk ID>*}
VM	[(Refresh)] VI server unreachable or certificate invalid.
VM	Virtual Machine with {IP address *<IP address>* | MAC address *<MAC address>*} came online
VM	Virtual Machine with {IP address *<IP address>* | MAC address *<MAC address>*} changed its VLAN to *<new VLAN>*. It was previously in VLAN *<old VLAN>*
VM	Virtual Machine with {IP address *<IP address>* | MAC address *<MAC address>*} is a member of VLAN *<VLAN>*
VM	Virtual Machine with {IP address *<IP address>* | MAC address *<MAC address>*} is not in VLAN *<VLAN>* anymore
VM	[(Refresh)] VM agent command not implemented.
VM	[(Refresh)] VM agent could not be started.
VM	[(Refresh)] VM agent could not login to server.
VM	[(Refresh)] VM agent could not retrieve {host | VM} properties.
VM	[(Refresh)] VM agent encountered a file error.
VM	[(Refresh)] VM agent encountered an IPC error.
VM	[(Refresh)] VM agent file error.
VM	[(Refresh)] VM Agent not active.
VM	[(Refresh)] VM agent operation failed due to a conflict.
VM	[(Refresh)] VM agent operation failed.
VM	[(Refresh)] VM agent operation needs no change.
VM	[(Refresh)] VM agent operation timed out.
VM	[(Refresh)] VM agent protocol error.
VM	VM agent resumed (Refresh).
VM	VM agent resumed (Scan).
VM	[(Refresh)] VM agent timed out and could not be stopped.
VM	[(Refresh)] VM agent timed out.
VM	[(Refresh)] VM agent unable to logout from server.
VM	[(Refresh)] VM agent unknown error.

Thread	LOG_NOTICE Message (continued)
VM	[(Refresh)] VM agent VE limit reached.
VM	[(Refresh)] VM agent: Invalid ID.
VM	VM agent: local table full.
VM	VM MAC *<MAC address>* NOT added to hash table
VM	VM move detected but failed to move network conf
VRRP	virtual router *<IP address>* is now {BACKUP | MASTER}
WEB	*<username>* ejected from BBI
WEB	*<username>* ejected from BBI because username password was changed
WEB	RSA host key is being saved to Flash ROM, please don't reboot the box immediately.

LOG_WARNING

Thread	LOG_WARNING Message
	Static IPMC route group *<group number>* on vlan <VLAN> [primary| backup] has been converted to a host route group because IGMP snooping is enabled.
8021X	Authentication session terminated with {Failure|Success} on port *<port>*
8021X	Could not create failover checkpoint record for port *<port>*
8021X	Logoff request on port *<port>*
8021X	Port *<port>* {assigned to|removed from} vlan *<VLAN>*
8021X	RADIUS server *<IP address>* auth response for port *<port>* has an invalid Tunnel-Type value (*<tunnel type>*); should be 13 for VLAN assignment
8021X	RADIUS server *<IP address>* auth response for port *<port>* has an invalid Tunnel-Medium-Type value (*<tunnel type>*); should be 6 for VLAN assignment
8021X	RADIUS server *<IP address>* auth response for port *<port>* is missing one or more tunneling attributes for VLAN assignment
8021X	RADIUS server *<IP address>* auth response has a VLAN id (*<VLAN>*) of a reserved VLAN and cannot be assigned to port *<port>*
8021X	RADIUS server *<IP address>* auth response has a VLAN id (*<VLAN>*) of a non-existent or disabled VLAN, and cannot be assigned to port *<port>*
8021X	RADIUS server *<IP address>* auth response has an invalid VLAN id (*<VLAN>*) and cannot be assigned to port *<port>*
CFG	Authentication should be disabled to run RIPv2 in RIPv1 compatibility mode on interface *<interface>*.
CFG	Configured {sip|dip|protocol|tcpl4|udpl4|port|dport} hashing without tcpl4 or udpl4. {sip|dip|protocol|tcpl4|udpl4|port|dport} hashing will be ignored!
CFG	Configured {sip|dip|protocol|tcpl4|udpl4|port|dport} hashing without sport or dport. {sip|dip|protocol|tcpl4|udpl4|port|dport} hashing will be ignored!
CFG	Multicast should be disabled to run RIPv2 in RIPv1 compatibility mode on interface *<interface>*.
CFG	Static IPMC route group *<IP address>* on vlan *<VLAN>* [primary| backup] has been converted to a host route group because IGMP snooping is enabled.
CFG	Switch cannot support more than 16 protocols simultaneously!

Thread	LOG_WARNING Message (continued)
CFG	Trunk hash changed, Dataplane L3 hash includes configured Trunk hash and ECMP hash
CFG	Unfit config exists when protocol-vlan apply.
DCBX	Feature "{DCBX|ETS|PFC|App Proto|VNIC|ETS}" not supported by peer on port *<port>*
ETS	ETS prohibits a PG comprising of PFC and non-PFC traffic. Mixing in the same PG different PFC settings may affect the switch functionality.
HOTLINKS	"Error" is set to "Standby|Active"
HOTLINKS	"Learning" is set to "Standby|Active"
HOTLINKS	"None" is set to "Standby|Active"
HOTLINKS	"Side Max" is set to "Standby|Active"
HOTLINKS	has no "{Side Max|None|Learning|Error}" interface
IP	*<IP address>* configured as V*<version>* and received IGMP V{1|2} query
IP	IGMP: Switch Querier {disabled|enabled} on Vlan *<VLAN>*
IP	IGMP: Switch {became|is no longer} a Querier for Vlan *<VLAN>*
IP	IGMP: Switch is [not] elected as Querier for Vlan *<VLAN>*
IP	IGMP: Switch Querier election process started for Vlan *<VLAN>*
IP	IGMP: Switch Querier election type changed for Vlan *<VLAN>*
IP	IGMP: Warning Querier Source-IP is not configured on Vlan *<VLAN>* Queries with Source-IP Zero may be ignored in Querier election process.
IP	IGMP: Warning Snooping is not enabled on Vlan *<VLAN>*, Querier configured only to send queries.
IP	New Multicast router learned on *<IP address>*, Vlan *<VLAN>*, Version {V1|V2|V3}
LLDP	ERROR!!! The request port item *<item>* is invalid
NTP	cannot contact NTP server *<IP address>* - {Mgmt|Ext-mgt} port unavailable
NTP	cannot contact [primary|secondary] NTP server *<IP address>*
SYSTEM	I2C device *<ID> <description>* set to access state *<state>* [from CLI]
SYSTEM	Interface <interface> failed to renew DHCP Lease.
TEAMING	error, action is undefined
TEAMING	is down, but teardown is blocked

Thread	LOG_WARNING Message (continued)
TEAMING	is down, control ports are auto disabled
TEAMING	is up, control ports are auto controlled
VNIC	Peer does not support VNIC on port *<port>*

Appendix B. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support website at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and pre-installed software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, ReadMe files, and Help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/systems/support/ and follow the instructions. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information on the World Wide Web

On the World Wide Web, the IBM website has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x® and xSeries® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/intellistation/.

You can find service information for IBM systems and optional devices at http://www.ibm.com/systems/support/.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and x Series servers, BladeCenter products, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/sl/products/.

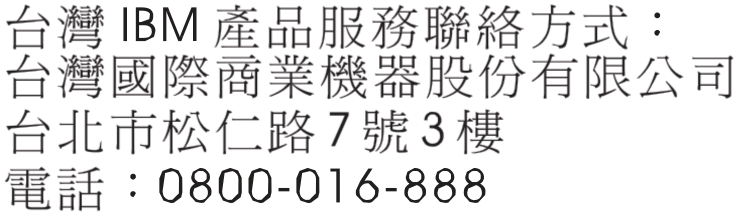
For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to http://www.ibm.com/partnerworld/ and click **Find Business Partners** on the right side of the page. For IBM support telephone numbers, see http://www.ibm.com/planetwide/. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service



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