Command Reference

Alteon OS™ 20.2

Layer 2-7 GbE Switch Module for IBM @server BladeCenter

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NORTEL NETWORKS™

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Preface

The *Alteon OS 20.2 Command Reference* describes how to configure and use the Alteon OS software with your GbE Switch Module.

For documentation on installing the switches physically, see the *Installation Guide* for your GbE Switch Module.

Who Should Use This Book

This *Command Reference* 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 "The Command Line Interface," describes how to connect to the switch and access the information and configuration menus.

Chapter 2 "First-Time Configuration," describes how to use the Setup utility for initial switch configuration and how to change the system passwords.

Chapter 3 "Menu Basics," provides an overview of the menu system, including a menu map, global commands, and menu shortcuts.

Chapter 4 "The Information Menu," shows how to view switch configuration parameters.

Chapter 5 "The Statistics Menu," shows how to view switch performance statistics.

Chapter 6 "The Configuration Menu," shows how to configure switch system parameters, ports, VLANs, Spanning Tree Protocol, SNMP, Port Mirroring, IP Routing, Port Trunking, and more.

Chapter 7 "The SLB Configuration Menu," shows how to configure Server Load Balancing, Filtering, Global Server Load Balancing, and more.

Chapter 8 "The Operations Menu," shows how to use commands which affect switch performance immediately, but do not alter permanent switch configurations (such as temporarily disabling ports). The menu describes how to activate or deactivate optional software features.

Chapter 9 "The Boot Options Menu," 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 10 "The Maintenance Menu," 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, "Alteon OS Syslog Messages," shows a listing of syslog messages.

Appendix B, "Alteon OS SNMP Agent," lists the Management Interface Bases (MIBs) supported in the switch software.

"Glossary" includes definitions of terminology used throughout the book.

"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	Example
`AaBbCc123`	This type is used for names of commands, files, and directories used within the text.	View the `readme.txt` file.
	It also depicts on-screen computer output and prompts.	`Main#`
`AaBbCc123`	This bold type appears in command examples. It shows text that must be typed in exactly as shown.	`Main#` **`sys`**
<*AaBbCc123*>	This italicized type appears in command examples as a parameter placeholder. Replace the indicated text with the appropriate real name or value when using the command. Do not type the brackets.	To establish a Telnet session, enter: `host#` **`telnet`** <*IP address*>
	This also shows book titles, special terms, or words to be emphasized.	Read your *User's Guide* thoroughly.
[ ]	Command items shown inside brackets are optional and can be used or excluded as the situation demands. Do not type the brackets.	`host#` **`ls`** `[`**`-a`**`]`

How to Get Help

If you need help, service, or technical assistance, see the “Getting help and technical assistance” appendix in the Nortel Networks *Layer 2-7 GbE Switch Module for IBM eServer BladeCenter Installation Guide* on the IBM *BladeCenter Documentation* CD.

CHAPTER 1

The Command Line Interface

Your GbE Switch Module 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.

The extensive Alteon OS switching software included in your switch provides a variety of options for accessing and configuring the switch:

- A built-in, text-based command line interface and menu system for access via a Telnet session
- SNMP support for access through network management software such as IBM Director or HP OpenView
- Alteon OS Browser-Based Interface (BBI)

The command line interface is the most direct method for collecting switch information and performing switch configuration. Using a basic terminal, you are presented with a hierarchy of menus that enable you to view information and statistics about the switch, and to perform any necessary configuration.

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

Connecting to the Switch

You can access the command line interface in any one of the following ways:

- Using a Telnet via the management module
- Using a Telnet connection over the network
- Using a SSH connection to securely log into another computer over a network

Management Module Setup

The BladeCenter GbE Switch Module is an integral subsystem within the overall BladeCenter system. The BladeCenter chassis includes a management module (MM) as the central element for overall chassis management and control.

You can use the 100-Mbps Ethernet port on the Management Module to configure and manage the GbE Switch Module. The GbE Switch Module communicates with the management module through port MGT1 and port MGT2, which you can access through the 100 Mbps Ethernet port on the management module. The factory default settings will *only* permit management and control access to the switch module through the 10/100 Mbps Ethernet port on the management module. You can use the four external 10/100/1000 Mbps Ethernet ports on the switch module for management and control of the switch by selecting this mode as an option through the management module configuration utility program (see the applicable *BladeCenter Installation and User's Guide* publications on the IBM *BladeCenter Documentation* CD for more information).

Factory-Default vs. MM assigned IP Addresses

Each GbE Switch Module must be assigned its own Internet Protocol address, which is used for communication with an SNMP network manager or other transmission control protocol/ Internet Protocol (TCP/IP) applications (for example, BootP or TFTP). The factory-default IP address is 10.90.90.9x, where x corresponds to the number of the bay into which the GbE Switch Module is installed. For additional information, see the *Installation Guide*). The management module assigns an IP address of 192.168.70.1*xx*, where *xx* corresponds to the number of the bay into which each GbE Switch Module is installed, as shown in Table 1-1:

Table 1-1 GbE Switch Module IP addresses, based on switch-module bay numbers

Bay number	Factory-default IP address	IP address assigned by MM
Bay 1	10.90.90.91	192.168.70.127
Bay 2	10.90.90.92	192.168.70.128
Bay 3	10.90.90.94	192.168.70.129
Bay 4	10.90.90.97	192.168.70.130

Default Gateway

The default Gateway IP address determines where packets with a destination address outside the current subnet should be sent. Usually, the default Gateway is a router or host acting as an IP gateway to handle connections to other subnets of other TCP/IP networks. If you want to access the GbE Switch Module from outside your local network, use the management module to assign a default Gateway address to the GbE Switch Module. Choose **I/O Module Tasks > Management** from the navigation pane on the left, and enter the default Gateway IP address (for example, 192.168.70.125). Click **Save**.

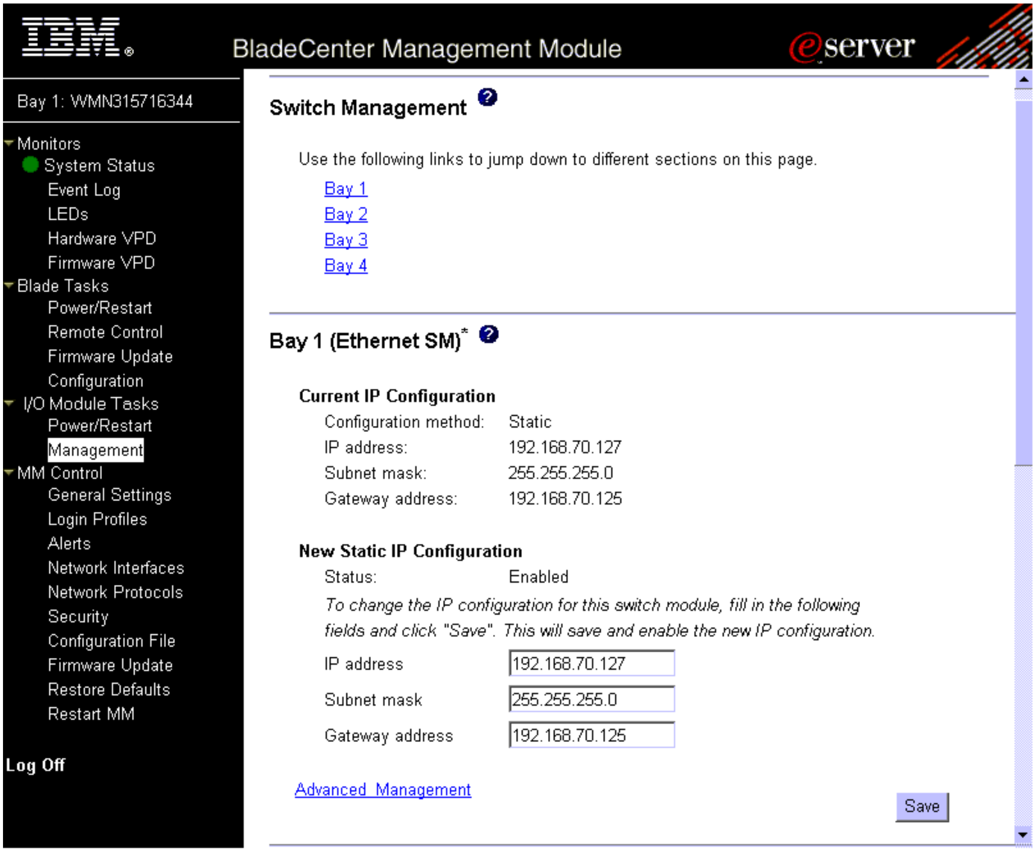
Configuring the Management Module for Switch Access

Complete the following initial configuration steps:

1. **Connect the Ethernet port of the management module to a 10/100 Mbps network (with access to a management station) or directly to a management station.**

2. **Access and log on to the management module, as described in the *BladeCenter Management Module User's Guide* on the IBM *BladeCenter Documentation* CD. The management module provides the appropriate IP addresses for network access (see the applicable *BladeCenter Installation and User's Guide* publications on the IBM *BladeCenter Documentation* CD for more information).**

3. **Select** Management **on the** I/O Module Tasks **menu on the left side of the BladeCenter Management Module window. See** Figure 1.



Switch Management

Use the following links to jump down to different sections on this page.

Bay 1
Bay 2
Bay 3
Bay 4

Bay 1 (Ethernet SM)*

Current IP Configuration

Configuration method: Static
IP address: 192.168.70.127
Subnet mask: 255.255.255.0
Gateway address: 192.168.70.125

New Static IP Configuration

Status: Enabled

To change the IP configuration for this switch module, fill in the following fields and click "Save". This will save and enable the new IP configuration.

IP address: 192.168.70.127
Subnet mask: 255.255.255.0
Gateway address: 192.168.70.125

Advanced Management

Figure 1 Switch management on the BladeCenter management module

4. **You can use the default IP addresses provided by the management module, or you can assign a new IP address to the switch module through the management module. You can assign this IP address through one of the following methods:**

- Manually through the BladeCenter management module.
- Automatically through the IBM Director Configuration Wizard (when it becomes available)

NOTE – If you change the IP address of the GbE Switch Module, make sure that the switch module and the management module both reside on the same subnet.
Both management module ports (Ethernet 0 and Ethernet 1) must reside on the same subnet.

5. **Enable the following features in the management module (Switch Tasks > Management > Advanced Management):**

   - External Ports
   - External management over all ports (required if you want to access the management network through the four external ports on the GbE Switch Module)

   The default value is Disabled for both features. If these features are not already enabled, change the value to **Enabled**, then **Save**.

NOTE – In the switch management Advanced Setup, enable "Preserve new IP configuration on all switch resets," to retain the switch's IP interface when you restore factory defaults. This setting preserves the management port's IP address in the management module's memory, so you maintain connectivity to the management module after a reset.

You can now start a Telnet session, Browser-Based Interface (Web) session, or a Secure Shell session to the GbE Switch Module.

Connecting to the Switch via Telnet

Use the management module to access the GbE Switch Module through Telnet. Choose **I/O Module Tasks > Management** from the navigation pane on the left. Select a bay number and click **Advanced Management > Start Telnet/Web Session > Start Telnet Session**. A Telnet window opens a connection to the Switch Module.

Once that you have configured the GbE Switch Module with an IP address and gateway, you can access the switch from any workstation connected to the management network. Telnet access provides the same options for user and administrator access as those available through the management module, minus certain Telnet and management commands.

To establish a Telnet connection with the switch, run the Telnet program on your workstation and issue the Telnet command, followed by the switch IP address:

```
telnet <switch IP address>
```

Running Telnet

Once the IP parameters on the GbE Switch Module are configured, you can access the CLI using a Telnet connection. From the management module, you can establish a Telnet connection with the switch.

You will then be prompted to enter a password as explained on page 22.

Using a BOOTP Server

If you have a BOOTP server on your network, add the MAC address of the switch to the BOOTP configuration file located on the BOOTP server. The MAC address can be found on a small white label on the back panel of the switch. The MAC address can also be found in the System Information menu (see "System Information" on page 54).

Establishing an SSH Connection

Although a remote network administrator can manage the configuration of a GbE Switch Module via Telnet, this method does not provide a secure connection. The SSH (Secure Shell) protocol enables you to securely log into another computer over a network to execute commands remotely. As a secure alternative to using Telnet to manage switch configuration, SSH ensures that all data sent over the network is encrypted and secure.

The switch can do only one session of key/cipher generation at a time. Thus, a SSH/SCP client will not be able to login if the switch is doing key generation at that time or if another client has just logged in before this client. Similarly, the system will fail to do the key generation if a SSH/SCP client is logging in at that time.

The supported SSH encryption and authentication methods are listed below.

- Server Host Authentication: Client RSA-authenticates the switch in the beginning of every connection.
- Key Exchange: RSA
- Encryption: 3DES-CBC, DES
- User Authentication: Local password authentication, Radius

The following SSH clients have been tested:

- SSH 1.2.23 and SSH 1.2.27 for Linux (freeware)
- SecureCRT 3.0.2 and SecureCRT 3.0.3 (Van Dyke Technologies, Inc.)
- F-Secure SSH 1.1 for Windows (Data Fellows)

NOTE – The Alteon OS implementation of SSH is based on SSH version 1.5 and supports SSH-1.5-1.X.XX. SSH clients of other versions (especially Version 2) are not supported.

Running SSH

Once the IP parameters are configured and the SSH service is turned on the GbE Switch Module, you can access the command line interface using an SSH connection. The default setting for SSH access is disabled.

To establish an SSH connection with the switch, run the SSH program on your workstation by issuing the SSH command, followed by the switch IP address:

```
>> # ssh <switch IP address>
```

or, if SecurID authentication is required, use the following command:

```
>> # ssh -1 ace <switch IP address>
```

You will then be prompted to enter your user name and password.

Accessing the Switch

To enable better switch management and user accountability, seven levels or *classes* of user access have been implemented on the GbE Switch Module. 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 GbE Switch Module. Users may display information that has no security or privacy implications, such as switch statistics and current operational state information.
- Operators can only effect temporary changes on the GbE Switch Module. These changes will be 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.
- 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 GbE Switch Module. 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. For more information, see "Setting Passwords" on page 39.

Table 1-2 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`

Table 1-2 User Access Levels

User Account	Description and Tasks Performed	Password
SLB Operator	The SLB Operator manages Web servers and other Internet services and their loads. In addition to being able to view all switch information and statistics, the SLB Operator can enable/ disable servers using the Server Load Balancing operation menu.	`slboper`
Layer 4 Operator	The Layer 4 Operator manages traffic on the lines leading to the shared Internet services. This user currently has the same access level as the SLB operator. and the access level is reserved for future use, to provide access to operational commands for operators managing traffic on the line leading to the shared Internet services.	`l4oper`
Operator	The Operator manages all functions of the switch. In addition to SLB Operator functions, the Operator can reset ports or the entire switch.	`oper`
SLB Administrator	The SLB Administrator configures and manages Web servers and other Internet services and their loads. In addition to SLB Operator functions, the SLB Administrator can configure parameters on the Server Load Balancing menus, with the exception of not being able to configure filters or bandwidth management.	`slbadmin`
Layer 4 Administrator	The Layer 4 Administrator configures and manages traffic on the lines leading to the shared Internet services. In addition to SLB Administrator functions, the Layer 4 Administrator can configure all parameters on the Server Load Balancing menus, including filters and bandwidth management.	`l4admin`
Administrator	The superuser Administrator has complete access to all menus, information, and configuration commands on the GbE Switch Module, 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. All user levels below “admin” will (by default) be initially disabled (empty password) until they are enabled by the “admin” user. This is done in order to avoid inadvertently leaving the switch open to unauthorized users.

Setup Versus CLI

Once the administrator password is verified, you are given complete access to the switch. If the switch is still set to its factory default configuration, the system will ask whether you wish to run Setup (see Chapter 2, “First-Time Configuration”), a utility designed to help you through the first-time configuration process. If the switch has already been configured, the Main Menu of the CLI is displayed instead.

The following table shows the Main Menu with administrator privileges.

```
[Main Menu]
      info     - Information Menu
      stats    - Statistics Menu
      cfg      - Configuration Menu
      oper     - Operations Command Menu
      boot     - Boot Options Menu
      maint    - Maintenance Menu
      diff     - Show pending config changes  [global command]
      apply    - Apply pending config changes [global command]
      save     - Save updated config to FLASH [global command]
      revert   - Revert pending or applied changes [global command]
      exit     - Exit  [global command, always available]
```

NOTE – If you are accessing a user account or Layer 4 administrator account, some menu options will not be available.

Command Line History and Editing

For a description of global commands, shortcuts, and command line editing functions, see “Menu Basics” on page 45.”

Idle Timeout

By default, the switch will disconnect your Telnet session after five minutes of inactivity. This function is controlled by the idle timeout parameter, which can be set from 1 to 60 minutes. For information on changing this parameter, see “System Configuration” on page 167.

CHAPTER 2
First-Time Configuration

To help with the initial process of configuring your switch, the Alteon OS software includes a Setup utility. The Setup utility prompts you step-by-step to enter all the necessary information for basic configuration of the switch. This chapter describes how to use the Setup utility and how to change system passwords. Before you run Setup, you must first connection to the switch (see Chapter 1, "Connecting to the Switch").

Using the Setup Utility

Whenever you log in as the system administrator under the factory default configuration, you are asked whether you wish to run the Setup utility. Setup can also be activated manually from the command line interface any time after login.

Information Needed For Setup

Setup requests the following information:

- Basic system information
  - Date & time
  - Whether to use BOOTP or not
  - Whether to use Spanning Tree Group or not
- Optional configuration for each port
  - Speed, duplex, flow control, and negotiation mode (as appropriate)
  - Whether to use VLAN tagging or not (as appropriate)
- Optional configuration for each VLAN
  - Name of VLAN
  - Which ports are included in the VLAN

- Optional configuration of IP parameters
  - IP address, subnet mask, and VLAN for each IP interface
  - IP addresses for up to four default gateways
  - Destination, subnet mask, and gateway IP address for each IP static route
  - Whether IP forwarding is enabled or not
  - Whether the RIP supply is enabled or not

Starting Setup When You Log In

The Setup prompt appears automatically whenever you login as the system administrator under the factory default settings.

1. **Connect to the switch.**

   After connecting, the login prompt will appear as shown below.

   ```
   Enter Password:
   ```

2. **Enter `admin` as the default administrator password.**

   If the factory default configuration is detected, the system prompts:

   ```
   Connected to GbE Switch Module
   18:44:05 Wed Jan 3, 2004

   The switch is booted with factory default configuration.
   To ease the configuration of the switch, a "Set Up" facility which
   will prompt you with those configuration items that are essential to
   the operation of the switch is provided.
   Would you like to run "Set Up" to configure the switch? [y/n]:
   ```

   NOTE – If the default `admin` login is unsuccessful, or if the administrator Main Menu appears instead, the system configuration has probably been changed from the factory default settings. If you are certain that you need to return the switch to its factory default settings, see “Selecting a Configuration Block” on page 309.

3. **Enter `y` to begin the initial configuration of the switch, or n to bypass the Setup facility.**

Stopping and Restarting Setup Manually

Stopping Setup

To abort the Setup utility, press <Ctrl-C> during any Setup question. When you abort Setup, the system will prompt:

```
Would you like to run from top again? [y/n]
```

Enter **n** to abort Setup, or **y** to restart the Setup program at the beginning.

Restarting Setup

You can restart the Setup utility manually at any time by entering the following command at the administrator prompt:

```
# /cfg/setup
```

Setup Part 1: Basic System Configuration

When Setup is started, the system prompts:

```
"Set Up" will walk you through the configuration of
System Date and Time, BOOTP, Spanning Tree, Port Speed/Mode,
VLANs, and IP interfaces. [type Ctrl-C to abort "Set Up"]
-------------------------------------------------------------

Will you be configuring VLANs? [y/n]
```

1. **Enter y if you will be configuring VLANs. Otherwise enter n.**

   If you decide not to configure VLANs during this session, you can configure them later using the configuration menus, or by restarting the Setup facility. For more information on configuring VLANs, see the *Alteon OS 20.2 Application Guide*.

   Next, the Setup utility prompts you to input basic system information.

2. **Enter the year of the current date at the prompt:**

   ```
   Enter year [2004]:
   ```

   Enter the last two digits of the year as a number from 00 to 99. “00” is considered 2000. To keep the current year, press <Enter>.

NOTE – When the GbE Switch Module is reset, the date and time to revert to default values. Use `/cfg/sys/date` and `/cfg/sys/time` to reenter the current date and time.

The system displays the date and time settings:

```
System clock set to 18:55:36 Wed Jan 3, 2004.
```

3. **Enter the month of the current system date at the prompt:**

```
System Date:
Enter month [1]:
```

Enter the month as a number from 1 to 12. To keep the current month, press <Enter>.

4. **Enter the day of the current date at the prompt:**

```
Enter day [3]:
```

Enter the date as a number from 1 to 31. To keep the current day, press <Enter>.

5. **Enter the hour of the current system time at the prompt:**

```
System Time:
Enter hour in 24-hour format [18]:
```

Enter the hour as a number from 00 to 23. To keep the current hour, press <Enter>.

6. **Enter the minute of the current time at the prompt:**

```
Enter minutes [55]:
```

Enter the minute as a number from 00 to 59. To keep the current minute, press <Enter>.

7. **Enter the seconds of the current time at the prompt:**

```
Enter seconds [37]:
```

Enter the seconds as a number from 00 to 59. To keep the current second, press <Enter>.

The system displays the date and time settings:

```
System clock set to 8:55:36 Wed Jan 3, 2004.
```

8. **Enable or disable the use of `BOOTP` at the prompt:**

```
BootP Option:
Current BOOTP:  disabled
Enter new BOOTP  [d/e]:
```

If available on your network, a BOOTP server can supply the switch with IP parameters so that you do not have to enter them manually. BOOTP must be disabled however, before the system will prompt for IP parameters.

Enter **d** to disable the use of BOOTP, or enter **e** to enable the use of BOOTP. To keep the current setting, press <Enter>.

9. **Turn Spanning Tree Protocol on or off at the prompt:**

```
Spanning Tree:
Current Spanning Tree Group 1 setting: ON
Turn Spanning Tree Group 1 OFF? [y/n]
```

Enter **y** to turn off Spanning Tree, or enter **n** to leave Spanning Tree on.

Setup Part 2: Port Configuration

NOTE – When configuring port options for your switch, some of the prompts and options may be different.

1. **Select the port to configure, or skip port configuration at the prompt:**

```
Port Config:
Enter port alias or port number (INT1-14, MGT1-2, EXT1-4):
```

NOTE – The sample screens that appear in this document might differ slightly from the screens displayed by your system. Screen content varies based on the type of BladeCenter unit that you are using and the firmware versions and options that are installed.

If you wish to change settings for individual ports, enter the number of the port you wish to configure. To skip port configuration, press <Enter> without specifying any port and go to "Setup Part 3: VLANs" on page 33.

2. **Configure Gigabit Ethernet port flow parameters.**

   If you selected a port that has a Gigabit Ethernet connector, the system prompts:

   ```
   Gig Link Configuration:
   Port Flow Control:
   Current Port EXT1 flow control setting:    both
   Enter new value ["rx"/"tx"/"both"/"none"]:
   ```

   Enter **`rx`** to enable receive flow control, **`tx`** for transmit flow control, **`both`** to enable both, or **`none`** to turn flow control off for the port. To keep the current setting, press <Enter>.

3. **Configure Gigabit Ethernet port autonegotiation mode.**

   If you selected a port that has a Gigabit Ethernet connector, the system prompts:

   ```
   Port Auto Negotiation:
   Current Port EXT1 autonegotiation:         on
   Enter new value ["on"/"off"]:
   ```

   Enter **`on`** to enable port autonegotiation, **`off`** to disable it, or press <Enter> to keep the current setting.

4. **If configuring VLANs, enable or disable VLAN tagging for the port.**

   If you have selected to configure VLANs back in Part 1, the system prompts:

   ```
   Port VLAN tagging config (tagged port can be a member of multiple VLANs)
   Current TAG support:             disabled
   Enter new TAG support [d/e]:
   ```

   Enter **`d`** to disable VLAN tagging for the port or enter **`e`** to enable VLAN tagging for the port. To keep the current setting, press <Enter>.

5. **The system prompts you to configure the next port:**

   ```
   Enter port alias or port number (INT1-14, MGT1-2, EXT1-4):
   ```

   When you are through configuring ports, press <Enter> without specifying any port. Otherwise, repeat the steps in this section.

Setup Part 3: VLANs

If you chose to skip VLANs configuration back in Part 1, skip to "Setup Part 4: IP Configuration" on page 34.

1. **Select the VLAN to configure, or skip VLAN configuration at the prompt:**

```
VLAN Config:
Enter VLAN number from 2 to 4095, NULL at end:
```

If you wish to change settings for individual VLANs, enter the number of the VLAN you wish to configure. To skip VLAN configuration, press <Enter> without typing a VLAN number and go to "Setup Part 4: IP Configuration" on page 34.

2. **Enter the new VLAN name at the prompt:**

```
VLAN is newly created.
Pending new VLAN name: VLAN 2
Enter new VLAN name:
```

Entering a new VLAN name is optional. To use the pending new VLAN name, press <Enter>.

3. **Configure jumbo frame support for the VLAN:**

```
VLAN Jumbo Frame Support:
Current jumbo frame support: disabled
Enter new jumbo frame support [d/e]:
```

4. **Enter the VLAN port numbers:**

```
Define Ports in VLAN:
Current VLAN 2:  empty
Enter ports one per line, NULL at end:
```

Enter each port, by port number or port alias, and confirm placement of the port into this VLAN. When you are finished adding ports to this VLAN, press <Enter> without specifying any port.

5. **Configure Spanning Tree Group membership for the VLAN:**

```
Spanning Tree Group membership:
Enter new Spanning Tree Group index [1-16]:
```

6. **The system prompts you to configure the next VLAN:**

```
VLAN Config:
Enter VLAN number from 2 to 4095, NULL at end:
```

Repeat the steps in this section until all VLANs have been configured. When all VLANs have been configured, press <Enter> without specifying any VLAN.

Setup Part 4: IP Configuration

The system prompts for IP parameters.

IP Interfaces

IP interfaces are used for defining subnets to which the switch belongs.

Up to 128 IP interfaces can be configured on the GbE Switch Module. The IP address assigned to each IP interface provide the switch with an IP presence on your network. No two IP interfaces can be on the same IP subnet. The interfaces can be used for connecting to the switch for remote configuration, and for routing between subnets and VLANs (if used).

1. **Select the IP interface to configure, or skip interface configuration at the prompt:**

```
IP Config:

IP interfaces:
Enter interface number: (1-128)
```

If you wish to configure individual IP interfaces, enter the number of the IP interface you with to configure. To skip IP interface configuration, press <Enter> without typing an interface number and go to “Default Gateways” on page 35.

NOTE – Interface 128 is reserved for switch management. If you change the IP address of IF 128, you can lose the connection to the management module. Use the management module to change the IP address of the Gbe Switch Module.

2. **For the specified IP interface, enter the IP address in dotted decimal notation:**

```
Current IP address:      0.0.0.0
Enter new IP address:
```

To keep the current setting, press <Enter>.

3. **At the prompt, enter the IP subnet mask in dotted decimal notation:**

```
Current subnet mask:            0.0.0.0
Enter new subnet mask:
```

To keep the current setting, press <Enter>.

4. **If configuring VLANs, specify a VLAN for the interface.**

This prompt appears if you selected to configure VLANs back in Part 1:

```
Current VLAN:     1
Enter new VLAN:
```

Enter the number for the VLAN to which the interface belongs, or press <Enter> without specifying a VLAN number to accept the current setting.

5. **At the prompt, enter `y` to enable the IP interface, or `n` to leave it disabled**:

```
Enable IP interface? [y/n]
```

6. **The system prompts you to configure another interface:**

```
Enter interface number: (1-128)
```

Repeat the steps in this section until all IP interfaces have been configured. When all interfaces have been configured, press <Enter> without specifying any interface number.

Default Gateways

1. **At the prompt, select a default gateway for configuration, or skip default gateway configuration:**

```
IP default gateways:
Enter default gateway number: (1-132)
```

Enter the number for the default gateway to be configured. To skip default gateway configuration, press <Enter> without typing a gateway number and go to "IP Routing" on page 36.

2. **At the prompt, enter the IP address for the selected default gateway:**

```
Current IP address:       0.0.0.0
Enter new IP address:
```

Enter the IP address in dotted decimal notation, or press <Enter> without specifying an address to accept the current setting.

3. **At the prompt, enter `y` to enable the default gateway, or `n` to leave it disabled:**

```
Enable default gateway? [y/n]
```

4. **The system prompts you to configure another default gateway:**

```
Enter default gateway number: (1-132)
```

Repeat the steps in this section until all default gateways have been configured. When all default gateways have been configured, press <Enter> without specifying any number.

IP Routing

When IP interfaces are configured for the various subnets attached to your switch, IP routing between them can be performed entirely within the switch. This eliminates the need to send inter-subnet communication to an external router device. Routing on more complex networks, where subnets may not have a direct presence on the GbE Switch Module, can be accomplished through configuring static routes or by letting the switch learn routes dynamically.

This part of the Setup program prompts you to configure the various routing parameters.

1. **At the prompt, enable or disable forwarding for IP Routing:**

```
Enable IP forwarding? [y/n]
```

Enter **`y`** to enable IP forwarding. To disable IP forwarding, enter **`n`** and proceed to Step 2.To keep the current setting, press <Enter>.

2. **At the prompt, enable or disable the RIP supply:**

```
Enable RIP supply? [y/n]
```

Setup Part 5: Final Steps

1. **When prompted, decide whether to restart Setup or continue:**

```
Would you like to run from top again? [y/n]
```

Enter **y** to restart the Setup utility from the beginning, or **n** to continue.

2. **When prompted, decide whether you wish to review the configuration changes:**

```
Review the changes made? [y/n]
```

Enter **y** to review the changes made during this session of the Setup utility. Enter **n** to continue without reviewing the changes. We recommend that you review the changes.

3. **Next, decide whether to apply the changes at the prompt:**

```
Apply the changes? [y/n]
```

Enter **y** to apply the changes, or **n** to continue without applying. Changes are normally applied.

4. **At the prompt, decide whether to make the changes permanent:**

```
Save changes to flash? [y/n]
```

Enter **y** to save the changes to flash. Enter **n** to continue without saving the changes. Changes are normally saved at this point.

5. **If you do not apply or save the changes, the system prompts whether to abort them:**

```
Abort all changes? [y/n]
```

Enter **y** to discard the changes. Enter **n** to return to the “`Apply the changes?`” prompt.

NOTE – After initial configuration is complete, it is recommended that you change the default passwords as shown in “Setting Passwords” on page 39.

Optional Setup for SNMP Support

NOTE – This step is optional. Perform this procedure only if you are planning on using SNMP-based tools.

1. **Enable SNMP and select one of the options.**

```
>> # /cfg/sys/snmp dis|read|write
```

2. **Set SNMP read or write community string. By default, they are public and private respectively.**

```
>> # /cfg/snmp/rcomm|wcomm
```

3. **Apply and save configuration if you are not configuring the switch with Telnet support. Otherwise apply and save after "Optional Setup for Telnet Support" on page 38.**

```
>> System# apply
>> System# save
```

Optional Setup for Telnet Support

NOTE – This step is optional. Perform this procedure only if you are planning on connecting to the GbE Switch Module through a remote Telnet connection.

1. **Telnet is enabled by default. To change the setting, use the following command:**

```
>> # /cfg/sys/tnet
```

2. **Apply and save SNMP and /or telnet configuration(s).**

```
>> System# apply
>> System# save
```

If your network uses Routing Interface Protocol (RIP), enter **y** to enable the RIP supply. Otherwise, enter **n** to disable it. When RIP is enabled, RIP listen is set by default.

Setting Passwords

It is recommended that you change the user and administrator passwords after initial configuration and as regularly as required under your network security policies.

To change both the user password and the administrator password, you must login using the administrator password. Passwords cannot be modified from the user command mode.

NOTE – If you forget your administrator password, call your technical support representative for help using the password fix-up mode.

Changing the Default Administrator Password

The administrator has complete access to all menus, information, and configuration commands, including the ability to change both the user and administrator passwords.

The default password for the administrator account is `admin`. To change the default password, follow this procedure:

1. **Connect to the switch and log in using the `admin` password.**

2. **From the Main Menu, use the following command to access the Configuration Menu:**

```
Main# /cfg
```

The Configuration Menu is displayed.

```
[Configuration Menu]
     sys      - System-wide Parameter Menu
     port     - Port Menu
     pmirr    - Port Mirroring Menu
     l2       - Layer 2 Menu
     l3       - Layer 3 Menu
     slb      - Server Load Balancing (Layer 4-7) Menu
     setup    - Step by step configuration set up
     dump     - Dump current configuration to script file
     ptcfg    - Backup current configuration to tftp server
     gtcfg    - Restore current configuration from tftp server
```

3. **From the Configuration Menu, use the following command to select the System Menu:**

```
>> Configuration# sys
```

The System Menu is displayed.

```
[System Menu]
     syslog   - Syslog Menu
     sshd     - SSH Server Menu
     radius   - RADIUS Authentication Menu
     tacacs   - TACACS+ Authentication Menu
     ntp      - NTP Server Menu
     ssnmp    - System SNMP Menu
     access   - System Access Menu
     date     - Set system date
     time     - Set system time
     idle     - Set timeout for idle CLI sessions
     notice   - Set login notice
     bannr    - Set login banner
     smtp     - Set SMTP host
     hprompt  - Enable/disable display hostname (sysName) in CLI prompt
     bootp    - Enable/disable use of BOOTP
     cur      - Display current system-wide parameters
```

4. **From the System Menu, use the following command to select the System Access Menu:**

```
>> System# access
```

The System Access Menu is displayed.

```
[System Access Menu]
     user     - User Access Control Menu (passwords)
     http     - Enable/disable HTTP (Web) access
     wport    - Set HTTP (Web) server port number
     mnet     - Set management network
     mmask    - Set management netmask
     snmp     - Set SNMP access control
     tnet     - Enable/disable Telnet access
     tnport   - Set Telnet server port number
     cur      - Display current system access configuration
```

5. **Select the administrator password.**

```
System Access# user/admpw
```

6. **Enter the current administrator password at the prompt:**

```
Changing ADMINISTRATOR password; validation required...
Enter current administrator password:
```

NOTE – If you forget your administrator password, call your technical support representative for help using the password fix-up mode.

7. **Enter the new administrator password at the prompt:**

```
Enter new administrator password:
```

8. **Enter the new administrator password, again, at the prompt:**

```
Re-enter new administrator password:
```

9. **Apply and save your change by entering the following commands:**

```
System# apply
System# save
```

Changing the Default User Password

The user login has limited control of the switch. Through a user account, you can view switch information and statistics, but you can’t make configuration changes.

The default password for the user account is `user`. This password cannot be changed from the user account. Only the administrator has the ability to change passwords, as shown in the following procedure.

1. **Connect to the switch and log in using the `admin` password.**

2. **From the Main Menu, use the following command to access the Configuration Menu:**

```
Main# cfg
```

3. **From the Configuration Menu, use the following command to select the System Menu:**

```
>> Configuration# sys
```

4. **From the System Menu, use the following command to select the System Access Menu:**

```
>> System# access
```

5. **Select the user password.**

```
System# user/usrpw
```

6. **Enter the current administrator password at the prompt.**

   Only the administrator can change the user password. Entering the administrator password confirms your authority.

```
Changing USER password; validation required...
Enter current administrator password:
```

7. **Enter the new user password at the prompt:**

```
Enter new user password:
```

8. **Enter the new user password, again, at the prompt:**

```
Re-enter new user password:
```

9. **Apply and save your changes:**

```
System# apply
System# save
```

Changing the Default Layer 4 Administrator Password

The Layer 4 administrator has limited control of the switch. Through a Layer 4 administrator account, you can view all switch information and statistics, but can configure changes only on the Server Load Balancing menus.

The default password for the Layer 4 administrator account is `l4admin`. To change the default password, follow this procedure:

1. **Connect to the switch and log in using the administrator account.**

   To change any switch password, you must login using the administrator password. Passwords cannot be modified from the Layer 4 administrator account or the user account.

2. **From the Main Menu, use the following command to access the System Menu:**

```
Main# /cfg/sys/access/user
```

3. **Select the Layer 4 administrator password:**

```
System# l4apw
```

4. **Enter the current *administrator* password (not the Layer 4 administrator password) at the prompt:**

```
Changing L4 ADMINISTRATOR password; validation required...
Enter current administrator password:
```

NOTE – If you forget your administrator password, call your technical support representative for help using the password fix-up mode.

5. **Enter the new Layer 4 administrator password at the prompt:**

```
Enter new L4 administrator password:
```

6. **Enter the new administrator password, again, at the prompt:**

```
Re-enter new L4 administrator password:
```

7. **Apply and save your change by entering the following commands:**

```
System Access# apply
System Access# save
```

CHAPTER 3
Menu Basics

The GbE Switch Module's Command Line Interface (CLI) is used for viewing switch information and statistics. In addition, the administrator can use the CLI for performing all levels of switch configuration.

To make the CLI easy to use, the various commands have been logically grouped into a series of menus and sub-menus. Each menu displays a list of commands and/or sub-menus that are available, along with a summary of what each command will do. Below each menu is a prompt where you can enter any command appropriate to the current menu.

This chapter describes the Main Menu commands, and provides a list of commands and shortcuts that are commonly available from all the menus within the CLI.

The Main Menu

The Main Menu appears after a successful connection and login. The following table shows the Main Menu for the administrator login. Some features are not available under the user login.

```
[Main Menu]
      info     - Information Menu
      stats    - Statistics Menu
      cfg      - Configuration Menu
      oper     - Operations Command Menu
      boot     - Boot Options Menu
      maint    - Maintenance Menu
      diff     - Show pending config changes  [global command]
      apply    - Apply pending config changes [global command]
      save     - Save updated config to FLASH [global command]
      revert   - Revert pending or applied changes [global command]
      exit     - Exit  [global command, always available]
```

Menu Summary

- **Information Menu**

  Provides sub-menus for displaying information about the current status of the switch: from basic system settings to VLANs, Layer 4 settings, and more.

- **Statistics Menu**

  Provides sub-menus for displaying switch performance statistics. Included are port, IF, IP, ICMP, TCP, UDP, SNMP, routing, ARP, DNS, VRRP, and Layer 4 statistics.

- **Configuration Menu**

  This menu is available only from an administrator login. It includes sub-menus for configuring every aspect of the switch. Changes to configuration are not active until explicitly applied. Changes can be saved to non-volatile memory.

- **Operations Command Menu**

  Operations-level commands are used for making immediate and temporary changes to switch configuration. This menu is used for bringing ports temporarily in and out of service, performing port mirroring, and enabling or disabling Server Load Balancing functions. It is also used for activating or deactivating optional software packages.

- **Boot Options Menu**

  This menu is used for upgrading switch software, selecting configuration blocks, and for resetting the switch when necessary.

- **Maintenance Menu**

  This menu is used for debugging purposes, enabling you to generate a dump of the critical state information in the switch, and to clear entries in the forwarding database and the ARP and routing tables.

Global Commands

Some basic commands are recognized throughout the menu hierarchy. These commands are useful for obtaining online help, navigating through menus, and for applying and saving configuration changes.

For help on a specific command, type `help`. You will see the following screen:

.

```
Global Commands: [can be issued from any menu]
help                 up                   print                pwd
lines                verbose              exit                 quit
diff                 apply                save                 revert
ping                 traceroute           telnet               history
pushd                popd

The following are used to navigate the menu structure:
     .  Print current menu
    ..  Move up one menu level
     /  Top menu if first, or command separator
     !  Execute command from history
```

Table 3-1 Description of Global Commands

Command	Action
? *command* **or help**	Provides more information about a specific command on the current menu. When used without the *command* parameter, a summary of the global commands is displayed.
. or print	Display the current menu.
.. or up	Go up one level in the menu structure.
/	If placed at the beginning of a command, go to the Main Menu. Otherwise, this is used to separate multiple commands placed on the same line.
lines	Set the number of lines (n) that display on the screen at one time. The default is 24 lines. When used without a value, the current setting is displayed.
diff	Show any pending configuration changes.
apply	Apply pending configuration changes.
save	Write configuration changes to non-volatile flash memory.

Table 3-1 Description of Global Commands

Command	Action
revert	Remove pending configuration changes between "apply" commands. Use this command to restore configuration parameters set since last "apply" command.
exit or quit	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*> [*tries (1-32)*> [*msec delay*]] [**-m** | **-mgmt** | **-d** | **-data**] Where *IP address* is the hostname or IP address of the device, *tries* (optional) is the number of attempts (1-32), *msec delay* (optional) is the number of milliseconds between attempts. By default, the **-d** or **-data** option for network ports is in effect. If the management port is used, specify the **-m** or **-mgmt** option. The DNS parameters must be configured if specifying hostnames (see "Domain Name System Configuration" on page 234).
traceroute	Use this command to identify the route used for station-to-station connectivity across the network. The format is as follows: **traceroute** <*host name*>| <*IP address*> [<*max-hops (1-32)*> [*msec delay*]] [**-m** | **-mgmt** | **-d** | **-data**] Where *IP address* is the hostname or IP address of the target station, *max-hops* (optional) is the maximum distance to trace (1-16 devices), and *delay* (optional) is the number of milliseconds for wait for the response. By default, the **-d** or **-data** option for network ports is in effect. If the management port is used, specify the **-m** or **-mgmt** option. As with `ping`, the DNS parameters must be configured if specifying hostnames.
pwd	Display the command path used to reach the current menu.
verbose *n*	Sets the level of information displayed on the screen: 0 =Quiet: Nothing appears except errors—not even prompts. 1 =Normal: Prompts and requested output are shown, but no menus. 2 =Verbose: Everything is shown. When used without a value, the current setting is displayed.
telnet	This command is used to telnet out of the switch. The format is as follows: <*hostname*> | <*IP address*> [port] [**-m** | **-mgmt** | **-d** | **-data**]. Where *IP address* is the hostname or IP address of the device. By default, the **-d** or **-data** option for network ports is in effect. If the management port is used, specify the **-m** or **-mgmt** option.
history	This command brings up the history of the last 10 commands.

Command Line History and Editing

Using the command line interface, you can retrieve and modify previously entered commands with just a few keystrokes. The following options are available globally at the command line:

Table 3-2 Command Line History and Editing Options

Option	Description
`history`	Display a numbered list of the last 10 previously entered commands.
`!!`	Repeat the last entered command.
`!`*n*	Repeat the n^{th} command shown on the history list.
<Ctrl-p>	(Also the up arrow key.) Recall the *previou*s command from the history list. This can be used multiple times to work backward through the last 10 commands. The recalled command can be entered as is, or edited using the options below.
<Ctrl-n>	(Also the down arrow key.) Recall the *next* command from the history list. This can be used multiple times to work forward through the last 10 commands. The recalled command can be entered as is, or edited using the options below.
<Ctrl-a>	Move the cursor to the beginning of command line.
<Ctrl-e>	Move cursor to the *end* of the command line.
<Ctrl-b>	(Also the left arrow key.) Move the cursor *back* one position to the left.
<Ctrl-f>	(Also the right arrow key.) Move the cursor *forward* one position to the right.
<Backspace>	(Also the Delete key.) Erase one character to the left of the cursor position.
<Ctrl-d>	*Delete* one character at the cursor position.
<Ctrl-k>	*Kill* (erase) all characters from the cursor position to the end of the command line.
<Ctrl-l>	Redraw the screen.
<Ctrl-u>	Clear the entire line.
Other keys	Insert new characters at the cursor position.

Command Line Interface Shortcuts

Command Stacking

As a shortcut, you can type multiple commands on a single line, separated by forward slashes (/). You can connect as many commands as required to access the menu option that you want. For example, the keyboard shortcut to access the Spanning Tree Port Configuration Menu from the `Main#` prompt is as follows:

```
Main# cfg/stg/port
```

Command Abbreviation

Most commands can be abbreviated by entering the first characters which distinguish the command from the others in the same menu or sub-menu. For example, the command shown above could also be entered as follows:

```
Main# c/st/p
```

Tab Completion

By entering the first letter of a command at any menu prompt and hitting <Tab>, the CLI will display all commands or options in that menu that begin with that letter. Entering additional letters will further refine the list of commands or options displayed. If only one command fits the input text when <Tab> is pressed, that command will be supplied on the command line, waiting to be entered. If the <Tab> key is pressed without any input on the command line, the currently active menu will be displayed.

CHAPTER 4

The Information Menu

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.

/info
Information Menu

```
[Information Menu]
     sys       - System Information Menu
     l2        - Layer 2 Information Menu
     l3        - Layer 3 Information Menu
     slb       - Layer 4-7 Information Menu
     link      - Show link status
     port      - Show port information
     dump      - Dump all information
```

The information provided by each menu option is briefly described in Table 4-1 on page 51, with pointers to where detailed information can be found.

Table 4-1 Information Menu Options (/info)

Command Syntax and Usage

`sys`

Displays the System Information Menu. For details, see page 53.

`l2`

Displays the Layer 2 Information Menu. For details, see page 56.

`l3`

Displays the Layer 3 Information Menu. For details, see page 66.

`slb`

Displays the Layer 4 Information Menu. For details, see page 84.

Table 4-1 Information Menu Options (/info)

Command Syntax and Usage

`link`

Displays configuration information about each port, including:

- Port alias
- Port speed (10, 100, 10/100, or 1000)
- Duplex mode (half, full, or auto)
- Flow control for transmit and receive (no, yes, or auto)
- Link status (up or down)

For details, see page 91.

`port`

Displays port status information, including:

- Port alias
- Whether the port uses VLAN Tagging or not
- Port VLAN ID (PVID)
- Port name
- VLAN membership

For details, see page 92.

`dump`

Dumps all switch information available from the Information Menu (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.

/info/sys
System Information

```
[System Menu]
     general   - Show general system information
     log       - Show last 30 syslog messages
     dump      - Dump all system information
```

The information provided by each menu option is briefly described in Table 4-2 on page 53, with pointers to where detailed information can be found.

Table 4-2 System Menu Options (/info/sys)

Command Syntax and Usage
`general` 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 IP interface #1 ■ Hardware version and part number ■ Software image file and version number ■ Configuration name ■ Log-in banner, if one is configured For details, see page 54.
`log` Displays 30 most recent syslog messages. For details, see page 55.
`dump` Dumps all switch information available from the Information Menu (10K or more, depending on your configuration).

/info/sys/general
General System Information

```
System Information at  0:57:36 Thu Jul  1, 2004

Layer 2-7 Gigabit Ethernet Switch Module for IBM eServer BladeCenter

Switch is up 5 days, 1 hour, 1 minute and 21 seconds.
Last boot:  0:01:03 Thu Jul  1, 2004 (power cycle)

MAC Address: 00:09:97:ec:e6:00    Management IP Address (if 128):
10.90.90.97
Software Version 20.2.0 (FLASH image1), active configuration.

PCBA Part Number:      316210-A
FAB Number:            86
Serial Number:         YJIRTK3510
Manufacturing Date:    5120
Hardware Revision:     48
PLD Firmware Version:  3.4
```

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
- IP address of IP interface #1
- Hardware version and part number
- Software image file and version number
- Configuration name
- Log-in banner, if one is configured

/info/sys/log
Show Last 30 Syslog Messages

```
Date    Time      Criticality level      Message
Jul  8  17:25:41    NOTICE       system: link up on port INT1
Jul  8  17:25:41    NOTICE       system: link up on port INT8
Jul  8  17:25:41    NOTICE       system: link up on port INT7
Jul  8  17:25:41    NOTICE       system: link up on port INT2
Jul  8  17:25:41    NOTICE       system: link up on port INT1
Jul  8  17:25:41    NOTICE       system: link up on port INT4
Jul  8  17:25:41    NOTICE       system: link up on port INT3
Jul  8  17:25:41    NOTICE       system: link up on port INT6
Jul  8  17:25:41    NOTICE       system: link up on port INT5
Jul  8  17:25:41    NOTICE       system: link up on port EXT4
Jul  8  17:25:41    NOTICE       system: link up on port EXT1
Jul  8  17:25:41    NOTICE       system: link up on port EXT3
Jul  8  17:25:41    NOTICE       system: link up on port EXT2
Jul  8  17:25:41    NOTICE       system: link up on port INT3
Jul  8  17:25:42    NOTICE       system: link up on port INT2
Jul  8  17:25:42    NOTICE       system: link up on port INT4
Jul  8  17:25:42    NOTICE       system: link up on port INT3
Jul  8  17:25:42    NOTICE       system: link up on port INT6
Jul  8  17:25:42    NOTICE       system: link up on port INT5
Jul  8  17:25:42    NOTICE       system: link up on port INT1
Jul  8  17:25:42    NOTICE       system: link up on port INT6
```

Each syslog message has a criticality 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 below.

- 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 debut-level message

/info/l2
Layer 2 Menu

```
[Layer 2 Menu]
     fdb      - Forwarding Database Information Menu
     lacp     - Link Aggregation Control Protocol Menu
     stg      - Show STG information
     trunk    - Show Trunk Group information
     vlan     - Show VLAN information
     dump     - Dump all layer 2 information
```

The information provided by each menu option is briefly described in Table 4-3 on page 56, with pointers to where detailed information can be found.

Table 4-3 Layer 2 Menu Options (/info/l2)

Command Syntax and Usage
`fdb` Displays the Forwarding Database Information Menu. For details, see page 57.
`lacp` Displays the Link Aggregation Control Protocol Menu. For details, see page 60.
`stg` 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 For details, see page 62.
`trunk` When trunk groups are configured, you can view the state of each port in the various trunk groups. For details, see page 64.

Table 4-3 Layer 2 Menu Options (/info/l2)

Command Syntax and Usage
`vlan` Displays VLAN configuration information, including: ■ VLAN Number ■ VLAN Name ■ Status ■ Port membership of the VLAN For details, see page 65.
`dump` Dumps all switch information available from the Layer 2 menu (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.

/info/l2/fdb
FDB Information Menu

```
[Forwarding Database Menu]
      find     - Show a single FDB entry by MAC address
      port     - Show FDB entries on a single port
      trunk    - Show FDB entries on a single trunk
      vlan     - Show FDB entries on a single VLAN
      refpt    - Show FDB entries referenced by a single port
      dump     - Show all FDB entries
```

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 2K MAC address entries on the MP per switch. Each SP port supports up to 1K entries.

Table 4-4 FDB Information Menu Options (/info/l2/fdb)

Command Syntax and Usage
`find` *<MAC address>* [*<VLAN>*] 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`.
`port` *<port number or alias>* Displays all FDB entries for a particular port.
`trunk` *<Trunk Group number>* Displays all FDB entries on a single trunk.
`vlan` *<VLAN number (1-4095)>* Displays all FDB entries on a single VLAN.
`refpt` *<SP number (1-4)>* Displays the FDB entries referenced by a single port.
`dump` Displays all entries in the Forwarding Database. For more information, see page 59.

/info/l2/fdb/dump

Show All FDB Information

```
  MAC address    VLAN  Port Trunk State  Referenced SPs Learned port
----------------- ----  ---- ----- -----  -------------- -----------
00:02:01:00:00:00  300  EXT1        FWD     2             EXT1
00:02:01:00:00:01  300  INT1        FWD     1             INT1
00:02:01:00:00:02  300  INT1        FWD     2             INT1
00:02:01:00:00:03  300  INT7        FWD     1             INT7
00:02:01:00:00:04  300  INT3        FWD     1             INT3
00:02:01:00:00:05  300  INT4        FWD     2             INT4
00:02:01:00:00:06  300  INT6        FWD     2             INT6
00:02:01:00:00:07  300  INT2        FWD     2             INT2
00:02:01:00:00:08  300  INT5        FWD     1 2           INT5
00:02:01:00:00:09  300  INT4        FWD     1 2           INT4
00:02:01:00:00:0a  300  INT3        FWD     1 2           INT3
00:02:01:00:00:0b  300  INT2        FWD     1 2           INT2
00:02:01:00:00:0c  4095 MGT1        FWD     1             MGT1
```

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 will be listed under “Reference ports.”

If the state for the port is listed as an interface (IF), the MAC address is for a standard VRRP virtual router. If the state is listed as a virtual server (VIP), the MAC address is for a virtual server router—a virtual router with the same IP address as a virtual server.

Clearing Entries from the Forwarding Database

To delete a MAC address from the forwarding database (FDB) or to clear the entire FDB, refer to “Forwarding Database Options” on page 313.

/info/l2/lacp
Link Aggregation Control Protocol menu

```
[LACP Menu]
     aggr      - Show LACP aggregator information for the port
     port      - Show LACP port information
     dump      - Show all LACP ports information
```

Use these commands to display LACP status information about each port on a GbE Switch Module.

Table 4-5 Link Aggregation Control Protocol (/info/l2/lacp)

Command Syntax and Usage
aggr Displays detailed information of the LACP aggregator used by the selected port.
port Displays LACP information about the selected port.
dump Displays a summary of LACP information. For details, see page 60.

/info/l2/lacp/dump
Link Aggregation Control Protocol

```
port  lacp   adminkey  operkey  selected  prio  attached  trunk
                                                  aggr
--------------------------------------------------------------
EXT1  active     30        30         y     128       17     19
EXT2  active     30        30         y     128       17     19
EXT3  off        19        19         n     128       --     --
EXT4  off        20        20         n     128       --     --
```

LACP dump includes the following information for each external port in the GbESM:

- lacp

  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.
- attached aggr
  Displays the aggregator associated with each port.
- trunk
  This value represents the LACP trunk group number.

/info/l2/stg
Spanning Tree Information

```
Spanning Tree Group 1: On

Current Root:            Path-Cost   Port Hello MaxAge FwdDel Aging
 8000 00:03:42:fa:3b:80        0       0    2     20     15    300

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

Port  Priority   Cost      State      Designated Bridge     Des Port
----  --------   ----    ----------  ----------------------  --------
INT1      128      5     FORWARDING   8000-00:03:42:fa:3b:80    32769
INT2      128      5     FORWARDING   8000-00:03:42:fa:3b:80    32770
INT3       128      0       DISABLED
INT4       128      0       DISABLED
INT5       128      0       DISABLED
INT6       128      0       DISABLED
INT7       128      0       DISABLED
INT8       128      0       DISABLED
INT9       128      0       DISABLED
INT10      128      0       DISABLED
INT11     128     10      FORWARDING   8000-00:03:42:fa:3b:80   32779
INT12      128      0       DISABLED
INT13      128      0       DISABLED
INT14      128      0       DISABLED
EXT1       128      0       DISABLED
EXT2       128      0       DISABLED
EXT3       128      0       DISABLED
EXT4       128      0       DISABLED
```

NOTE – The sample screens that appear in this document might differ slightly from the screens displayed by your system. Screen content varies based on the type of BladeCenter unit that you are using and the firmware versions and options that are installed.

The switch software uses the IEEE 802.1d Spanning Tree Protocol (STP). 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:

- Slot number
- Port alias and priority
- Cost
- State

The following table describes the STG parameters.

Table 4-6 Spanning Tree Parameter Descriptions

Parameter	Description
`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 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.
`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.

Table 4-6 Spanning Tree Parameter Descriptions (Continued)

Parameter	Description
`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 `BLOCKING`, `LISTENING`, `LEARNING`, `FORWARDING`, or `DISABLED`.

`/info/l2/trunk`
Trunk Group Information

```
Trunk group 1, failover ena, 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`.

/info/l2/vlan
VLAN Information

```
VLAN                Name                Status Jumbo  Ports
----  -------------------------------- ------ -----  -----------------
1     Default VLAN                       ena    n    EXT1 EXT3
2     pc03p                              ena    n    INT2
7     pc07f                              ena    n    INT7
11    pc04u                              ena    n    INT11
14    8600-14                            ena    n    INT14
15    8600-15                            ena    n    INT5
16    8600-16                            ena    n    INT6
17    8600-17                            ena    n    INT8
18    35k-1                              ena    n    INT9
19    35k-2                              ena    n    INT10
20    35k-3                              ena    n    INT12
21    35k-4                              ena    n    INT13
22    pc07z                              ena    n    INT6
24    redlan                             ena    n    INT7
300   ixiaTraffic                        ena    n    EXT1 INT12 INT13
4000  bpsports                           ena    n    INT3-INT6
4095  Mgmt VLAN                          ena    n    MGT1 MGT2
```

NOTE – The sample screens that appear in this document might differ slightly from the screens displayed by your system. Screen content varies based on the type of BladeCenter unit that you are using and the firmware versions and options that are installed.

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
- Jumbo frame support
- Port membership of the VLAN

/info/l3
Layer 3 Menu

```
[Layer 3 Menu]
     route     - IP Routing Information Menu
     arp       - ARP Information Menu
     bgp       - BGP Information Menu
     ospf      - OSPF Routing Information Menu
     igmp      - IGMP Information Menu
     ip        - Show IP information
     vrrp      - Show Virtual Router Redundancy Protocol information
     dump      - Dump all layer 3 information
```

The information provided by each menu option is briefly described in Table 4-7 on page 66, with pointers to where detailed information can be found.

Table 4-7 Layer 3 Menu Options (/info/l3)

Command Syntax and Usage
`route` Displays the IP Routing Menu. Using the options of this menu, the system displays the following for each configured or learned route: ■ Route destination IP address, subnet mask, and gateway address ■ Type of route ■ Tag indicating origin of route ■ Metric for RIP tagged routes, specifying the number of hops to the destination (1-15 hops, or 16 for infinite hops) ■ The IP interface that the route uses For details, see page 68.
`arp` Displays the Address Resolution Protocol (ARP) Information Menu. For details, see page 70.
`bgp` Displays BGP Information Menu. To view menu options, see page 73.
`ospf` Displays OSPF routing Information Menu. For details, see page 75.
`igmp` Displays IGMP Information Menu. For details, see page 80.

Table 4-7 Layer 3 Menu Options (/info/l3)

Command Syntax and Usage

`ip`

Displays IP Information. For details, see page 82.

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 information: Enable status, `lnet` and `lmask`
- Port status

`vrrp`

Displays the VRRP Information Menu. For details, see page 82.

`dump`

Dumps all switch information available from the Layer 3 Menu (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.

/info/l3/route
IP Routing Information

```
[IP Routing Menu]
     find     - Show a single route by destination IP address
     gw       - Show routes to a single gateway
     type     - Show routes of a single type
     tag      - Show routes of a single tag
     if       - Show routes on a single interface
     dump     - Show all routes
```

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

Table 4-8 Route Information Menu Options (/info/l3/route)

Command Syntax and Usage
find *<IP address (such as 192.4.17.101)>* Displays a single route by destination IP address.
gw *<default gateway address (such as 192.4.17.44)>* Displays routes to a single gateway.
type indirect|direct|local|broadcast|martian|multicast Displays routes of a single type. For a description of IP routing types, see Table 4-9 on page 69.
tag fixed|static|addr|rip|ospf|bgp|broadcast|martian|vip Displays routes of a single tag. For a description of IP routing types, see Table 4-10 on page 70.
if *<interface number (1-128)>* Displays routes on a single interface.
dump Displays all routes configured in the switch. For more information, see page 68.

/info/l3/route/dump

Show All IP Route Information

```
Status code: * - best
    Destination         Mask          Gateway        Type      Tag     Metr If
 --------------- --------------- --------------- --------- --------- ---- --
* 11.0.0.0        255.0.0.0       11.0.0.1        direct    fixed            211
* 11.0.0.1        255.255.255.255 11.0.0.1        local     addr             211
* 11.255.255.255  255.255.255.255 11.255.255.255  broadcast broadcast       211
* 12.0.0.0        255.0.0.0       12.0.0.1        direct    fixed            12
* 12.0.0.1        255.255.255.255 12.0.0.1        local     addr             12
* 12.255.255.255  255.255.255.255 12.255.255.255  broadcast broadcast        12
* 13.0.0.0        255.0.0.0       11.0.0.2        indirect  ospf          2 211
* 47.0.0.0        255.0.0.0       47.133.88.1     indirect  static           24
* 47.133.88.0     255.255.255.0   47.133.88.46    direct    fixed            24
* 172.30.52.223   255.255.255.255 172.30.52.223   broadcast broadcast         2
* 224.0.0.0       224.0.0.0       0.0.0.0         martian   martian
* 224.0.0.5       255.255.255.255 0.0.0.0         multicast addr
```

The following table describes the `Type` parameters.

Table 4-9 IP Routing Type Parameters (/info/l3/route/dump/type)

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 4-10 IP Routing Tag Parameters (info/l3/route/tag)

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 GbE Switch Module.
`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)
`broadcast`	Indicates a broadcast address.
`martian`	The address belongs to a filtered group.
`vip`	Indicates a route destination that is a virtual server IP address. VIP routes are needed to advertise virtual server IP addresses via BGP.

/info/l3/arp
ARP Information

```
[Address Resolution Protocol Menu]
      find    - Show a single ARP entry by IP address
      port    - Show ARP entries on a single port
      vlan    - Show ARP entries on a single VLAN
      refpt   - Show ARP entries referenced by a single port
      dump    - Show all ARP entries
      help    - Show help on the fields of ARP entries
      addr    - Show ARP address list
```

The ARP information includes IP address and MAC address of each entry, address status flags (see Table 4-11 on page 70), VLAN and port for the address, and port referencing information.

Table 4-11 ARP Information Menu Options (/info/l3/arp)

Command Syntax and Usage
`find` *<IP address (such as, 192.4.17.101>* Displays a single ARP entry by IP address.

Table 4-11 ARP Information Menu Options (/info/l3/arp)

Command Syntax and Usage
`port` *<port alias or number>* Displays the ARP entries on a single port.
`vlan` *<VLAN number (1-4095)>* Displays the ARP entries on a single VLAN.
`refpt` *<port alias or number (1-4)>* Displays the ARP entries referenced by a single port.
`dump` Displays all ARP entries. including: ■ IP address and MAC address of each entry ■ Address status flag (see below) ■ 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 72.
`help` Displays Help information about ARP entries.
`addr` Displays the ARP address list: IP address, IP mask, MAC address, and VLAN flags.

/info/l3/arp/dump

Show All ARP Entry Information

```
IP address       Flags   MAC address        VLAN  Port   Referenced SPs
--------------- ----- ----------------- ---- ----  ---------------
47.80.22.1              00:e0:16:7c:28:86    1  INT6    empty
47.80.23.243      P     00:03:42:fa:3b:30    1          1 2
47.80.23.245            00:c0:4f:60:3e:c1    1  INT6    empty
190.10.10.1       P     00:03:42:fa:3b:30   10          1 2
```

Referenced ports are the ports that request the ARP entry. So the traffic coming into the referenced ports has the destination IP address. From the ARP entry (the referenced ports), this traffic needs to be forwarded to the egress port (port INT6 in the above example).

NOTE – If you have VMA turned on, the referenced port will be the designated port. If you have VMA turned off, the designated port will be the normal ingress port.

The Flag field is interpreted as follows:

Table 4-12 ARP Dump Flag Parameters

Flag	Description
P	Permanent entry created for switch IP interface.
P 4	Permanent entry created for Layer 4 proxy IP address or virtual server IP address.
R	Indirect route entry.
U	Unresolved ARP entry. The MAC address has not been learned.

/info/l3/arp/addr

ARP Address List Information

```
  IP address        IP mask        MAC address    VLAN Flags
--------------- --------------- ----------------- ---- -----
205.178.18.66   255.255.255.255  00:70:cf:03:20:04        P
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
```

/info/l3/bgp
BGP Information Menu

```
[BGP Menu]
      peer     - Show all BGP peers
      summary  - Show all BGP peers in summary
      dump     - Show BGP routing table
```

Table 4-13 BGP Peer Information Menu Options

Command Syntax and Usage
`peer` Displays BGP peer information. See page 73 for a sample output.
`summary` Displays peer summary information such as AS, message received, message sent, up/down, state. See page 74 for a sample output.
`dump` Displays the BGP routing table. See page 74 for a sample output.

/info/l3/ip/bgp/peer
BGP Peer information

Following is an example of the information that `/info/l3/ip/bgp/peer` provides.

```
BGP Peer Information:

  3: 2.1.1.1         , version 0, TTL 1
    Remote AS: 0, Local AS: 0, Link type: IBGP
    Remote router ID: 0.0.0.0,    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: 0, Holdtime: 0, MinAdvTime: 60
    LastErrorCode: unknown(0), LastErrorSubcode: unspecified(0)
    Established state transitions: 0

  4: 2.1.1.4         , version 0, TTL 1
    Remote AS: 0, Local AS: 0, Link type: IBGP
    Remote router ID: 0.0.0.0,    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: 0, Holdtime: 0, MinAdvTime: 60
    LastErrorCode: unknown(0), LastErrorSubcode: unspecified(0)
    Established state transitions: 0
```

/info/l3/ip/bgp/summary

BGP Summary information

Following is an example of the information that `/info/l3/ip/bgp/summary` provides.

```
   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
```

/info/l3/ip/bgp/dump

Dump BGP Information

Following is an example of the information that `/info/l3/ip/bgp/dump` provides.

```
 >> BGP# dump
Status codes: * valid, > best, i - internal
Origin codes: i - IGP, e - EGP, ? - incomplete
    Network         Next Hop        Metr  LcPrf Wght  Path
   --------------- ---------------  ----- ---- ----- --------------
*> 10.0.0.0         205.178.21.147      1        256 147 148 i
*>i205.178.15.0     0.0.0.0                          0 i
*                   205.178.21.147      1        128 147 i
*> 205.178.17.0     205.178.21.147      1        128 147 i
   13.0.0.0         205.178.21.147      1        256 147 {35} ?

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

/info/l3/ospf
OSPF Information

```
[OSPF Information Menu]
     general - Show general information
     aindex  - Show area(s) information
     if      - Show interface(s) information
     virtual - Show details of virtual links
     nbr     - Show neighbor(s) information
     dbase   - Database Menu
     sumaddr - Show summary address list
     nsumadd - Show NSSA summary address list
     routes  - Show OSPF routes
     dump    - Show OSPF information
```

Table 4-14 OSPF Information Menu options

Command Syntax and Usage
`general` Displays general OSPF information. See page 76 for a sample output.
`aindex` *<area index [0-2]>* Displays area information for a particular area index. If no parameter is supplied, it displays area information for all the areas.
`if` *<interface number [1-128]>* Displays interface information for a particular interface. If no parameter is supplied, it displays information for all the interfaces. See page 77 for a sample output.
`virtual` Displays information about all the configured virtual links.
`nbr` *<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.
`dbase` Displays OSPF database menu. To view menu options, see page 78.
`sumaddr` *<area index [0-2]>* Displays the list of summary ranges belonging to non-NSSA areas.
`nsumadd` *<area index [0-2]>* Displays the list of summary ranges belonging to NSSA areas.

Table 4-14 OSPF Information Menu options

Command Syntax and Usage
routes Displays OSPF routing table. See page 79 for a sample output.
dump Displays the OSPF information.

/info/l3/ospf/general

OSPF General Information

```
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
```

/info/l3/ospf/if

OSPF Interface Information

```
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
```

/info/l3/ospf/dbase

OSPF Database Information

```
[OSPF Database Menu]
     advrtr  - LS Database info for an Advertising Router
     asbrsum - ASBR Summary LS Database info
     dbsumm  - LS Database summary
     ext     - External LS Database info
     nw      - Network LS Database info
     nssa    - NSSA External LS Database info
     rtr     - Router LS Database info
     self    - Self Originated LS Database info
     summ    - Network-Summary LS Database info
     all     - All
```

Table 4-15 OSPF Database Information Menu (/info/l3/ospf/dbase)

Command Syntax and Usage

`advrtr` *<router-id (A.B.C.D)>*

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.

`asbrsum` *<adv-rtr (A.B.C.D)>* | *<link_state_id (A.B.C.D>* | *<self>*

Displays ASBR summary LSAs. The usage of this command is as follows:

a) `asbrsum adv-rtr 20.1.1.1` displays ASBR summary LSAs having the advertising router 20.1.1.1.

b) `asbrsum link_state_id 10.1.1.1` displays ASBR summary LSAs having the link state ID 10.1.1.1.

c) `asbrsum self` displays the self advertised ASBR summary LSAs.

d) `asbrsum` with no parameters displays all the ASBR summary LSAs.

`dbsumm`

Displays the following information about the LS database in a table format:

a) the number of LSAs of each type in each area.

b) the total number of LSAs for each area.

c) the total number of LSAs for each LSA type for all areas combined.

d) the total number of LSAs for all LSA types for all areas combined.

No parameters are required.

`ext` *<adv-rtr (A.B.C.D)>* | *<link_state_id (A.B.C.D>* | *<self>*

Displays the AS-external (type 5) LSAs with detailed information of each field of the LSAs. The usage of this command is the same as the usage of the command `asbrsum`.

Table 4-15 OSPF Database Information Menu (/info/l3/ospf/dbase)

<table>
<tr><th>Command Syntax and Usage</th></tr>
<tr><td><b>nw</b> <i>&lt;adv-rtr (A.B.C.D)&gt; | <link_state_id (A.B.C.D> | &lt;self&gt;</i>
Displays the network (type 2) LSAs with detailed information of each field of the LSA.network LS database. The usage of this command is the same as the usage of the command <code>asbrsum</code>.</td></tr>
<tr><td><b>nssa</b> <i>&lt;adv-rtr (A.B.C.D)&gt; | <link_state_id (A.B.C.D> | &lt;self&gt;</i>
Displays the NSSA (type 7) LSAs with detailed information of each field of the LSAs. The usage of this command is the same as the usage of the command <code>asbrsum</code>.</td></tr>
<tr><td><b>rtr</b> <i>&lt;adv-rtr (A.B.C.D)&gt; | <link_state_id (A.B.C.D> | &lt;self&gt;</i>
Displays the router (type 1) LSAs with detailed information of each field of the LSAs. The usage of this command is the same as the usage of the command <code>asbrsum</code>.</td></tr>
<tr><td><b>self</b>
Displays all the self-advertised LSAs. No parameters are required.</td></tr>
<tr><td><b>summ</b> <i>&lt;adv-rtr (A.B.C.D)&gt; | <link_state_id (A.B.C.D> | &lt;self&gt;</i>
Displays the network summary (type 3) LSAs with detailed information of each field of the LSAs. The usage of this command is the same as the usage of the command <code>asbrsum</code>.</td></tr>
<tr><td><b>all</b>
Displays all the LSAs.</td></tr>
</table>

/info/l3/ospf/routes

OSPF Information Route Codes

```
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
```

/info/igmp
IGMP Multicast Group Information

```
[IGMP Menu]
     snoop    - Show IGMP Snooping Multicast Group Information
     mrouter  - Show IGMP Snooping Multicast Router Port information
```

Table 4-16 describes the commands used to display information about IGMP groups learned by the switch.

Table 4-16 IGMP Multicast Group Menu Options (/info/igmp)

Command Syntax and Usage
`snoop` Displays a single IGMP multicast group information.
`mrouter` Displays static Multicast Router information.

/info/igmp/snoop
IGMP Multicast Router Port Information

```
[IGMP Snooping Menu]
     find     - Show a single group by IP group address
     vlan     - Show groups on a single vlan
     port     - Show groups on a single port
     dump     - Show all groups
```

Table 4-17 describes the commands used to display information about IGMP groups learned by the switch.

Table 4-17 IGMP Multicast Group Menu Options (/info/igmp/snoop)

Command Syntax and Usage
`find` *<IP address>* Displays a single IGMP multicast group by its IP address.
`vlan` *<VLAN number>* Displays all IGMP multicast groups on a single VLAN.

Table 4-17 IGMP Multicast Group Menu Options (/info/igmp/snoop)

Command Syntax and Usage
`port` *<Port number or alias>* Displays all IGMP multicast groups on a single port.
`dump` Displays information for all multicast groups.

`/info/igmp/mrouter`
IGMP Multicast Router Port Information

```
[IGMP Multicast Router Ports Menu]
     vlan   - Show all learned multicast router ports on a single vlan
     dump   - Show all learned multicast router ports
     versions - Show last detected multicast router IGMP versions
```

Table 4-18 describes the commands used to display information about multicast routers learned through IGMP Snooping.

Table 4-18 IGMP Multicast Router Menu Options (/info/igmp/mrouter)

Command Syntax and Usage
`vlan` Displays information for all multicast groups learned on the selected VLAN.
`dump` Displays information for all multicast groups learned by the switch.
`versions` Displays the IGMP version of the most recent multicast group learned by the switch.

/info/l3/ip
IP Information

```
Interface information:
  1: 47.80.23.243    255.255.254.0   47.80.23.255,    vlan 1, up
Default gateway information: metric strict
  1: 47.80.22.1,      vlan any,  up
Current IP forwarding settings: ON, dirbr disabled
Current local networks:
Current IP port settings:
  All other ports have forwarding ON
Current network filter settings:
  none
Current route map settings:
Current BGP settings:
  ON, pref 100
Current BGP peer settings:
Current BGP aggr settings:
```

/info/l3/vrrp
VRRP Information

Virtual Router Redundancy Protocol (VRRP) support on GbE Switch Module 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.

```
VRRP information:
  1: vrid 2, 205.178.18.210, if  1, renter, prio 100, master, server
  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, proxy
```

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. 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.
- Server status. The `server` state identifies virtual routers that support Layer 4 services. These are known as virtual *server* routers: any virtual router whose IP address is the same as any configured virtual server IP address.
- Proxy status. The proxy state identifies virtual proxy routers, where the virtual router shares the same IP address as a proxy IP address. The use of virtual proxy routers enables redundant switches to share the same IP address, minimizing the number of unique IP addresses that must be configured.

/info/slb
SLB Information

```
[Server Load Balancing Information Menu]
      sess     - Session Table Information Menu
      real     - Show real server information
      virt     - Show virtual server information
      filt     - Show filter information
      port     - Show port information
      idshash  - Show IDS server selected by hash or minmisses metric
      bind     - Show real server selected by hash or minmisses metric
      cookie   - Decode the HEX value to get the VIP and RIP
      synatk   - Show SYN attack detection information
      dump     - Show all layer 4 information
```

Layer 4 information includes the following:

Table 4-19 Layer 4 Information Menu Options (/info/slb)

Command Syntax and Usage
`sess` Displays the Session Table Information Menu. To view menu options, see page 85.
`real` *<real server number (1-63)>* Displays Real server number, real IP address, MAC address, VLAN, physical switch port, layer where health check is performed, and health check result.
`virt` *<virtual server number (1-64)>* ■ Displays Virtual Server State: Virtual server number, IP address, virtual MAC address ■ Virtual Port State: Virtual service or port, server port mapping, real server group, group backup server.
`filt` *<filter ID (1-1024)>* | **`list`** | **`allow`** | **`deny`** | **`redir`** | **`nat`** Displays the filter number, destination port, real server port, real server group, health check layer, group backup server, URL for health checks, and real server group, IP address, backup server, and status.
`port` *<port alias or number>* Displays the physical port number, proxy IP address, filter status, a list of applied filters, and client and/or server Layer 4 activity.
`idshash` *<IP address 1> <IP address 2>* Displays the Intrusion Detection System server selected by `hash` or `minmisses` metric.
`bind` *<IP address> <mask> <group number>* Displays the real server selected by `hash` or `minmisses` metric.

Table 4-19 Layer 4 Information Menu Options (/info/slb)

Command Syntax and Usage

`cookie` *<16 bytes cookie value in hexadecimal format as 0XXXXXXXXXXXXXXXXX>*

Decodes the hexadecimal value to get the virtual server IP address and real server IP address.

`synatk`

Displays SYN attack detection information. To identify whether or not the server is under SYN attack, the number of new half open sessions is examined within a set period of time, for example, every two seconds. This feature requires `dbind` to be enabled.

`dump`

Displays all Layer 4 information for the switch. For details, see page 90.

/info/slb/sess

Session Table Information

```
[Session Table Information Menu]
      cip     - Show all session entries with source IP address
      cport   - Show all session entries with source port
      dip     - Show all session entries with destination IP address
      dport   - Show all session entries with destination port
      pip     - Show all session entries with proxy IP address
      pport   - Show all session entries with proxy port
      filter  - Show all session entries with matching filter
      flag    - Show all session entries with matching flag
      port    - Show all session entries with ingress port
      real    - Show all session entries with real IP address
      sp      - Show all session entries on sp
      dump    - Show all session entries
      help    - Session entry description
```

Table 4-20 Session Information Menu Options (/info/slb/sess)

Command Syntax and Usage

`cip` *<IP address>*

Displays all session entries with client's source IP address.

`cport` *<real port>*

Displays all session entries with source (client) port.

`dip` *<IP address>*

Displays all session entries with destination IP address.

Table 4-20 Session Information Menu Options (/info/slb/sess)

Command Syntax and Usage

`dport` *<real port>*

Displays all session entries with destination port.

`pip` *<IP address>*

Displays all session entries with proxy IP address.

`pport` *<proxy port>*

Displays all session entries with proxy port.

`filter` *<filter ID (1-1024)>*

Displays all session entries with matching filter.

`flag` *<E|L|N|P|S|T|U|W>*

Displays all session entries with matching flag.

`port` *<port number or alias>*

Displays all session entries on the ingress port.

`real` *<IP address>*

Displays all session entries with real server IP address.

`sp` *<port number (1-4)>*

Displays all session entries on switch processor.

`dump`

Displays all session entries. Information similar to the following may appear in a session entry dump:

```
3,  01: 1.1.1.1 4586,  2.2.2.1   http -> 1.1.1.2   3567   3.3.3.1 http    age 6   f:10   EUSPT    c
(1) (2)   (3)      (4)      (5)        (6)       (7a)       (7)       (8)       (9)     (10)     (11)    (12)       (13)
```

Note: The fields, 1 to 13 associated with a session as identified in the above example, are described in "Session dump information in Alteon OS" on page 88.

`help`

Displays the description of the session entry.

Samples of Session Dumps for Different Applications

L4 HTTP

```
3,01: 172.21.12.19 1040, 39.2.2.1 http -> 47.81.24.79 http age 4
```

L4-L7 WCR HTTP

```
2,16: 172.21.8.200 44687, 172.21.8.51 http -> 192.168.1.11 wcr age 4 f:12 E
3,01: 172.21.12.19 1040, 39.2.2.1 http -> 47.81.24.79 urlwcr age 6 f:123 E
```

RTSP

L4-L7 RTSP

```
3,01: 172.21.12.19 4586, 39.2.2.1 rtsp -> 47.81.144.13 rtsp age 10 EU
3,01: 172.21.12.19 6970, 39.2.2.1 21220 -> 47.81.144.13 21220 age 10 P
```

The first session is RTSP TCP control connection.
The second session is RTSP UDP data connection.

```
3,01: 172.21.12.19 6970, 39.2.2.1 rtsp -> 47.81.144.13 0 age 10 P
```

During client-server port negotiation, the destination port shows “rtsp” and server port shows “0”

L7 WCR RTSP

```
3,01: 172.21.12.19 4586, 39.2.2.1 rtsp -> 47.81.144.13 urlwcr age 10 f:100 EU
3,01: 172.21.12.19 6970, 39.2.2.1 21220 -> 47.81.144.13 21220 age 10 P
```

Filtering LinkLB

```
2,07: 10.0.1.26 1706, 205.178.14.84 http -> 192.168.4.10 linklb age 8 f:10 E
```

FTP

```
1,00: 172.31.4.215 80, 172.31.4.200 0 172.31.3.11 age 8 EP c:1
1,09: 172.31.4.215 4098, 172.31.4.200 ftp ->172.31.3.20 ftp age 10 EU
1,09: 172.31.4.215 4102, 172.31.4.200 ftp-data ->172.31.3.20 ftp-data age 10 E
```

NAT

```
2,05: 172.21.8.16 2559, 10.0.1.26 http NAT age 2 f:24 E
```

Persistent session

```
3,00: 237.162.52.123 160.10.20.30 age 4 EPS C:3
```

The destination port, real server IP and server port are not shown for persistent session.

Session dump information in Alteon OS

Field	Description
`(1) SP number`	This field indicates the Switch Port number that created the session.
`(2) Ingress port`	This field shows the physical port through which the client traffic enters the switch.
`(3) Source IP address`	This field contains the source IP address from the client's IP packet.
`(4) Source port`	This field identifies the source port from the client's TCP/UDP packet.
`(5) Destination IP address`	This field identifies the destination IP address from the client's TCP/UDP packet.
`(6) Destination port`	This field identifies the destination port from client's TCP/UDP packet.
`(7a) Proxy IP address`	This field contains the Proxy IP address substituted by the switch. This field contains the real server IP address of the corresponding server that the switch selects to forward the client packet to, for load balancing. If the switch does not find a live server, this field contains the same as the destination IP address mentioned in field (5). This field also shows the real server IP address for filtering. No address is shown if the filter action is Allow, Deny or NAT. It will show "ALLOW", "DENY" or "NAT" instead.
`(7) Proxy Port`	This field identifies the TCP/UDP source port substituted by the switch.
`(8) Real Server IP Address`	For load balancing, this field contains the IP address of the real server that the switch selects to forward client packet to. If the switch does not find live server, this field is the same as destination IP address(5). For example: 3,01: 1.1.1.1 1040, 2.2.2.1 http -> 3.3.3.1 http age 10 3,01: 1.1.1.1 6970, 2.2.2.1 rtsp -> 2.2.2.1 21220 age 10 P For filtering, this field also shows the real server IP address. No address is shown if the filter action is Allow, Deny or NAT. It will show ALLOW, DENY or NAT instead. For example: 3,01: 1.1.1.1 1040, 2.2.2.1 http -> 3.3.3.1 http age 10 f:11 2,07: 1.1.1.1 1706, 2.2.2.1 http-> 192.168.4.10 linklb age 8 f:10 E

Field	Description
`(9) Server port`	This field is the same as the destination port (field 6) for load balancing except for the RTSP UDP session. For RTSP UDP session, this server port is obtained from the client-server negotiation. This field is the filtering application port for filtering. It is for internal use only. This field can be “urlwcr”, “wcr”, “idslb”, “linkslb” or “nonat”.
(10) Age	This is the session timeout value. If no packet is received within the value specified, the session is freed.
(11) Filter number	This field indicates the session created by filtering code as a result of the IP header keys matching the filtering criteria.
(12) Flag	“E”: Indicates the session is in use and will be aged out if no traffic is received within session timeout value. “P”: Indicates the session is a persistent session and is not to be aged out. Fields (6), (7) and (8) cannot not have persistent session. “U”: Indicates the session is L7 delayed binding and the switch is trying to open TCP connection to the real server. “S”: Indicates the session is persistent session and the application is special SSL or Cookie Pbind. “T”: Indicates the session is TCP rate limiting per-client entry.
(13) Persistent session user count	This counter indicates the number of client sessions created to associate with this persistent session.

/info/slb/dump

Show All Layer 4 Information

```
Real server state:
  1: 210.1.2.200, 00:01:02:c1:4b:48, vlan 1, port 1, health 3, up
  2: 210.1.2.1, 00:01:02:70:4d:4a, vlan 1, port 8, health 3, up
 26: 20.20.20.102, 00:03:47:07:a4:9e, vlan 1, port 6, health 3, up
 27: 20.20.20.101, 00:01:02:71:9c:a6, vlan 1, port 7, health 3, up

Virtual server state:
  1: 20.20.20.200,    00:60:cf:47:5c:1e
    virtual ports:
    http: rport http, group 88, backup none, dbind
      HTTP Application: urlslb
        real servers:
         26: 20.20.20.102, backup none, 2 ms, up
             exclusionary string matching: disabled
             1: any
             2: urlone
         27: 20.20.20.101, backup none, 1 ms, up
             exclusionary string matching: disabled
             3: urltwo
             4: urlthree

Redirect filter state:
Action redir
dport http, rport 3128, vlan any
200: group 1, health 3, backup none
     proxy enabled, radius snoop disabled
    real servers:
      1: 210.1.2.200, backup none, 3 ms, up
      2: 210.1.2.1, backup none, 2 ms, up

Port state:
  1: filt disabled, filters: 80
  2: idslb filt  enabled, filters: 200
  3: idslb filt  enabled, filters: 200
  4: filt disabled, filters: 50 200
```

/info/link
Link Status Information

```
Alias    Port   Speed    Duplex     Flow Ctrl      Link
----    -----   -----   --------   --TX-----RX--   ------
  INT1     1     1000     full      yes     yes      up
  INT2     2     1000     full      yes     yes      up
  INT3     3     1000     full      yes     yes      up
  INT4     4     1000     full      yes     yes      up
  INT5     5     1000     full      yes     yes     down
  INT6     6     1000     full      yes     yes      up
  INT7     7     1000     full      yes     yes      up
  INT8     8     1000     full      yes     yes      up
  INT9     9     1000     full      yes     yes      up
  INT10   10     1000     full      yes     yes      up
  INT11   11     1000     full      yes     yes      up
  INT12   12     1000     full      yes     yes      up
  INT13   13     1000     full      yes     yes      up
  INT14   14     1000     full      yes     yes      up
  MGT1    15      100     full      yes     yes      up
  MGT2    16      100     full      yes     yes     down
  EXT1    17      any      any      yes     yes      up
  EXT2    18      any      any      yes     yes      up
  EXT3    19      any      any      yes     yes      up
  EXT4    20      any      any      yes     yes      up
```

NOTE – The sample screens that appear in this document might differ slightly from the screens displayed by your system. Screen content varies based on the type of BladeCenter unit that you are using and the firmware versions and options that are installed.

Use this command to display link status information about each port on an GbE Switch Module slot, including:

- Port alias
- Port speed (10, 100, 10/100, or 1000)
- Duplex mode (half, full, any, or auto)
- Flow control for transmit and receive (no, yes, or auto)
- Link status (up or down)

/info/port
Port Information

```
Alias  Port  Tag  FAST RMON  PVID       NAME             VLAN(s)
-----  ----  ---  ---- ----  ----  --------------  -----------------
INT1      1   y    n     d      1  INT1               1 4095
INT2      2   y    n     d      1  INT2               1 4095
INT3      3   y    n     d      1  INT3               1 4095
INT4      4   y    n     d      1  INT4               1 4095
INT5      5   y    n     d      1  INT5               1 4095
INT6      6   y    n     d      1  INT6               1 4095
INT7      7   y    n     d      1  INT7               1 4095
INT8      8   y    n     d      1  INT8               1 4095
INT9      9   y    n     d      1  INT9               1 4095
INT10    10   y    n     d      1  INT10              1 4095
INT11    11   y    n     d      1  INT11              1 4095
INT12    12   y    n     d      1  INT12              1 4095
INT13    13   y    n     d      1  INT13              1 4095
INT14    14   y    n     d      1  INT14              1 4095
MGT1     15   y    n     d   4095  MGT1            4095
MGT2     16   y    n     d   4095  MGT2            4095
EXT1     17   n    n     d      1  EXT1               1
EXT2     18   n    n     d      1  EXT2               1
EXT3     19   n    n     d      1  EXT3               1
EXT4     20   n    n     d      1  EXT4               1
```

NOTE – The sample screens that appear in this document might differ slightly from the screens displayed by your system. Screen content varies based on the type of BladeCenter unit that you are using and the firmware versions and options that are installed.

Port information includes:

- Port alias
- Whether the port uses VLAN tagging or not (`y` or `n`)
- Port VLAN ID (PVID)
- Port name
- VLAN membership
- Whether RMON is enabled or disabled on the port

`/info/dump`
Information Dump

Use the dump command to dump all switch information available from the Information Menu (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 5

The Statistics Menu

You can 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.

/stats
Statistics Menu

```
[Statistics Menu]
     port      - Port Stats Menu
     l2        - Layer 2 Stats Menu
     l3        - Layer 3 Stats Menu
     slb       - Server Load Balancing (L4-7) Stats Menu
     mp        - MP-specific Stats Menu
     sp        - SP-specific Stats Menu
     pace      - Packet Acceleration Stats Menu
     snmp      - Show SNMP stats
     ntp       - Show NTP stats
     dump      - Dump all stats
```

Table 5-1 Statistics Menu Options (/stats)

Command Syntax and Usage
`port` *<port alias or number>* Displays the Port Statistics Menu for the specified port. Use this command to display traffic statistics on a port-by-port basis. Traffic statistics are included in SNMP Management Information Base (MIB) objects. To view menu options, see page 97.
`l2` Displays the Layer 2 Stats Menu. To view menu options, see page 108.
`l3` Displays the Layer 3 Stats Menu. To view menu options, see page 110.
`slb` Displays the Server Load Balancing (SLB) Menu. To view menu options, see page 130.
`mp` Displays the Management Processor Statistics Menu. Use this command to view information on how switch management processes and resources are currently being allocated. To view menu options, see page 153.
`sp` *<SP number (1-4)>* Displays Switch Processor specific menu. To view menu options, see page 156.
`pace` Displays Packet Acceleration Stats Menu. To view menu options, see page 157.
`snmp` Displays SNMP statistics. See page 158 for sample output.
`ntp` *<clear>* Displays Network Time Protocol (NTP) Statistics. See page 216 for a sample output and a description of NTP Statistics. You can execute the `clear` command option to delete all statistics.
`dump` 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. For details, see page 162.

`/stats/port` *<port alias or number>*
Port Statistics Menu

This menu displays traffic statistics on a port-by-port basis. Traffic statistics include SNMP Management Information Base (MIB) objects.

```
[Port Statistics Menu]
     brg      - Show bridging ("dot1") stats
     ether    - Show Ethernet ("dot3") stats
     if       - Show interface ("if") stats
     ip       - Show Internet Protocol ("IP") stats
     link     - Show link stats
     rmon     - Show RMON stats
     dump     - Dump port stats
     clear    - Clear all port stats
```

Table 5-2 Port Statistics Menu Options (/stats/port)

Command Syntax and Usage
`brg` Displays bridging (“dot1”) statistics for the port. See page 98 for sample output.
`ether` Displays Ethernet (“dot1”) statistics for the port. See page 99 for sample output.
`if` Displays interface statistics for the port. See page 102 for sample output.
`ip` Displays IP statistics for the port. See page 104 for sample output.
`link` Displays link statistics for the port. See page 105 for sample output.
`rmon` Displays RMON statistics for the port. See page 105 for sample output.
`dump` Displays all the port statistics.
`clear` This command clears all the statistics on the port.

/stats/port *<port alias or number>*/brg

Bridging Statistics

This menu option enables you to display the bridging statistics of the selected port.

```
Bridging statistics for port INT1:
dot1PortInFrames:                    63242584
dot1PortOutFrames:                   63277826
dot1PortInDiscards:                         0
dot1TpLearnedEntryDiscards:                 0
dot1BasePortDelayExceededDiscards:         NA
dot1BasePortMtuExceededDiscards:           NA
dot1StpPortForwardTransitions:              0
```

Table 5-3 Bridging Statistics of a Port (/stats/port/brg)

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.
`dot1BasePortDelay ExceededDiscards`	The number of frames discarded by this port due to excessive transit delay through the bridge. It is incriminated by both transparent and source route bridges.
`dot1BasePortMtu ExceededDiscards`	The number of frames discarded by this port due to an excessive size. It is incremented by both transparent and source route bridges.
`dot1StpPortForward Transitions`	The number of times this port has transitioned from the Learning state to the Forwarding state.

/stats/port *<port alias or number>*/ether

Ethernet Statistics

This menu option enables you to display the ethernet statistics of the selected port

```
Ethernet statistics for port INT1:
dot3StatsAlignmentErrors:                    0
dot3StatsFCSErrors:                          0
dot3StatsSingleCollisionFrames:              0
dot3StatsMultipleCollisionFrames:            0
dot3StatsSQETestErrors:                     NA
dot3StatsDeferredTransmissions:              0
dot3StatsLateCollisions:                     0
dot3StatsExcessiveCollisions:                0
dot3StatsInternalMacTransmitErrors:         NA
dot3StatsCarrierSenseErrors:                 0
dot3StatsFrameTooLongs:                      0
dot3StatsInternalMacReceiveErrors:           0
dot3CollFrequencies [1-15]:                 NA
```

Table 5-4 Ethernet Statistics for Port (/stats/port/ether)

Statistics	Description
`dot3StatsAlignmentErrors`	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 5-4 Ethernet Statistics for Port (/stats/port/ether)

Statistics	Description
`dot3StatsSingleCollisionFrames`	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.
`dot3StatsMultipleCollisionFrames`	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.
`dot3StatsSQETestErrors`	A count of times that the SQE TEST ERROR message is generated by the PLS sub layer for a particular interface. The SQE TEST ERROR message is defined in section 7.2.2.2.4 of ANSI/IEEE 802.3-1985 and its generation is described in section 7.2.4.6 of the same document.
`dot3StatsDeferredTransmissions`	A count of frames for which the first transmission attempt on a particular interface is delayed because the medium is busy. The count represented by an instance of this object does not include frames involved in collisions.
`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.
`dot3StatsInternalMacTransmitErrors`	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 5-4 Ethernet Statistics for Port (/stats/port/ether)

Statistics	Description
`dot3StatsCarrierSenseErrors`	The number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame on a particular interface. The count represented by an instance of this object is incremented at most once per transmission attempt, even if the carrier sense condition fluctuates during a transmission attempt.
`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.
`dot3StatsInternalMacReceiveErrors`	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.
`dot3CollFrequencies`	A count of individual MAC frames for which the transmission (successful or otherwise) on a particular interface occurs after the frame has experienced exactly the number of collisions in the associated `dot3CollCount` object. For example, a frame which is transmitted on interface 77 after experiencing exactly 4 collisions would be indicated by incrementing only `dot3CollFrequencies`. 77.4. No other instance of `dot3CollFrequencies` would be incremented in this example.

/stats/port *<port alias or number>*/if

Interface Statistics

This menu option enables you to display the interface statistics of the selected port.

```
Interface statistics for port EXT1:
                     ifHCIn Counters       ifHCOut Counters
Octets:                  51697080313            51721056808
UcastPkts:                  65356399               65385714
BroadcastPkts:                     0                   6516
MulticastPkts:                     0                      0
Discards:                          0                      0
Errors:                            0                  21187
```

Table 5-5 Interface Statistics for Port (/stats/port/if)

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.
`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.

Table 5-5 Interface Statistics for Port (/stats/port/if)

Statistics	Description
`ifInUnknownProtos`	For packet-oriented interfaces, the number of packets received via the interface which were discarded because of an unknown or unsupported protocol. For character-oriented or fixed-length interfaces which support protocol multiplexing, the number of transmission units received via the interface which were discarded because of an unknown or unsupported protocol. For any interface which does not support protocol multiplexing, this counter will always be 0.
`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 to a 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`.
`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.

/stats/port *<port alias or number>*/ip

Interface Protocol Statistics

This menu option enables you to display the interface statistics of the selected port.

```
IP statistics for port INT1:
ipInReceives:              0
ipInAddrErrors:            0   ipForwDatagrams:         0
ipInUnknownProtos:         0   ipInDiscards:            0
ipInDelivers:              0
ipTtlExceeds:              0
ipLANDattacks:             0
```

Table 5-6 Interface Protocol Statistics (/stats/port/ip)

Statistics	Description
`ipInReceives`	The total number of input datagrams received from interfaces, including those received in error.
`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.
`ipForwDatagrams`	The 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.
`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).
`ipTtlExceeds`	The number of IP datagram for which an `ICMP TTL exceeded` message was sent.

/stats/port *<port alias or number>*/link

Link Statistics

This menu enables you to display the link statistics of the selected port.

```
Link statistics for port INT1:
linkStateChange:             1
```

Table 5-7 Link Statistics (/stats/port/link)

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

/stats/port *<port alias or number>*/rmon

RMON Statistics

This menu option enables you to display the remote monitor statistics of the selected port.

```
RMON statistics for port EXT1:
etherStatsDropEvents:                        0
etherStatsOctets:                   3727038769
etherStatsPkts:                       69869242
etherStatsBroadcastPkts:                     0
etherStatsMulticastPkts:                     0
etherStatsCRCAlignErrors:                    0
etherStatsUndersizePkts:                     0
etherStatsOversizePkts:                      0
etherStatsFragments:                         0
etherStatsJabbers:                           0
etherStatsCollisions:                        0
etherStatsPkts64Octets:                 102426
etherStatsPkts65to127Octets:           6050515
etherStatsPkts128to255Octets:         12293234
etherStatsPkts256to511Octets:         24586063
etherStatsPkts64Octets:               49171870
etherStatsPkts1024to1518Octets:       47539775
```

Table 5-8 Remote Monitor Statistics (/stats/port/rmon)

Statistics	Description
`etherStatsDrop Events`	The total number of events in which packets were dropped by the probe due to lack of resources. Note that this number is not necessarily the number of packets dropped; it is just the number of times this condition has been detected.
`etherStatsOctets`	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). This object can be used as a reasonable estimate of utilization (which is the percent utilization of the ethernet segment). If greater precision is desired, the `etherStatsPkts` and `etherStatsOctets` objects should be sampled before and after a common interval. The differences in the sampled values are `Pkts` and `Octets`, respectively, and the number of seconds in the interval is `Interval`. These values are used to calculate the utilization as follows: $$\mathrm{Utilization} = \frac{\mathrm{Pkts} \times (9.6 + 6.4) + (\mathrm{Octets} \times 0.8)}{\mathrm{Interval} \times 10,000}$$ The result of this equation is the percent value of utilization.
`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. Note that this does not include multicast packets.
`etherStatsMulticastPkts`	The total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
`etherStatsCRCAlign Errors`	The total number of packets received that had a length (excluding framing bits, but including Frame Check Sequence (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).
`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.

Table 5-8 Remote Monitor Statistics (/stats/port/rmon)

Statistics	Description
`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). Note that it is entirely normal for `etherStatsFragments` to increment. This is because it counts both runts (which are normal occurrences due to collisions) and noise hits. (A runt is a packet that is less than 64 bytes.)
`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). Note that this definition of jabber is different than the definition in IEEE-802.3 section 8.2.1.5 (10Base-5) and section 10.3.1.4 (10Base-2). These documents define jabber as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 milliseconds and 150 milliseconds.
`etherStatsCollisions`	The best estimate of the total number of collisions on this Ethernet segment. The value returned will depend on the location of the RMON probe. Section 8.2.1.3 (10Base-5) and section 10.3.1.3 (10Base-2) of IEEE standard 802.3 states that a station must detect a collision, in the receive mode, if three or more stations are transmitting simultaneously. A repeater port must detect a collision when two or more stations are transmitting simultaneously. Thus a probe placed on a repeater port could record more collisions than a probe connected to a station on the same segment would. Probe location plays a much smaller role when considering 10Base-T. 14.2.1.4 (10Base-T) of IEEE standard 802.3 defines a collision as the simultaneous presence of signals on the DO and RD circuits (transmitting and receiving at the same time). A 10Base-T station can only detect collisions when it is transmitting. Thus probes placed on a station and a repeater, should report the same number of collisions. Note also that an RMON probe inside a repeater should ideally report collisions between the repeater and one or more other hosts (transmit collisions as defined by IEEE 802.3k) plus receiver collisions observed on any coax segments to which the repeater is connected.
`etherStatsPkts64Octets`	The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including Frame Check Sequence (FCS) octets).

Table 5-8 Remote Monitor Statistics (/stats/port/rmon)

Statistics	Description
`etherStatsPkts65to127Octets`	The total number of packets (including bad packets) received that were between 65 and 127 octets in length (excluding framing bits but including FCS octets).
`etherStatsPkts128to255Octets`	The total number of packets (including bad packets) received that were between 128 and 255 octets in length (excluding framing bits but including Frame Check Sequence (FCS) octets).
`etherStatsPkts256to511Octets`	The total number of packets (including bad packets) received that were between 256 and 511 octets in length (excluding framing bits but including FCS octets).
`etherStatsPkts512to1023Octets`	The total number of packets (including bad packets) received that were between 512 and 1023 octets in length (excluding framing bits but including FCS octets).
`etherStatsPkts1024to1518Octets`	The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length (excluding framing bits but including FCS octets).

/stats/l2

Layer 2 Statistics Menu

```
[Layer 2 Statistics Menu]
     fdb      - Show FDB stats
     lacp     - Show LACP stats
```

Table 5-9 Statistics Menu Options (/stats/l2)

Command Syntax and Usage
`fdb` Displays FDB statistics. See page 109 for sample output.
`lacp` *<port alias or number>* Displays Link Aggregation Control Protocol (LACP) statistics. See page 110 for sample output.

/stats/l2/fdb
FDB Statistics

```
FDB statistics:
 creates:          30503   deletes:          30420
 current:             83   hiwat:              855
 lookups:         511889   lookup fails:      1126
 finds:            21801   find fails:           0
 find_or_c's:      36140   overflows:            0
```

This menu option enables you to display statistics regarding the use of the forwarding database, including the number of new entries, finds, and unsuccessful searches.

FDB statistics are described in the following table:

Table 5-10 Forwarding Database Statistics (/stats/fdb)

Statistic	Description
`creates`	Number of entries created in the Forwarding Database.
`current`	Current number of entries in the Forwarding Database.
`lookups`	Number of entry lookups in the Forwarding Database.
`finds`	Number of successful searches in the Forwarding Database.
`find_or_c's`	Number of entries found or created in the Forwarding Database.
`deletes`	Number of entries deleted from the Forwarding Database.
`hiwat`	Highest number of entries recorded at any given time in the Forwarding Database.
`lookup fails`	Number of unsuccessful searches made in the Forwarding Database.
`find fails`	Number of search failures in the Forwarding Database.
`overflows`	Number of entries overflowing the Forwarding Database.

/stats/l2/lacp *<port alias or number>*
LACP Statistics

```
Port EXT1:
 ---------------------------------------
 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
```

/stats/l3
Layer 3 Statistics Menu

```
[Layer 3 Statistics Menu]
     ospf      - OSPF Statistics Menu
     ip        - Show IP stats
     route     - Show route stats
     arp       - Show ARP stats
     vrrp      - Show VRRP stats
     dns       - Show DNS stats
     icmp      - Show ICMP stats
     igmp      - Show IGMP stats
     if        - Show IP interface ("if") stats
     tcp       - Show TCP stats
     udp       - Show UDP stats
     ifclear   - Clear IP interface ("if") stats
     ipclear   - Clear IP stats
     igmpclear - Clear IGMP stats
     dump      - Dump layer 3 stats
```

Table 5-11 Statistics Menu Options (/stats/l3)

Command Syntax and Usage
`ospf` Displays OSPF statistics Menu. See page 112 for sample output.
`ip` Displays IP statistics. See page 117 for sample output.
`route` Displays route statistics. See page 119 for sample output.
`arp` Displays Address Resolution Protocol (ARP) statistics. See page 120 for sample output.
`vrrp` When virtual routers are configured, you can display the following protocol statistics for VRRP: ■ Advertisements received (`vrrpInAdvers`) ■ Advertisements transmitted (`vrrpOutAdvers`) ■ Advertisements received, but ignored (`vrrpBadAdvers`) See page 121 for sample output.
`dns` Displays Domain Name Server (DNS) statistics. See page 122 for sample output.
`icmp` Displays ICMP statistics. See page 122 for sample output.
`igmp` Displays IGMP statistics. See page 122 for sample output.
`if` *<interface number (1-128)>* Displays IP interface statistics. See page 125 for sample output.
`tcp` Displays TCP statistics. See page 127 for sample output.
`udp` Displays UDP statistics. See page 129 for sample output.
`ifclear` Clears IP interface statistics. Use this command with caution as it will delete all the IP interface statistics.
`ipclear` Clears IP statistics. Use this command with caution as it will delete all the IP statistics.
`igmpclear` Clears IGMP statistics.

Table 5-11 Statistics Menu Options (/stats/l3)

Command Syntax and Usage
`dump` 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.

/stats/l3/ospf
OSPF Statistics Menu

```
[OSPF stats Menu]
      general  - Show global stats
      aindex   - Show area(s) stats
      if       - Show interface(s) stats
```

Table 5-12 OSPF Statistics Menu (/stats/l3/ospf)

Command Syntax and Usage
`general` Displays global statistics. See page 113 for sample output.
`aindex` Displays area statistics.
`if` Displays interface statistics.

/stats/l3/ospf/general

OSPF Global Statistics

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

```
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 5-13 OSPF General Statistics (stats/l3/ospf/general)

Statistics	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.
`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.

Table 5-13 OSPF General Statistics (stats/l3/ospf/general) (Continued)

Statistics	Description
`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.
`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.

Table 5-13 OSPF General Statistics (stats/l3/ospf/general) (Continued)

Statistics	Description
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.
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.

/stats/l3/ip
IP Statistics

```
IP statistics:
ipInReceives:        3115873   ipInHdrErrors:           1
ipInAddrErrors:        35447   ipForwDatagrams:         0
ipInUnknownProtos:    500504   ipInDiscards:            0
ipInDelivers:        2334166   ipOutRequests:     1010542
ipOutDiscards:             4   ipOutNoRoutes:           4
ipReasmReqds:              0   ipReasmOKs:              0
ipReasmFails:              0   ipFragOKs:               0
ipFragFails:               0   ipFragCreates:           0
ipRoutingDiscards:         0   ipDefaultTTL:          255
ipReasmTimeout:            5
```

Table 5-14 IP Statistics (stats/l3/ip)

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.
`ipForwDatagrams`	The 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.
`ipInUnknownProtos`	The number of locally addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.

Table 5-14 IP Statistics (stats/l3/ip)

Statistics	Description
`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).
`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.
`ipOutNoRoutes`	The number of IP datagrams discarded because no route could be found to transmit them to their destination. Note that this counter includes any packets counted in `ipForwDatagrams`, which meet this *no-route* criterion. Note that this includes any datagrams which a host cannot route because all of its default gateways are down.
`ipReasmReqds`	The number of IP fragments received which needed to be reassembled at this entity (the switch).
`ipReasmOKs`	The number of IP datagrams successfully re- assembled.
`ipReasmFails`	The 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.
`ipFragOKs`	The number of IP datagrams that have been successfully fragmented at this entity (the switch).
`ipFragFails`	The 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.
`ipFragCreates`	The number of IP datagram fragments that have been generated as a result of fragmentation at this entity (the switch).

Table 5-14 IP Statistics (stats/l3/ip)

Statistics	Description
`ipRoutingDiscards`	The number of routing entries, which were chosen to be discarded even though they are valid. One possible reason for discarding such an entry could be to free-up buffer space for other routing entries.
`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.
`ipReasmTimeout`	The maximum number of seconds, which received fragments are held while they are awaiting reassembly at this entity (the switch).

/stats/l3/route
Route Statistics

```
Route statistics:
ipRoutesCur:                 7  ipRoutesHighWater:         7
ipRoutesMax:              1024

RIP statistics:
ripInPkts:                   0  ripOutPkts:                0
ripBadPkts:                  0  ripRoutesAgedOut:          0

BGP statistics:
bgpInPkts:                   0  bgpOutPkts:                0
bgpBadPkts:                  0  bgpSessFailures:           0
bgpRoutesAdded:              0  bgpRoutesRemoved:          0
bgpRoutesCur:                0  bgpRoutesFailed:           0
bgpRoutesIgnored:            0  bgpRoutesFiltered:         0
```

Table 5-15 Route Statistics (/stats/l3/route)

Statistics	Description
`ipRoutesCur`	The total number of outstanding routes in the route table.
`ipRoutesHighWater`	The highest number of routes ever recorded in the route table.
`ipRoutesMax`	The maximum number of routes that are supported.
`RIP statistics:`	
`ripInPkts`	The total number of good RIP advertisement packets received.

Table 5-15 Route Statistics (/stats/l3/route)

Statistics	Description
`ripOutPkts`	The total number of RIP advertisement packets sent.
`ripBadPkts`	The total number of RIP advertisement packets received that were dropped.
`ripRoutesAgedOut`	The total number of routes learned via RIP that has aged out.
`BGP statistics:`	
`bgpInPkts`	The total number of BGP packets received.
`bgpOutPkts`	The total number of BGP packets sent.
`bgpBadPkts`	The total number of BGP packets dropped.
`bgpSessFailures`	The total number of failed sessions.
`bgpRoutesAdded`	The total number of routes that were added to the routing table.
`bgpRoutesRemoved`	The total number of routes that were removed from the routing table.
`bgpRoutesCur`	The total number of current BGP routes.
`bgpRoutesFailed`	The total number of BGP routes that failed to add in the routing table.
`bgpRoutesIgnored`	The total number of routes ignored because the peer was not connected locally or multihop was not configured.
`bgpRoutesFiltered`	The total number of routes dropped by the filter.

/stats/l3/arp
ARP statistics

This menu option enables you to display Address Resolution Protocol statistics.

```
ARP statistics:
arpEntriesCur:              3  arpEntriesHighWater:           4
arpEntriesMax:           4096
```

Table 5-16 ARP Statistics (/stats/l3/arp)

Statistics	Description
`arpEntriesCur`	The total number of outstanding ARP entries in the ARP table.

Table 5-16 ARP Statistics (/stats/l3/arp)

Statistics	Description
`arpEntriesHighWater`	The highest number of ARP entries ever recorded in the ARP table.
`arpEntriesMax`	The maximum number of ARP entries that are supported.

/stats/l3/vrrp
VRRP Statistics

Virtual Router Redundancy Protocol (VRRP) support on the GbE Switch Module 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 following protocol statistics for VRRP:

- Advertisements received (`vrrpInAdvers`)
- Advertisements transmitted (`vrrpOutAdvers`)
- Advertisements received, but ignored (`vrrpBadAdvers`)

The statistics for the VRRP LAN are displayed:

```
VRRP statistics:
vrrpInAdvers:                0   vrrpBadAdvers:            0
vrrpOutAdvers:               0
```

Table 5-17 VRRP Statistics (/stats/l3/vrrp)

Statistics	Description
`vrrpInAdvers`	The total number of 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.

/stats/l3/dns
DNS Statistics

This menu option enables you to display Domain Name System statistics.

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

Table 5-18 DNS Statistics (/stats/dns)

Statistics	Description
`dnsInRequests`	The total number of DNS request 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.

/stats/l3/icmp
ICMP Statistics

```
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 5-19 ICMP Statistics (/stats/l3/icmp)

Statistics	Description
`icmpInMsgs`	The total number of ICMP messages which the entity (the switch) received. Note that this counter includes all those counted by `icmpInErrors`.

Table 5-19 ICMP Statistics (/stats/l3/icmp)

Statistics	Description
`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.
`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.

Table 5-19 ICMP Statistics (/stats/l3/icmp)

Statistics	Description
`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.

/stats/l3/igmp
IGMP Statistics

```
IGMP Snoop vlan 1 statistics:
-------------------------------------------------------------------
rxIgmpValidPkts:             0    rxIgmpInvalidPkts:             0
rxIgmpGenQueries:            0    rxIgmpGrpSpecificQueries:      0
rxIgmpLeaves:                0    rxIgmpReports:                 0
txIgmpReports:               0    txIgmpGrpSpecificQueries:      0
txIgmpLeaves:                0
Current Groups:              0    Current M-cast Routers:        1
```

This menu option enables you to display statistics regarding the use of the IGMP Multicast Groups.

IGMP statistics are described in the following table:

Table 5-20 IGMP Statistics (/stats/igmp)

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

Table 5-20 IGMP Statistics (/stats/igmp)

Statistic	Description
`rxIgmpLeaves`	Total number of Leave requests received
`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
`Current Groups`	Total number of active IGMP groups learned through IGMP Snooping
`Current M-Cast Routers`	Total number of static Multicast Routers configured on the switch

/stats/l3/if *<interface number>* Interface Statistics

```
IP interface 1 statistics:
ifInOctets:          48948386   ifInUcastPkts:         220553
ifInNUCastPkts:        167895   ifInDiscards:               0
ifInErrors:                 0   ifInUnknownProtos:          0
ifOutOctets:         27100789   ifOutUcastPkts:        441938
ifOutNUcastPkts:       218652   ifOutDiscards:              0
ifOutErrors:                0   ifStateChanges              1
```

Table 5-21 Interface Statistics (/stats/l3/if)

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.

Table 5-21 Interface Statistics (/stats/l3/if)

Statistics	Description
`ifInNUCastPkts`	The number of packets, delivered by this sub-layer to a higher (sub-layer), which were addressed to a multicast or broadcast address at this sub-layer. This object is deprecated in favor of `ifInMulticastPkts` and `ifInBroadcastPkts`.
`ifInDiscards`	The number of inbound packets that 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.
`ifInUnknownProtos`	For packet-oriented interfaces, the number of packets received via the interface which were discarded because of an unknown or unsupported protocol. For character-oriented or fixed-length interfaces which support protocol multiplexing the number of transmission units received via the interface which were discarded because of an unknown or unsupported protocol. For any interface which does not support protocol multiplexing, this counter will always be 0.
`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.
`ifOutNUcastPkts`	The total number of packets that higher-level protocols requested to be transmitted, and which were addressed to a multicast or broadcast address at this sub-layer, including those that were discarded or not sent. This object is deprecated in favor of `ifOutMulticastPkts` and `ifOutBroadcastPkts`.
`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.

Table 5-21 Interface Statistics (/stats/l3/if)

Statistics	Description
`ifStateChanges`	The number of times an interface has transitioned from either down to up or from up to down.

/stats/l3/tcp
TCP Statistics

```
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
tcpCurBuff:               0   tcpCurConn:               3
tcpOutRsts:             417
```

Table 5-22 TCP Statistics (/stats/l3/tcp)

Statistics	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.

Table 5-22 TCP Statistics (/stats/l3/tcp)

Statistics	Description
`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.
`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`).
`tcpCurBuff`	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.

/stats/l3/udp
UDP Statistics

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

Table 5-23 UDP Statistics (/stats/l3/udp)

Statistics	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.

/stats/slb
Load Balancing Statistics Menu

```
[Server Load Balancing Statistics Menu]
      sp      - SLB Switch SP Stats Menu
      real    - Show real server stats
      group   - Show real server group stats
      virt    - Show virtual server stats
      filt    - Show filter stats
      layer7  - Show Layer 7 stats
      ssl     - Show SSL SLB stats
      ftp     - Show FTP SLB parsing and NAT stats
      rtsp    - Show RTSP SLB stats
      dns     - Show DNS SLB stats
      wap     - Show WAP SLB stats
      tcp     - Show TCP rate limiting stats
      maint   - Show maintenance stats
      clear   - Clear non-operational Server Load Balancing stats
      aux     - Show auxiliary session table stats
      dump    - Dump all SLB statistics
```

Table 5-24 SLB Statistics Menu Options (/stats/slb)

Command Syntax and Usage
sp *<SP number (1-4)>* Displays the server load balancing statistics menu. To view menu options, see page 132.
real *<real server number (1-63)>* Displays the following real server statistics: ■ Number of times the real server has failed its health checks ■ Number of sessions currently open on the real server ■ Total sessions the real server was assigned ■ Highest number of simultaneous sessions recorded for each real server ■ Real server transmit/receive octets See page 133 for sample output.
group *<real server group number (1-64)>* Displays the following real server group statistics: ■ Current and total sessions for each real server in the real server group. ■ Current and total sessions for all real servers associated with the real server group. ■ Highest number of simultaneous sessions recorded for each real server. ■ Real server transmit/receive octets. For per-service octet counters, see page 135. See page 136 for sample output.

Table 5-24 SLB Statistics Menu Options (/stats/slb)

Command Syntax and Usage
`virt` *<virtual server number (1-64)>* Displays the following virtual server statistics: ■ Current and total sessions for each real server associated with the virtual server. ■ Current and total sessions for all real servers associated with the virtual server. ■ Highest number of simultaneous sessions recorded for each real server. ■ Real server transmit/receive octets. For per-service octet counters, see page 135. See page 137 for sample output.
`filt` *<filter ID (1-1024)>* Displays the total number of times any filter has been used. See page 137 for sample output.
`layer7` Displays Layer 7 statistics. See page 138 for sample output.
`ssl` Displays SSL server load balancing statistics. See page 142 for sample output.
`ftp` Displays FTP SLB parsing and NAT statistics. See page 143 for sample output.
`rtsp` Displays RTSP SLB statistics. See page 146 for sample output.
`dns` Displays DNS SLB statistics. See page 146 for sample output.
`wap` Displays WAP SLB statistics. See page 148 for sample output.
`tcp` Displays statistics for TCP rate limiting. See page 150 for sample output.
`maint` Displays SLB maintenance statistics. See page 150 for sample output.
`clear` [y|n] Clears all non-operating SLB statistics on the GbE Switch Module, resetting them to zero. This command does not reset the switch and does ***not*** affect the following counters: ■ Counters required for Layer 4 and Layer 7 operation (such as current real server sessions). ■ All related SNMP counters. To view the statistics reset by this command, refer to Table 5-42 on page 152.
`aux` Displays auxiliary session table statistics.

Table 5-24 SLB Statistics Menu Options (/stats/slb)

Command Syntax and Usage

`dump`

Dumps all switch SLB statistics. Use this command to gather data for tuning and debugging switch performance. To save dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump command.

/stats/slb/sp

Server Load Balancing SP statistics Menu

```
[Server Load Balancing SP Statistics Menu]
      real     - Show real server stats
      group    - Show real server group stats
      virt     - Show virtual server stats
      filt     - Show filter stats
      maint    - Show maintenance stats
      aux      - Show auxiliary session table stats
      clear    - Clear SP stats
```

Table 5-25 SP Statistics Menu options (/stats/slb/sp)

Command Syntax and Usage

`real` *<real server number (1-63)>*

Displays real server statistics of the switch port. See page 133 for a sample output.

`group` *<real server group number (1-64)>*

Displays real server group statistics of the switch port. See page 133 for a sample output.

`virt` *<virtual server number (1-64)>*

Displays statistics of the virtual server. See page 133 for a sample output.

`filt` *<filter ID (1-1024)>*

Displays statistics of the filter. See page 134 for a sample output.

`maint`

Displays the SP maintenance statistics. See page 134 for a sample output.

`aux`

Displays the statistics of the auxiliary session table.

`clear`

Deletes all the SP statistics.

/stats/slb/sp/real *<real server number>*

SP Real Server Statistics

```
Port 1 Real server 1 stats:
Current sessions:                     3
Total sessions:                       3
Octets:                               24
```

/stats/slb/sp *<sp number>*/group *<real group server number>*

SP Real Group Server Statistics

```
Real server group 1 stats:
                      Current      Total  Highest
Real IP address      Sessions   Sessions Sessions           Octets
---- --------------- -------- ---------- --------  ---------------
  1  200.100.10.14         20         60        9           480000
  2  200.100.10.15         20         77       12           616000
---- --------------- -------- ---------- --------  ---------------
                           40        137       21          1096000
```

/stats/slb/sp *<sp number>*/virt *<virtual server number>*

SP Virtual Server Statistics

```
Real server group 1 stats:
                      Current      Total  Highest
Real IP address      Sessions   Sessions Sessions           Octets
---- --------------- -------- ---------- --------  ---------------
  1  200.100.10.14         20         60        9           480000
  2  200.100.10.15         20         77       12           616000
---- --------------- -------- ---------- --------  ---------------
     200.100.10.100        40        137       21          1096000
```

/stats/slb/sp *<sp number>*/filt *<filter number>*

SP Filter Statistics

```
Poet 1 Filter 30 stats:
Total Firings:    2
```

/stats/slb/sp *<sp number>*/maint

SP Maintenance Statistics

```
SP 1 SLB Maintenance stats:
Maximum sessions:                 523264
Current sessions:                      0
  4 second average:                    0
 64 second average:                    0
Terminated sessions:                   0
Allocation failures:                   0
Non TCP/IP frames:                     0
TCP fragments:                         0
UDP datagrams:                         0
Incorrect VIPs:                        0
Incorrect Vports:                      0
No available real server:              0
Filtered (denied) frames:              0
LAND attacks:                          0
Total IP fragment sessions:            0
IP fragment sessions:                  0
IP fragment discards:                  0
IP fragment table full:                0
```

/stats/slb/real *<real server number>*

Real Server SLB Statistics

```
Real server 1 stats:
Health check failures:              0
Current sessions:                   129
Total sessions:                     65478
Highest sessions:                   4343
Octets                              523824000
```

NOTE – Octets are provided per server, not per service, unless configured as described in "Per Service Octet Counters" on page 135.

Table 5-26 Real Server SLB Statistics (/stats/slb/real)

Statistics	Description
`Current sessions`	The total number of outstanding sessions that are established to the particular real server.
`Total sessions`	The total number of sessions that have been established to the particular real server.
`Highest sessions`	The highest number of sessions ever recorded for the particular real server.
`Octets`	The total number of octets sent by the particular real server.

Per Service Octet Counters

For each load-balanced real server, the octet counters represent the combined number of transmit and receive bytes (octets). These counters are then added to report the total octets for each virtual server.

The octet counters are provided per server–not per service. If you need octet counters on a per-service basis, you can accomplish this through the following configuration:

1. **Configure a separate IP address for each service on each server being load balanced.**

   For instance, you can configure IP address 10.1.1.20 for HTTP services, and 10.1.1.21 for FTP services on the same physical server.

2. **On the GbE Switch Module, configure a real server with a real IP address for each service above.**

   Continuing the example above, two real servers would be configured for the physical server (representing each real service). If there were five physical servers providing the two services (HTTP and FTP), 10 real servers would have to be configured: five for the HTTP services on each physical server, and five for the FTP services on each physical server.

3. **On the GbE Switch Module, configure one real server group for each type of service, and group each appropriate real server IP address into the group that handles the specific service.**

   Thus, in keeping with our example, two groups would be configured: one for handling HTTP and one for handling FTP.

4. **Configure a virtual server and add the appropriate services to that virtual server.**

`/stats/slb/group` *<real server group number>*

Real Server Group Statistics

```
Real server group 1 stats:
                      Current      Total  Highest
Real IP address       Sessions   Sessions Sessions           Octets
---- --------------- -------- ---------- --------  ---------------
  1  200.100.10.14         20         60        9            480000
  2  200.100.10.15         20         77       12            616000
---- --------------- -------- ---------- --------  ---------------
                           40        137       21           1096000
```

Real server group statistics include the following:

- Current and total sessions for each real server in the real server group.
- Current and total sessions for all real servers associated with the real server group.
- Highest number of simultaneous sessions recorded for each real server.
- Real server transmit/receive octets. For per-service octet counters, see the procedure on "Per Service Octet Counters" on page 135.

/stats/slb/virt *<virtual server number>*

Virtual Server SLB Statistics

```
Virtual server 1 stats:
                      Current      Total  Highest
Real IP address      Sessions   Sessions Sessions           Octets
---- --------------- -------- ---------- --------  ---------------
  1  200.100.10.14         20         60        9           480000
  2  200.100.10.15         20         77       12           616000
---- --------------- -------- ---------- --------  ---------------
     200.100.10.20         40        309       21          1096000
```

NOTE – The virtual server IP address is shown on the last line, below the real server IP addresses.

Virtual server statistics include the following:

- Current and total sessions for each real server associated with the virtual server.
- Current and total sessions for all real servers associated with the virtual server.
- Highest number of simultaneous sessions recorded for each real server.
- Real server transmit/receive octets. For per-service octet counters, see "Per Service Octet Counters" on page 135.

/stats/slb/filt *<filter number>*

Filter SLB Statistics

```
Filter 1 stats:
Total firings:                       1011
```

You can obtain the total number of times any filter has been used.

/stats/slb/layer7

SLB Layer7 Statistics Menu

```
[Layer 7 Statistics Menu]
     redir    - Show URL Redirection stats
     str      - Show SLB String stats
     maint    - Show Layer 7 Maintenance stats
```

Table 5-27 SLB Layer 7 Statistics Menu Options (/stats/slb/layer7)

Command Syntax & Usage
redir Displays URL Redirection statistics. See page 138 for a sample output.
str Displays SLB string statistics. See page 139 for a sample output.
maint Displays Layer 7 maintenance statistics. See page 140 for a sample output.

/stats/slb/layer7/redir

Layer7 Redirection Statistics

```
Total URL based web cache redirection stats:
Total cache server hits:                              0
Total origin server hits:                             0
Total straight to origin server hits:                 0
Total none-GETs hits:                                 0
Total 'Cookie: ' hits:                                0
Total no-cache hits:                                  0
```

Table 5-28 Layer 7 Redirection Statistics (/stats/slb/layer7/redir)

Statistics	Description
`Total cache server hits`	The total number of HTTP requests redirected to the cache server.
`Total origin server hits`	The total number of HTTP requests forwarded to the origin server.
`Total straight to origin server hits`	The total number of HTTP requests forwarded from straight to the origin server.
`Total none-GETs hits`	The total number of none GET requests forwarded to the origin server.
`Total 'Cookie:' hits`	The total number of cookie requests forwarded to the origin server.

Table 5-28 Layer 7 Redirection Statistics (/stats/slb/layer7/redir)

Statistics	Description
`Total no-cache hits`	The total number of requests containing *no-cache header* forwarded to the origin server.

/stats/slb/layer7/str

Layer 7 SLB String Statistics

```
SLB String stats:
  ID SLB String                                             Hits
   1 any                                                 1527115
   2 www.[abcdefghijklm]*.com                                  0
   3 www.[nopqrstuvwxyz]*.com                                  0
   4 www.junk.com                                              0
   5 www.abc.com                                               0
   6 www.[abcdefjhijklm]*.org                                  0
   7 www.[nopqrstuvwxyz]*.org                                  0
```

Table 5-29 Layer 7 SLB String Statistics (/stats/slb/layer7/str)

Statistics	Description
`ID SLB String`	The user-defined strings being used in URL matching.
`Hits`	The total number of instances that are load-balanced due to matching of the particular URL ID.

/stats/slb/layer7/maint

Layer 7 SLB Maintenance Statistics

```
Clients reset by switch on server side:            0
Connection Splicing to support HTTP/1.1:           0
Half open connections:                             0
Switch retries:                                    0
Random early drops:                                0
Requests exceeded 4500 bytes:                      0
Invalid 3-way handshakes:                          0
Current SP[1] memory units:   327    Lowest:                   327
Current SP[2] memory units:   327    Lowest:                   327
Current SP[3] memory units:   327    Lowest:                   327
Current SP[4] memory units:   327    Lowest:                   327
Current SP memory units:     1308
Current SEQ buffer entries:     0    Highest:                    0
Current Data buffer use:        0    Highest:                    0
Current SP buffer entries:      0    Highest:                    0
Total Nonzero SEQ Alloc:        0
Total SEQ Buffer Allocs:        0    Total SEQ Frees:            0
Total Data Buffer Allocs:        0   Total Data Frees:            0
Alloc Fails - Seq buffers:      0    Alloc Fails - Ubufs:        0
Max sessions per bucket:        0    Max frames per session:     0
Max bytes buffered (sess):      0
```

Table 5-30 SLB Layer 7 Maintenance Statistics (/stats/slb/layer7/maint)

Statistics	Description
`Clients reset by switch on server side`	The number of reset frames sent to the server by the switch during server connection termination.
`Connection Splicing to support HTTP/1.1`	The total number of connection swapping between different real servers in supporting multiple HTTP/1.1 client requests.
`Half open connections`	The total numbers of outstanding TCP connections that are half opened. It is incremented when the switch responds to TCP SYN packet and decremented upon receiving TCP SYN ACK packet from the requester.
`Switch retries`	The total number of switch retries to connect to the real server.
`Random early drops`	The total number of SYN frames dropped when the buffer is low.
`Requests exceeded 4500 bytes`	The total number of GET requests that exceeded 4500 bytes.
`Invalid 3-way hand-shakes`	The total number of dropped frames because of invalid 3-way hand shakes.

Table 5-30 SLB Layer 7 Maintenance Statistics (/stats/slb/layer7/maint)

Statistics	Description
`Current SP memory units`	The current available SP memory units.
`Current SEQ buffer entries`	The number of outstanding sequence buffers used.
`Highest SEQ buffer entries`	The highest number of sequence buffers ever used.
`Current Data buffer use`	The number of outstanding data buffers used.
`Highest Data buffer use`	The highest number of data buffers ever used.
`Total Nonzero SEQ Alloc`	The total number of sequence buffer allocated.2
`Total SEQ Buffer Allocs`	The total number of sequence buffer allocations.
`Total SEQ Frees`	The total number of sequence buffer is freed.
`Total Data Buffer Allocs`	The total number of buffers allocated to store client request.2
`Total Data Frees`	The total of number buffers freed.
`Alloc Fails - Seq buffers`	The number of times sequence buffer allocation failed.
`Alloc Fails - Ubufs`	The number of times the URL data buffer allocation failed.
`Max sessions per bucket`	The maximum number of items (sessions) allowed in the session table hash bucket chain.
`Max frames per session`	The maximum number of frames to be buffered per session.
`Max bytes buffered (sess)`	The maximum number of bytes to be buffered per session.

/stats/slb/ssl

SLB Secure Socket Layer Statistics

```
SSL SLB maintenance stats:
SessionId allocation fails:                      0
                           Current      Total  Highest
                          Sessions   Sessions Sessions
------------------------- -------- ---------- --------
Unique SessionIds                0          0        0
SSL connections                  0          0        0
Persistent Port Sessions         0          0        0
```

Table 5-31 SLB Secure Socket Layer Statistics (/stats/slb/ssl)

Statistics	Description
`SSL SLB maintenance stats`	Debug stats for SSL `SessionId` based persistence.
`SessionId allocation fails`	The number of times allocation of a session table entry failed when attempting to store a `SessionId` in the table.
The table shows the Current Sessions, the total sessions seen on the switch since last reset and the high water mark of current sessions for the following:	
`Unique SessionIds`	Many SSL sessions can use the same `SessionId`, these should all bind to the same server. This number shows the number of unique SSL sessions seen on the switch.
`SSL connections`	The number of different TCP connections using SSL service.
`Persistent Port Sessions`	The number of `SessionIds`, to allow for persistence across different client ports.

/stats/slb/ftp

File Transfer Protocol SLB and Filter Statistics Menu

```
[FTP SLB parsing and Filter Statistics Menu]
      active   - Show active FTP NAT filter stats
      parsing - Show FTP SLB parsing server stats
      maint    - Show FTP maintenance stats
      dump     - Dump all FTP SLB/NAT stats
```

Table 5-32 FTP SLB Parsing and Filter Statistics Menu Options (/stats/slb/ftp)

Command Syntax and Usage
`active` Shows active FTP SLB parsing and filter statistics. See page 143 for sample output.
`parsing` Shows parsing statistics. See page 144 for sample output.
`maint` Shows maintenance statistics. See page 144 for sample output.
`dump` Shows all FTP SLB/NAT statistics. See page 145.

/stats/slb/ftp/active

Active FTP SLB Parsing and Filter Statistics

```
Total Active FTP NAT stats(PORT):
Total FTP:                             0
Total New Active FTP Index:            0
Active FTP NAT ACK/SEQ diff:           0
```

Table 5-33 Active FTP Slb Parsing and Filter statistics (/stats/slb/ftp/active)

Statistics	Description
`Total Active FTP NAT stats (PORT)`	The number of times the switch receives the `port` command from the client.
`Total FTP`	The number of times the switch receives both active and passive FTP connections.
`Total New Active FTP Index`	The number of times the switch creates a new index due to `port` command from the client.
`Active FTP NAT ACK/SEQ diff`	The difference in the numbers of ACK and SEQ that the Switch needs for packet adjustment.

/stats/slb/ftp/parsing

Passive FTP SLB Parsing Statistics

```
Total FTP SLB Parsing Stats(PASV):
Total FTP:                                 0
Total New FTP SLB parsing Index:           0
FTP SLB parsing ACK/SEQ diff:              0
```

Table 5-34 Passive FTP SLB Parsing Statistics (/stats/slb/ftp/parsing)

Statistics	Description
`Total FTP`	The number of times the switch receives both active and passive FTP connections.
`Total New FTP SLB parsing Index`	The number of times the switch creates a new index in response to the `pasv` command from the client.
`FTP SLB parsing ACK/SEQ diff`	The difference in the numbers of ACK and SEQ that the switch needs FTP SLB parsing.

/stats/slb/ftp/maint

FTP SLB Maintenance Statistics

```
FTP mode switch error:                     0
```

Table 5-35 FTP SLB Maintenance Statistics (/stats/slb/ftp/maint)

Statistics	Description
`FTP mode switch error`	The number of times the switch is not able to switch modes from active to passive and vice versa.

/stats/slb/ftp/dump

FTP SLB Statistics Dump

```
Total FTP:                                 0
Total FTP NAT Filtered:                    0
Total new active FTP NAT Index:            0
Total new FTP SLB parsing Index:           0
FTP Active FTP NAT ACK/SEQ diff:           0
FTP SLB parsing ACK/SEQ diff:              0
FTP mode switch error:                     0
```

Table 5-36 FTP SLB Statistics Dump (/stats/slb/ftp/dump)

Statistics	Description
`Total FTP`	The total number of FTP sessions that occurred.
`Total FTP NAT Filtered`	The total number of FTP NAT filter sessions that occurred.
`Total new active FTP NAT Index`	The total number of new data sessions created for FTP NAT filter in active mode.
`Total new FTP SLB parsing Index`	The number of times the switch creates a new index in response to the `pasv` command from the client.
`FTP Active FTP NAT ACK/SEQ diff`	The total number of times the adjustment between ACK and SEQ occured on the filter.
`FTP SLB parsing ACK/SEQ diff`	The difference in the numbers of ACK and SEQ that the switch needs for FTP SLB parsing.
`FTP mode switch error`	The number of times the switch could not switch mode from active to passive and vice versa.

/stats/slb/rtsp

RTSP SLB Statistics

```
    Control     UDP                     Connection  Buffer      Alloc
SP  Connection  Streams     Redirect    Denied      Allocs      Failures
--  ----------  ----------  ----------  ----------  ----------  ----------
 1           0           0           0           0           0           0
 2           0           0           0           0           0           0
 3           0           0           0           0           0           0
 4           0           0           0           0           0           0
 --  ----------  ----------  ----------  ----------  ----------  --------
             0           0           0           0           0           0
```

Table 5-37 RTSP SLB Statistics (/stats/slb/rtsp)

Statistics	Description
`ControlConnection`	The total number of TCP connections for RTSP control connection.
`UDP Streams`	The total number of UDP connections for data channels. The number depends upon the type of media player being used.
`Redirect`	The total number of times the connection got redirected.
`ConnectionDenied`	The total number of times the connections got denied due to shortage of resources or the real server being down.
`BufferAllocs`	The total number of buffer allocations used.
`AllocFailures`	The total number of times the buffer allocation failed.

/stats/slb/dns

DNS SLB Statistics

```
Total number of TCP DNS queries:                                  0
Total number of UDP DNS queries:                                  0
Total number of invalid DNS queries:                              0
Total number of multiple DNS queries:                             0
Total number of domain name parse errors:                         0
Total number of failed real server name matches:                  0
Total number of DNS parsing internal errors:                      0
```

Table 5-38 DNS SLB Statistics (/stats/slb/dns)

Statistics	Description
`Total number of TCP DNS queries`	The total number of DNS queries that received through TCP connections.
`Total number of UDP DNS queries`	The total number of DNS queries received through UDP requests.
`Total number of invalid DNS queries`	The total number of malformed DNS queries received.
`Total number of multiple DNS queries`	The total number of DNS queries that contain more than one domain name to be resolved. Currently only one domain name resolution per request is supported.
`Total number of domain name parse errors`	The total number of DNS queries that have short or invalid domain names to be resolved.
`Total number of failed real server name matches`	The total number of times the user failed to find a real server which has the same l7 strings that match the domain name to be resolved.
`Total number of DNS parsing internal errors`	The total number of out of memory and other unexpected errors the user gets while processing the DNS query.

/stats/slb/wap

WAP SLB Statistics

```
WAP Maintenance stats:
  current sessions:                   0
  allocation failures:                0
  incorrect VIPs:                     0
  incorrect Vports:                   0
  no available real server:           0
  requests to wrong SP:               0
------------------------------------------------------------------
TPCP External Notification stats:
  add session reqs:            0    del session reqs:            0
  req fails- q full:           0    req fails- q full:           0
  req fails- SP dead:          0    req fails- SP dead:          0
  entries in use:              0    entries in use:              0
  max entries in use:          0    max entries in use:          0
------------------------------------------------------------------
RADIUS Snooping stats:
  acct reqs:                   0    acct wrap reqs:              0
  acct start reqs:             0    acct update reqs:            0
  acct stop reqs:              0    acct bad reqs:               0
  add session reqs:            0    del session reqs:            0
  req fails- q full:           0    req fails- SP dead:          0
  req fails- DMA:              0    max entries in use:          0
```

Table 5-39 WAP SLB Statistics (/stats/slb/wap)

Statistics	Description
`WAP Maintenance stats:`	
`current sessions`	The number of session bindings currently in use.
`allocation failures`	Indicates instances where the switch ran out of available bindings for a port.
`incorrect VIPs`	Indicates the number of times the switch received a Layer 4 request for a virtual server which was not configured.
`incorrect Vports`	This dropped frames counter indicates that the virtual server has received frames for TCP/UDP services that have not been configured. Normally this indicates a mis-configuration on the virtual server or the client.
`no available real server`	This dropped frames counter indicates that all real servers are either out of service or at their maxcon limit.
`requests to wrong SP`	The number of session add/delete requests sent to the wrong SP.

Table 5-39 WAP SLB Statistics (/stats/slb/wap)

Statistics	Description
`TPCP External Notification stats:`	
`add session reqs`	The number of WAP session add requests via TPCP.
`del session reqs`	The number of WAP session delete requests via TPCP.
`req fails- q full`	The number of add-request failures due to request queue being full.
`req fails- SP dead`	The number of add-request failures due to dead target SP.
`entries in use`	The number of queue entries in use.
`max entries in use`	The maximum number of queue entries in use at one time for session delete requests via TPCP.
`RADIUS Snooping stats:`	
`acct reqs`	The number of RADIUS Accounting frames received.
`acct wrap reqs`	The number of wrapped RADIUS Accounting frames received.
`acct start reqs`	The number of RADIUS Accounting Start frames received.
`acct update reqs`	The number of RADIUS Accounting Update frames.
`acct stop reqs`	The number of RADIUS Accounting Stop frames received.
`acct bad reqs`	The number of bad RADIUS Accounting frames received.
`add session reqs`	The number of WAP session add requests via RADIUS snooping.
`del session reqs`	The number of WAP session delete requests via RADIUS snooping.
`req fails- q full`	The number of add/delete requests failed due to request queue being full.
`req fails- SP dead`	The number of add/delete request failures due to dead target SP.
`req fails- DMA`	The number of add/delete requests failed due to DMA write failure.
`max entries in use`	The maximum number of queue entries in use at a time for session add/delete requests via RADIUS snooping.

/stats/slb/tcp

SLB TCP Rate Limiting Statistics

```
TCP rate limiting stats:
  Total hold downs triggered:                    0
  Current per-client state entries:              0
```

Table 5-40 SLB TCP Rate Limiting Statistics (/stats/slb/tcp)

Statistics	Description
`Total hold downs triggered`	The total number of hold downs that occurred since the last stats clear.
`Current per-client state entries`	The current number of per client state entries in the session table.

/stats/slb/maint

SLB Maintenance Statistics

```
SLB Maintenance stats:
Maximum sessions:                   2093056
Current sessions:                         0
  4 second average:                       0
 64 second average:                       0
Terminated sessions:                      0
Allocation failures:                      0
TCP fragments:                            0
UDP datagrams:                            0
Non TCP/IP frames:                        0
Incorrect VIPs:                           0
Incorrect Vports:                         0
No available real server:                 0
Backup server activations:                0
Overflow server activations:              0
Filtered (denied) frames:                 0
LAND attacks:                             0
Total IP fragment sessions:               0
Current IP fragment sessions              0
IP fragment discards:                     0
IP fragment table full:                   0
```

SLB Maintenance statistics are described in the following table.

Table 5-41 Server Load Balancing Maintenance Statistics (/stats/slb/maint)

Statistic	Description
`Maximum sessions`	The maximum number of simultaneous sessions supported.
`Current Sessions`	Number of session bindings currently in use (the last 4 and 64 seconds).
`Terminated Sessions`	Number of sessions removed from the session table because the server assigned to them failed and graceful server failure was not enabled.
`Allocation Failures`	Indicates instances where the Switch ran out of available sessions for a port.
`TCP Fragments`	Indicates the number of TCP fragments encountered by the switch. Layer 4 processing might not handle TCP fragments, depending on configuration.
`UDP Datagrams`	Indicates that the virtual server IP address and MAC are receiving UDP frames when UDP balancing is not turned on.
`Non TCP/IP Frames`	Indicates the number of non-IP based frames received by the virtual server.
`Incorrect VIPs`	Indicates the number of times the switch received a Layer 4 request for a virtual server which was not configured.
`Incorrect Vports`	This dropped frames counter indicates that the virtual server has received frames for TCP/UDP services that have not been configured. Normally this indicates a mis-configuration on the virtual server or the client, but it may be an indication of a potential security probing application like SATAN.
`No Server Available`	This dropped frames counter indicates that all real servers are either out of service or at their `maxcon` limit.
`Backup Server Activations`	This indicates the number of times a real server failure has occurred and caused a backup server to be brought online.
`Overflow Server Activations`	This indicates the number of times a real server has reached the `maxcon` limit and caused an overflow server to be brought online.
`Filtered (Denied) Frames`	This indicates the number of frames that were dropped because they matched an active filter with the `deny` action set.
`LAND attacks`	This counter increases whenever a packet has the same source and destination IP addresses and ports.
`Total IP fragment sessions`	This represents the total number of fragment sessions the switch has processed so far.
`Current IP fragment sessions`	This represents the current number of fragment sessions.
`IP fragment discards`	The number of fragmented packets that are discarded due to lack of resources.
`IP fragment table full`	This counter indicates how many times session table is full.

/stats/slb/clear

Clearing the SLB Statistics

The following statistics are reset to zero when the clear command is given and confirmed:

Table 5-42 SLB Statistics Reset (/stats/slb/clear)

Statistics	Description
`Real server stats:`	Health check failures Total sessions Highest sessions Octets
`Real server group stats:`	Total sessions Highest sessions Octets
`Virtual server stats`	Total sessions Highest sessions Octets
`Filter stats`	Total firings
`SLB switch port stats, per port`	Real server stats: Octets, Total sessions Real server group: Octets, Total sessions Virtual server: Octets, Total sessions Total firings: Octets
`Global SLB stats`	Per real server: DNS handoffs HTTP redirects Per server group: DNS handoffs HTTP redirects
`URL SLB and Redirection stats`	Redir: Total cache server hits Total origin server hits Total none-GETs hits Total ’Cookie: ’ hits Total no-cache hits LB: ID SLB String hits
`SSL SLB stats`	Total Sessions Highest Sessions

Table 5-42 SLB Statistics Reset (/stats/slb/clear)

Statistics	Description
`FTP SLB parsing and NAT stats`	Total FTP Total FTP NAT Filtered Total new active FTP NAT Index Total new FTP SLB parsing Index FTP Active FTP NAT ACK/SEQ diff FTP SLB parsing ACK/SEQ diff
`Real server stats`	Health check failures Total sessions Highest sessions Octets
`Real server group stats`	Total sessions Highest sessions Octets
`Virtual server stats`	Total sessions Highest sessions Octets

/stats/mp

Management Processor Statistics

```
[MP-specific Statistics Menu]
     pkt     - Show Packet stats
     tcb     - Show All TCP control blocks in use
     ucb     - Show All UDP control blocks in use
     cpu     - Show CPU utilization
     mem     - Show memory stats
```

Table 5-43 Management Processor Statistics Menu Options (/stats/mp)

Command Syntax and Usage
`pkt` Displays packet statistics, to check for leads and load. To view a sample output and a description of the stats, see page 154.
`tcb` Displays all TCP control blocks that are in use. To view a sample output and a description of the stats, see page 155.

Table 5-43 Management Processor Statistics Menu Options (/stats/mp)

Command Syntax and Usage
`ucb` Displays all UDP control blocks that are in use. To view a sample output, see page 155.
`sfd` Displays all Socket File Descriptors that are in use. To view a sample output, see page 156.
`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 156.
`mem` Displays memory statistics.

/stats/mp/pkt

MP Packet Statistics

```
Packet counts:
 allocs:       1166996     frees:                      1166996
 mediums:            0     mediums hi-watermark:             7
 smalls:             0     smalls hi-watermark:              7
 failures:           0
```

Table 5-44 Packet Statistics (/stats/mp/pkt)

Statistics	Description
`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.
`mediums`	Total number of packet allocations with size between 128 to 1536 bytes from the packet buffer pool by the TCP/IP protocol stack.
`smalls`	Total number of packet allocations with size less than 128 bytes from 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.
`frees`	Total number of packets freed from the packet buffer pool by the TCP/IP protocol stack.

Table 5-44 Packet Statistics (/stats/mp/pkt)

Statistics	Description
`mediums 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.
`smalls 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.

/stats/mp/tcb

TCP Statistics

```
All TCP allocated control blocks:
10ad41e8:  0.0.0.0              0 <=> 0.0.0.0           80  listen
10ad5790:  47.81.27.5        1171 <=> 47.80.23.243      23  established
```

Table 5-45 MP Specified TCP Statistics (/stats/mp/tcb)

Statistics	Description
`10ad41e8/10ad5790`	Memory
`0.0.0.0/47.81.27.5`	Destination IP address
`0/1171`	Destination port
`0.0.0.0/47.80.23.243`	Source IP
`80/23`	Source port
`listen/established`	State

/stats/mp/ucb

UCB Statistics

```
All UDP allocated control blocks:
  161:  listen
```

/stats/mp/sfd

MP-Specific SFD Statistics

```
All Socket FD allocated:
max_fdi=2
fdi=0 fd=15 pfdi=-1
10c27fd8: 0.0.0.0            0<=>47.133.108.161 80  listen TCP server
fdi=1 fd=16 pfdi=-1
10b9564c: 0.0.0.0            0<=>47.133.108.161 23 listen TCP server
fdi=2 fd=17 pfdi=1
10c27c78: 47.129.153.150 5341<=>47.133.108.161 23 accept TCP  server
```

/stats/mp/cpu

CPU Statistics

This menu option enables you to display the CPU utilization statistics.

```
CPU utilization:
cpuUtil1Second:             53%
cpuUtil4Seconds:            54%
cpuUtil64Seconds:           54%
```

Table 5-46 CPU Statistics (stats/mp/cpu)

Statistics	Description
`cpuUtil1Second`	The utilization of MP CPU over 1 second. It shows the percentage.
`cpuUtil4Seconds`	The utilization of MP CPU over 4 seconds. It shows the percentage.
`cpuUtil64Seconds`	The utilization of MP CPU over 64 seconds. It shows the percentage.

/stats/sp *<SP Number>*

SP Specific Statistics Menu

```
[SP-specific Statistics Menu]
      maint    - Show maintenance stats
      clear    - Clear maintenance stats
      cpu      - Show CPU utilization
```

Table 5-47 SP Specific Statistics (/stats/sp)

Statistics	Description
`maint`	Indicates the total number of all the letter statistics received or sent from this SP.
clear	Deletes all the maintenance statistics.
`cpu`	Displays what percentage of the CPU has been utilized.

/stats/pace
Packet Acceleration Statistics Menu

```
[Packet Acceleration Statistics Menu]
     error    - PACE Error Stats
     info     - PACE Informational Stats
     maint    - PACE Maintenance Stats
     fp       - PACE HFP Stats
     clear    - Clear non-operational PACE stats
     dump     - Dump all PACE statistics
```

Table 5-48 Packet Acceleration Statistics (/stats/pace)

Statistics	Description
`error`	Display error statistics on the PACE processor.
info	Display general information about PACE performance.
maint	Display session data about the utilzation of PACE resources.
`fp`	Display hardware counts for data passed through the frame processor.
`clear`	Clear non-operational PACE statistics.
`dump`	Dump all PACE statistics.

/stats/snmp
SNMP Statistics

```
SNMP statistics:
snmpInPkts:                 54   snmpInBadVersions:              0
snmpInBadC'tyNames:          0   snmpInBadC'tyUses:              0
snmpInASNParseErrs:          0   snmpEnableAuthTraps:            0
snmpOutPkts:                54   snmpInBadTypes:                 0
snmpInTooBigs:               0   snmpInNoSuchNames:              0
snmpInBadValues:             0   snmpInReadOnlys:                0
snmpInGenErrs:               0   snmpInTotalReqVars:           105
snmpInTotalSetVars:          0   snmpInGetRequests:              2
snmpInGetNexts:             52   snmpInSetRequests:              0
snmpInGetResponses:          0   snmpInTraps:                    0
snmpOutTooBigs:              0   snmpOutNoSuchNames:             2
snmpOutBadValues:            0   snmpOutReadOnlys:               0
snmpOutGenErrs:              0   snmpOutGetRequests:             0
snmpOutGetNexts:             0   snmpOutSetRequests:             0
snmpOutGetResponses:        54   snmpOutTraps:                   0
```

Table 5-49 SNMP Statistics (/stats/snmp)

Statistics	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.
`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.

Table 5-49 SNMP Statistics (/stats/snmp)

Statistics	Description
`snmpEnableAuth Traps`	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.
`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.

Table 5-49 SNMP Statistics (/stats/snmp)

Statistics	Description
`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.
`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.
`snmpOutGet Responses`	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.

/stats/ntp
NTP Statistics

Alteon 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.

```
NTP statistics:
        Primary Server:
                Requests Sent:                17
                Responses Received:           17
                Updates:                      1
        Secondary Server:
                Requests Sent:                0
                Responses Received:           0
                Updates:                      0
```

Table 5-50 NTP Statistics Parameters (/stats/ntp)

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.

/stats/dump
Statistics Dump

Use the dump command to dump all switch statistics available from the Statistics Menu (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 commands.

CHAPTER 6

The Configuration Menu

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.

To make finding information easier, the menu options under the Server Load Balancing Menu (`/cfg/slb`) are in Chapter 7.

/cfg
Configuration Menu

```
[Configuration Menu]
     sys       - System-wide Parameter Menu
     port      - Port Menu
     pmirr     - Port Mirroring Menu
     l2        - Layer 2 Menu
     l3        - Layer 3 Menu
     slb       - Server Load Balancing (Layer 4-7) Menu
     setup     - Step by step configuration set up
     dump      - Dump current configuration to script file
     ptcfg     - Backup current configuration to tftp server
     gtcfg     - Restore current configuration from tftp server
```

Table 6-1 Configuration Menu Options (/cfg)

Command Syntax and Usage
`sys` Displays the System Configuration Menu. To view menu options, see page 167.
`port` *<port alias or number>* Displays the Port Configuration Menu. To view menu options, see page 181.

Table 6-1 Configuration Menu Options (/cfg)

Command Syntax and Usage
`pmirr` Displays the Mirroring Configuration Menu. To view menu options, see page 184.
`l2` Displays the Layer 2 Configuration Menu. To view menu options, see page 186.
`l3` Displays the Layer 3 Configuration Menu. To view menu options, see page 200.
`slb` Displays the Server Load Balancing Configuration Menu. To view menu options, see Chapter 7, “The SLB Configuration Menu”.
`setup` Step-by-step configuration set-up of the switch. For details, see page 249.
`dump` Dumps current configuration to a script file. For details, see page 249.
`ptcfg` *<host name or IP address of TFTP server> <filename on host>* Backs up current configuration to TFTP server. For details, see page 250.
`gtcfg` *<host name or IP address of TFTP server> <filename on host>* Restores current configuration from TFTP server. For details, see page 250.

Viewing, Applying, and Saving Changes

As you use the configuration menus to set switch parameters, the changes you make do not take effect immediately. All changes are considered “pending” until you explicitly apply them. Also, any changes are lost the next time the switch boots unless the changes are explicitly saved.

NOTE – Some operations can override the settings in the Configuration menu. Therefore, settings you view in the Configuration menu (for example, port status) might differ from run-time information that you view in the Information menu or on the management module. The Information menu displays current run-time information of switch parameters.

While configuration changes are in the pending state, you can do the following:

- View the pending changes
- Apply the pending changes
- Save the changes to flash memory

Viewing Pending Changes

You can view all pending configuration changes by entering **`diff`** at the menu prompt.

NOTE – The `diff` command is a global command. Therefore, you can enter **`diff`** at any prompt in the CLI.

Applying Pending Changes

To make your configuration changes active, you must apply them. To apply configuration changes, enter **`apply`** at any prompt in the CLI.

```
# apply
```

NOTE – The `apply` command is a global command. Therefore, you can enter **`apply`** at any prompt in the administrative interface.

NOTE – All configuration changes take effect immediately when applied, except for starting Spanning Tree Group. To turn STG on or off, you must apply the changes, save them (see below), and then reset the switch (see "Resetting the Switch" on page 310).

Saving the Configuration

In addition to applying the configuration changes, you can save them to flash memory on the GbE Switch Module.

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 at any CLI prompt:

```
# save
```

When you save configuration changes, the changes are saved to the *active* configuration block. The configuration being replaced by the save is first copied to the *backup* configuration block. If you do not want the previous configuration block copied to the backup configuration block, enter the following instead:

```
# save n
```

You can decide which configuration you want to run the next time you reset the switch. Your options include:

- The active configuration block
- The backup configuration block
- Factory default configuration

You can view all pending configuration changes that have been applied but not saved to flash memory using the `diff flash` command. It is a global command that can be executed from any menu.

For instructions on selecting the configuration to run at the next system reset, see "Selecting a Configuration Block" on page 309.

/cfg/sys
System Configuration

```
[System Menu]
     syslog   - Syslog Menu
     sshd     - SSH Server Menu
     radius   - RADIUS Authentication Menu
     tacacs   - TACACS+ Authentication Menu
     ntp      - NTP Server Menu
     ssnmp    - System SNMP Menu
     access   - System Access Menu
     date     - Set system date
     time     - Set system time
     idle     - Set timeout for idle CLI sessions
     notice   - Set login notice
     bannr    - Set login banner
     smtp     - Set SMTP host
     hprompt  - Enable/disable display hostname (sysName) in CLI prompt
     bootp    - Enable/disable use of BOOTP
     cur      - Display current system-wide parameters
```

This menu provides configuration of switch management parameters such as user and administrator privilege mode passwords, Web-based management settings, and management access lists.

Table 6-2 System Configuration Menu Options (/cfg/sys)

Command Syntax and Usage
`syslog` Displays the Syslog Menu. To view menu options, see page 169.
`sshd` Displays the SSH Server Menu. To view menu options, see page 170.
`radius` Displays the RADIUS Authentication Menu. To view menu options, see page 171.
`tacacs` Displays the TACACS+ Authentication Menu. To view menu options, see page 172
`ntp` Displays the Network Time Protocol (NTP) Server Menu. To view menu options, see page 174.
`ssnmp` Displays the System SNMP Menu. To view menu options, see page 176.

Table 6-2 System Configuration Menu Options (/cfg/sys)

Command Syntax and Usage
`access` Displays the System Access Menu. To view menu options, see page 178.
`date` Prompts the user for the system date. The date reverts to its default value when the switch is reset.
`time` Configures the system time using a 24-hour clock format. The time reverts to its default value when the switch is reset.
`idle` *<idle timeout in minutes Telnet>* Sets the idle timeout for CLI sessions, from 1 to 60 minutes. The default is 5 minutes.
`notice` *<max 1024 char multi-line login notice> <`'-'` to end>* Displays login notice immediately before the "Enter password:" prompt. This notice can contain up to 1024 characters and new lines.
`bannr` *<string, maximum 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 `/info/sys` command.
`smtp` *<SMTP host name or IP address>* Sets the Simple Mail Transfer Protocol (SMTP) host, which is used for sending bandwidth management history information.
`hprompt disable|enable` Enables or disables displaying of the host name (system administrator's name) in the Command Line Interface (CLI).
`bootp disable|enable` 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. This command is disabled by default.
`cur` Displays the current system parameters.

/cfg/sys/syslog

System Host Log Configuration

```
[Syslog Menu]
     host    - Set IP address of first syslog host
     host2   - Set IP address of second syslog host
     sever   - Set the severity of first syslog host
     sever2  - Set the severity of second syslog host
     facil   - Set facility of first syslog host
     facil2  - Set facility of second syslog host
     console - Enable/disable console output of syslog messages
     log     - Enable/disable syslogging of features
     cur     - Display current syslog settings
```

Table 6-3 System Configuration Menu Options (/cfg/sys/syslog)

Command Syntax and Usage
`host` *<new syslog host IP address (such as, 192.4.17.223)>* Sets the IP address of the first syslog host.
`host2` *<new syslog host IP address (such as, 192.4.17.223)>* Sets the IP address of the second syslog host.
`sever` *<syslog host local severity (0–7)>* This option sets the severity level of the first syslog host displayed. The default is 7, which means log all the seven severity levels.
`sever2` *<syslog host local severity (0–7)>* This option sets the severity level of the second syslog host displayed. The default is 7, which means, log all the seven severity levels.
`facil` *<syslog host local facility (0–7)>* This option sets the facility level of the first syslog host displayed. The default is 0.
`facil2` *<syslog host local facility (0–7)>* This option sets the facility level of the second syslog host displayed. The default is 0.
`console disable`|**`enable`** Enables or 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.
`log` *<feature|all> <enable|disable>* Displays a list of features for which syslog messages can be generated. You can choose to enable/disable specific features (such as vlans, gslb, filter), or enable/disable syslog on all available features.
`cur` Displays the current syslog settings.

/cfg/sys/sshd

SSH Server Configuration Menu

```
[SSHD Menu]
     intrval   - Set Interval for generating the RSA server key
     scpadm    - Set SCP-only admin password
     hkeygen   - Generate the RSA host key
     skeygen   - Generate the RSA server key
     sshport   - Set SSH server port number
     ena       - Enable the SCP apply and save
     dis       - Disable the SCP apply and save
     on        - Turn SSH server ON
     off       - Turn SSH server OFF
     cur       - Display current SSH server configuration
```

For the GbE Switch Module, this menu enables Secure Shell access from any SSH client. SSH scripts can be viewed by using the `/cfg/dump` command (see page 249).

NOTE – Except for `cur`, the commands of this menu are only accessible through the management module interface.

Table 6-4 System Configuration Menu Options (/cfg/sys/sshd)

Command Syntax and Usage
`intrval` *<0 - 24>* Set the interval for auto-generation of the RSA server key.
`scpadm` Set the administration password for SCP access.
`hkeygen` Generate the RSA host key.
`skeygen` Generate the RSA server key.
`sshport` *<TCP port number>* Sets the SSH server port number.
`ena` Enables the SCP apply and save.
`dis` Disables the SCP apply and save.
`on` Enables the SSH server.

Table 6-4 System Configuration Menu Options (/cfg/sys/sshd)

Command Syntax and Usage
`off` Disables the SSH server.
`cur` Displays the current SSH server configuration.

/cfg/sys/radius

RADIUS Server Configuration

```
[RADIUS Server Menu]
     prisrv  - Set primary RADIUS server address
     secsrv  - Set secondary RADIUS server address
     secret  - Set RADIUS secret
     secret2 - Set secondary RADIUS server secret
     port    - Set RADIUS port
     retries - Set RADIUS server retries
     timeout - Set RADIUS server timeout
     telnet  - Enable or disable RADIUS backdoor for telnet
     on      - Turn RADIUS authentication ON
     off     - Turn RADIUS authentication OFF
     cur     - Display current RADIUS configuration
```

Table 6-5 System Configuration Menu Options (/cfg/sys/radius)

Command Syntax and Usage
`prisrv` *<IP address>* Sets the primary RADIUS server address.
`secsrv` *<IP address>* Sets the secondary RADIUS server address.
`secret` *<1-32 character secret>* This is the shared secret between the switch and the RADIUS server(s).
`secret2` *<1-32 character secret>* This is the secondary shared secret between the switch and the RADIUS server(s).
`port` *<RADIUS port configure, default 1645>* Enter the number of the UDP port to be configured, between 1500 - 3000. The default is 1645.
`retries` *<RADIUS server retries (1-3)>* Sets the number of failed authentication requests before switching to a different RADIUS server. The default is 3 requests.

Table 6-5 System Configuration Menu Options (/cfg/sys/radius)

Command Syntax and Usage
`timeout` *<RADIUS server timeout seconds (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.
`telnet disable|enable` Enables or disables the RADIUS backdoor for telnet. The `telnet` command also applies to SSH/SCP connections and the Browser-Based Interface (BBI). The default is `disabled`. To obtain the RADIUS backdoor password for your GbESM, contact your IBM Service and Support line.
`on` Enables the RADIUS server.
`off` Disables the RADIUS server.
`cur` Displays the current RADIUS server parameters.

/cfg/sys/tacacs+

TACACS+ Server Configuration Menu

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 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 decoupled authentication, authorization, and accounting.

```
[TACACS+ Server Menu]
     prisrv    - Set primary TACACS+ server address
     secsrv    - Set secondary TACACS+ server address
     secret    - Set primary TACACS+ server secret
     secret2   - Set secondary TACACS+ server secret
     port      - Set TACACS+ TCP port
     retries   - Set TACACS+ server retries
     timeout   - Set TACACS+ server timeout (seconds)
     telnet    - Enable/disable TACACS+ backdoor for telnet
     cauth     - Enable/disable TACACS+ command authorization
     clog      - Enable/disable TACACS+ command logging
     on        - Turn TACACS+ authentication ON
     off       - Turn TACACS+ authentication OFF
     cur       - Display current TACACS+ configuration
```

Table 6-6 TACACS+ Server Menu Options (/cfg/sys/tacacs)

Command Syntax and Usage
`prisrv` *<IP address>* Defines the primary TACACS+ server address.
`secsrv` *<IP address>* Defines the secondary TACACS+ server address.
`secret` *<1-32 character secret>* This is the shared secret between the switch and the TACACS+ server(s).
`secret2` *<1-32 character secret>* This is the secondary shared secret between the switch and the TACACS+ server(s).
`port` *<TACACS port configure, default 49>* Enter the number of the TCP port to be configured, between 1 - 65000. The default is 49.
`retries` *<TACACS server retries, 1-3>* Sets the number of failed authentication requests before switching to a different TACACS+ server. The default is 3 requests.
`timeout` *<TACACS server timeout seconds, 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.
`telnet disable|enable` Enables or disables the TACACS+ back door for telnet. The `telnet` command also applies to SSH/SCP connections, and the Browser-Based Interface (BBI). The default is `disabled`. To obtain the TACACS+ backdoor password for your GbESM, contact your IBM Service and Support line.

Table 6-6 TACACS+ Server Menu Options (/cfg/sys/tacacs)

Command Syntax and Usage
`cauth disable|enable` Enables or disables TACACS+ command authorization.
`clog disable|enable` Enables or disables TACACS+ command logging.
`on` Enables the TACACS+ server. This is the default setting.
`off` Disables the TACACS+ server.
`cur` Displays current TACACS+ configuration parameters.

/cfg/sys/ntp

NTP Server Configuration

```
[NTP Server Menu]
      prisrv   - Set primary NTP server address
      secsrv   - Set secondary NTP server address
      intrval - Set NTP server resync interval
      tzone    - Set NTP timezone offset from GMT
      dlight   - Enable or disable NTP daylight savings time
      on       - Turn NTP service ON
      off      - Turn NTP service OFF
      cur      - Display current NTP configuration
```

This menu enables you to synchronize the switch clock to a Network Time Protocol (NTP) server. By default, this option is disabled.

Table 6-7 System Configuration Menu Options (/cfg/sys/ntp)

Command Syntax and Usage
`prisrv` *<NTP Server IP address>* Prompts for the IP addresses of the primary NTP server to which you want to synchronize the switch clock.
`secsrv` *<NTP Server IP address>* Prompts for the IP addresses of the secondary NTP server to which you want to synchronize the switch clock.
`intrval` *<resync interval in minutes>* Specifies the interval, that is, how often, in minutes (1-2880), to re-synchronize the switch clock with the NTP server.
`tzone` *<timezone offset, in HH:MM>* Prompts for the NTP time zone offset, in hours and minutes, of the switch you are synchronizing from Greenwich Mean Time (GMT).
`dlight disable|enable` 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.
`on` Enables the NTP synchronization service.
`off` Disables the NTP synchronization service.
`cur` Displays the current NTP service settings.

cfg/sys/ssnmp

System SNMP Menu

```
[System SNMP Menu]
     name      - Set SNMP "sysName"
     locn      - Set SNMP "sysLocation"
     cont      - Set SNMP "sysContact"
     rcomm     - Set SNMP read community string
     wcomm     - Set SNMP write community string
     trap1     - Set first SNMP trap host address
     trap2     - Set second SNMP trap host address
     t1comm    - Set community string for first trap host
     t2comm    - Set community string for second trap host
     timeout   - Set timeout for the SNMP state machine
     auth      - Enable/disable SNMP "sysAuthenTrap"
     linkt     - Enable/disable SNMP link up/down trap
     cur       - Display current system SNMP configuration
```

The Alteon OS software supports SNMP-based network management. 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)

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 hosts
- Trap community strings

Table 6-8 System SNMP Menu Options (/cfg/sys/ssnmp)

Command Syntax and Usage
`name` *<new string, maximum 64 characters>* Configures the name for the system. The name can have a maximum of 64 characters.
`locn` *<new string, maximum 64 characters>* Configures the name of the system location. The location can have a maximum of 64 characters.
`cont` *<new string, maximum 64 characters>* Configures the name of the system contact. The contact can have a maximum of 64 characters.
`rcomm` *<new SNMP read community string, maximum 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*.
`wcomm` *<new SNMP write community string, maximum 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*.
`trap1` *<new SNMP trap host IP address (such as, 192.4.17.101)>* Configures the IP address of the first SNMP trap host using dotted decimal notation. The SNMP trap host is the device that receives SNMP trap messages from the switch.
`trap2` *<new SNMP trap host IP address (such as, 192.4.17.101)>* Configures the IP address of the second SNMP trap host using dotted decimal notation.
`t1comm` *<new trap host community string, maximum 32 characters>* Configures the community string for the first trap host. The default community string for the first trap host is *public*.
`t2comm` *<new trap host community string, maximum 32 characters>* Configures the community string for the second trap host. The default community string for the second trap host is *public*.

Table 6-8 System SNMP Menu Options (/cfg/sys/ssnmp)

Command Syntax and Usage
`timeout` Set the timeout value for the SNMP state machine.
`auth disable|enable` Enables or disables the use of the system authentication trap facility. The default setting is disabled.
`linkt` <*port*> [**`disable|enable`**] Enables or disables the sending of SNMP link up and link down traps. The default setting is enabled.
`cur` Displays the current SNMP configuration.

cfg/sys/access

System Access Menu

```
[System Access Menu]
     user      - User Access Control Menu (passwords)
     http      - Enable/disable HTTP (Web) access
     wport     - Set HTTP (Web) server port number
     mnet      - Set management network
     mmask     - Set management netmask
     snmp      - Set SNMP access control
     tnet      - Enable/disable Telnet access
     tnport    - Set Telnet server port number
     cur       - Display current system access configuration
```

Table 6-9 System Configuration Menu Options (/cfg/sys/access)

Command Syntax and Usage
`user` Displays the User Access Control Menu. To view menu options, see page 179.
`http disable|enable` Enables or disables HTTP (Web) access to the Browser-Based Interface. It is enabled by default.
`wport` <*TCP port number (1-65535)*> Sets the switch port used for serving switch Web content. The default is HTTP port 80. If Global Server Load Balancing is to be used, set this to a different port (such as 8080).

Table 6-9 System Configuration Menu Options (/cfg/sys/access)

Command Syntax and Usage
`mnet` *<IP subnet (such as 192.4.17.0)>* Sets the base source IP address that allows access to switch management through Telnet, SNMP, RIP, or the Alteon OS Browser-Based Interface. A range of IP addresses is produced when used with `mmask` (below). Specify an IP address in dotted-decimal notation.
`mmask` *<IP subnet mask (such as 255.255.0.0)>* This IP address mask is used with `mnet` to set a range of source IP addresses allowed access to switch management functions. Specify the mask in dotted-decimal notation.
`snmp disable`|**`read-only`**|**`read-write`** Disables or provides read-only/write-read SNMP access.
`tnet` Enables or disables telnet access.This command is enabled by default. You will see this command only if you are connected to the switch through the management module.
`tnport` *<TCP port number>* Sets an optional telnet server port number for cases where the server listens for telnet sessions on a non-standard port.
`cur` Displays the current system access parameters.

/cfg/sys/access/user

User Access Control Configuration

```
[User Access Control Menu]
      usrpw    - Set user password (user)
      sopw     - Set SLB operator password (slboper)
      l4opw    - Set L4 operator password (l4oper)
      opw      - Set operator password (oper)
      sapw     - Set Slb administrator password (slbadmin)
      l4apw    - Set L4 administrator password (l4admin)
      admpw    - Set administrator password (admin)
      cur      - Display current user statistics
```

NOTE – Passwords can be a maximum of 15 characters.

Table 6-10 User Access Control Menu Options (/cfg/sys/user)

Command Syntax and Usage
`usrpw` Sets the user (`user`) password. The user has no direct responsibility for switch management. He or she can view switch status information and statistics, but cannot make any configuration changes.
`sopw` Sets the SLB operator (`slboper`) password. The SLB operator manages Web servers and other Internet services and their loads. He or she can view all switch information and statistics and can enable/disable servers using the Server Load Balancing configuration menus. Access includes "`user`" functions.
`l4opw` Sets the Layer 4 operator (`l4oper)` password. The Layer 4 operator manages traffic on the lines leading to the shared Internet services. He or she can view all switch information and statistics. Access includes "`slboper`" functions.
`opw` Sets the operator (`oper)` password. The operator password can have a maximum of 15 characters. The operator manages all functions of the switch. He or she can view all switch information and statistics and can reset ports or the entire switch. Access includes "`l4oper`" functions.
`sapw` Sets the SLB administrator (`slbadmin`) password. Administrator who configures and manages Web servers and other Internet services and their loads. He or she can view all switch information and statistics, but can configure changes only on the Server Load Balancing menus. Note that the Filter Menu options are not accessible to the SLB administrator. Access includes "`l4oper`" functions.
`l4apw` Sets the Layer 4 administrator (`l4admin`) password. The Layer 4 administrator configures and manages traffic on the lines leading to the shared Internet services. He or she can view all switch information and statistics and can configure parameters on the Server Load Balancing menus, with the exception of not being able to configure filters. Access includes "`slbadmin`" functions.

Table 6-10 User Access Control Menu Options (/cfg/sys/user)

Command Syntax and Usage

`admpw`

Sets the administrator (`admin`) password. The super user administrator has complete access to all menus, information, and configuration commands on the GbE Switch Module, including the ability to change both the user and administrator passwords.

Access includes “`oper`” and “`l4admin`” functions.

`cur`

Displays the current user status.

`/cfg/port` *<port alias or number>* Port Configuration

```
[Port INT1 Menu]
      gig     - Gig Phy Menu
      pvid    - Set default port VLAN id
      name    - Set port name
      rmon    - Enable/Disable RMON for port
      tag     - Enable/disable VLAN tagging for port
      iponly  - Enable/disable allowing only IP related frames
      fastfwd - Enable/disable Port Fast Forwarding mode
      ena     - Enable port
      dis     - Disable port
      cur     - Display current port configuration
```

The Port Menu enables you to configure settings for individual switch ports (except MGT1 and MGT2). This command is enabled by default.

Table 6-11 Port Configuration Menu Options (/cfg/port)

Command Syntax and Usage

`gig`

If a port is configured to support Gigabit Ethernet, this option displays the Gigabit Ethernet Physical Link Menu. To view menu options, see page 183.

`pvid` *<VLAN number, 1-4095>*

Sets the default VLAN number which will be used to forward frames which are not VLAN tagged. The default number is 1 for non-management ports.

Table 6-11 Port Configuration Menu Options (/cfg/port)

Command Syntax and Usage
`name` *<64 character string>*|**`none`** Sets a name for the port. The assigned port name appears next to the port number on some information and statistics screens. The default is set to None.
`rmon disable|enable` Disables or enables RMON for this port. It is disabled by default.
`tag disable|enable` Disables or enables VLAN tagging for this port. It is disabled by default.
`iponly disable|enable` Disables or enables allowing only IP-related frames. It is disabled by default.
`fastfwd disable|enable` Disables or enables Port Fast Forwarding, which permits a port that participates in Spanning Tree to bypass the Listening and Learning states and enter directly into the Forwarding state. While in the Forwarding state, the port listens to the BPDUs to learn if there is a loop and, if dictated by normal STG behavior (following priorities, etc.), the port transitions into the Blocking state. This feature permits the GbESM to interoperate well within Rapid Spanning Tree networks.
`ena` Enables the port.
`dis` Disables the port. (To temporarily disable a port without changing its configuration attributes, refer to “Temporarily Disabling a Port” on page 184.)
`cur` Displays current port parameters.

/cfg/port *<port alias or number>* gig

Port Link Configuration

```
[Gigabit Link Menu]
     speed    - Set link speed
     mode     - Set full or half duplex mode
     fctl     - Set flow control
     auto     - Set auto negotiation
     cur      - Display current gig link configuration
```

Use these menu options to set port parameters for the port link.

NOTE – Since the `speed` and `mode` parameters cannot be set for Gigabit Ethernet ports, these options do not appear on the Gigabit Link Menu.

Link menu options are described in Table 6-12 and appear on the `gig` port configuration menu for the GbE Switch Module. Using this configuration menu, you can set port parameters such as speed, flow control, and negotiation mode for the port link.

Table 6-12 Port Link Configuration Menu Options (/cfg/port *<alias or number>* gig)

Command Syntax and Usage
`speed 10|100|any` Sets the link speed. Not all options are valid on all ports. The choices include: ■ "Any," for automatic detection (default) ■ 10 Mbps ■ 100 Mbps
`mode full|half|any` Sets the operating mode. The choices include: ■ "Any," for auto negotiation (default) ■ Full-duplex ■ Half-duplex
`fctl rx|tx|both|none` Sets the flow control. The choices include: ■ Receive flow control ■ Transmit flow control ■ Both receive and transmit flow control (default) ■ No flow control
`auto on|off` Enables or disables auto negotiation for the port.

Table 6-12 Port Link Configuration Menu Options (/cfg/port *<alias or number>* gig)

Command Syntax and Usage
`cur` Displays current port parameters.

Temporarily Disabling a Port

To temporarily disable a port without changing its stored configuration attributes, enter the following command at any prompt:

```
Main# /oper/port <port alias or number>/dis
```

Because this configuration sets a temporary state for the port, you do not need to use `apply` or `save`. The port state will revert to its original configuration when the GbE Switch Module is reset. See the "Operations Menu" on page 299 for other operations-level commands.

/cfg/pmirr
Port Mirroring Menu

```
[Port Mirroring Menu]
      mirror   - Enable/Disable Mirroring
      monport  - Monitoring Port based PM Menu
      cur      - Display All Mirrored and Monitoring Ports
```

Port mirroring is disabled by default. For more information about port mirroring on the GbE Switch Module, see "Appendix A: Troubleshooting" in the *Alteon OS Application Guide*.

NOTE – Traffic on VLAN 4095 is not mirrored to the external ports.

The Port Mirroring Menu is used to configure, enable, and disable the monitored 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 6-13 Port Mirroring menu options (/cfg/pmirr)

Command Syntax and Usage
`mirror disable|enable` Enables or disables port mirroring
`monport` *<port alias or number>* Displays port-mirroring menu. To view menu options, see page 185.
`cur` Displays current settings of the mirrored and monitoring ports.

/cfg/pmirr/monport

Port-Mirroring Menu

```
[Port EXT1 Menu]
     add       - Add "Mirrored" port and VLANs
     rem       - Rem "Mirrored" port and VLANs
     delete    - Delete this "Monitor" port
     cur       - Display current Port Mirroring configuration
```

Table 6-14 Port-Based Port-Mirroring Menu Options (/cfg//pmirr/monport)

Command Syntax and Usage

`add` *<mirrored port (port to mirror from)> <direction (in, out, or both)> <vlan index or Carriage Return for all vlans>*

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 mirrored 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.

VLAN-based port mirroring allows the user to monitor traffic based on VLANs associated with a port. You can add specific VLAN(s) to a be monitored even if there are multiple VLANs associated with that port. If you do not specify a VLAN, all traffic on that port will be mirrored.

`rem` *<mirrored port (port to mirror from)> <vlan index or Carriage Return for all vlans>*

Removes the mirrored port.

`delete`

Deletes this monitor port.

`cur`

Displays the current settings of the monitoring port.

/cfg/l2
Layer 2 Menu

```
[Layer 2 Menu]
     stg       - Spanning Tree Menu
     trunk     - Trunk Group Menu
     thash     - IP Trunk Hash Menu
     lacp      - Link Aggregation Control Protocol Menu
     vlan      - VLAN Menu
     upfast    - Enable/disable Uplink Fast
     update    - UplinkFast station update rate
     cur       - Display current layer 2 parameters
```

Table 6-15 Configuration Menu Options (/cfg/l2)

Command Syntax and Usage
`stg` *<group number [1-16]>* Displays the Spanning Tree Configuration Menu. To view menu options, see page 188.
`trunk` *<trunk group number (1-2)>* Displays the Trunk Group Configuration Menu. To view menu options, see page 192.
`thash` Displays the IP Trunk Hash Menu. To view menu options, see page 193.
`lacp` Displays the Link Aggregation Control Protocol Menu. To view menu options, see page 196.
`vlan` *<VLAN number (1-4095)>* Displays the VLAN Configuration Menu. To view menu options, see page 198.
`upfast` Enables or disables Fast Uplink Convergence, which provides rapid Spanning Tree convergence to an upstream switch during failover. **Note**: When enabled, this feature increases bridge priorities to 65500 for all STGs and path cost by 3000 for all external STP ports.
`update` *<10-200>* Configures the station update rate for Fast Uplink convergence, in packets per second. The default value is 40.
`cur` Displays current Layer 2 parameters.

/cfg/l2/stg

Spanning Tree Configuration

```
[Spanning Tree Group 1 Menu]
      brg     - Bridge parameter menu
      port    - Port parameter menu
      add     - Add VLAN(s) to Spanning Tree Group
      remove  - Remove VLAN(s) from Spanning Tree Group
      clear   - Remove all VLANs from Spanning Tree Group
      on      - Globally turn Spanning Tree ON
      off     - Globally turn Spanning Tree OFF
      default - Default Spanning Tree and Member parameters
      cur     - Display current bridge parameters
```

Alteon OS supports the IEEE 802.1d Spanning Tree Protocol (STP). STG is used to prevent loops in the network topology. There are 16 spanning tree groups that can be configured on the switch (STG 16 is reserved for management). This command is turned on by default.

NOTE – When VRRP is used for active/active redundancy, STG must be enabled.

Table 6-16 Spanning Tree Configuration Menu (/cfg/l2/stg)

Command Syntax and Usage
`brg` Displays the Bridge Spanning Tree Menu. To view menu options, see page 189.
`port` *<port alias or number>* Displays the Spanning Tree Port Menu. To view menu options, see page 191.
`add` *<VLAN number (1-4095)>* Associates a VLAN with a spanning tree and requires an external VLAN ID as a parameter.
`remove` *<VLAN number (1-4095)>* Breaks the association between a VLAN and a spanning tree and requires an external VLAN ID as a parameter.
`clear` Removes all VLANs from a spanning tree.
`on` Globally enables Spanning Tree Protocol.
`off` Globally disables Spanning Tree Protocol.

Table 6-16 Spanning Tree Configuration Menu (/cfg/l2/stg)

Command Syntax and Usage
`default` Restores a spanning tree instance to its default configuration.
`cur` Displays current Spanning Tree Protocol parameters.

/cfg/l2/stg/brg

Bridge Spanning Tree Configuration

```
[Bridge Spanning Tree Menu]
      prior   - Set bridge Priority [0-65535]
      hello   - Set bridge Hello Time [1-10 secs]
      mxage   - Set bridge Max Age (6-40 secs)
      fwd     - Set bridge Forward Delay (4-30 secs)
      aging   - Set bridge Aging Time (1-65535 secs, 0 to disable)
      cur     - Display current bridge parameters
```

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
- Bridge aging time

Table 6-17 Bridge Spanning Tree Menu Options (/cfg/l2/stg/brg)

Command Syntax and Usage
`prior` *<new 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 range is 0 to 65535, and the default is 32768.
`hello` *<new bridge hello time (1-10 secs)>* 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.
`mxage` *<new bridge max age (6-40 secs)>* 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.
`fwd` *<new bridge Forward Delay (4-30 secs)>* 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.
`aging` *<new bridge Aging Time (1-65535 secs, 0 to disable)>* Configures the forwarding database aging time. The aging time specifies the amount of time the bridge waits without receiving a packet from a station before removing the station from the forwarding database. The range is 1 to 65535 seconds, and the default is 300 seconds. To disable aging, set this parameter to 0.
`current` Displays the current bridge STG parameters.

When configuring STG bridge parameters, the following formulas must be used:

- $2*(fwd-1) \geq mxage$
- $2*(hello+1) \leq mxage$

`/cfg/l2/stg` *<STP Group Index>*`/port` *<port alias or number>*

Spanning Tree Port Configuration

```
[Spanning Tree Port EXT1 Menu]
      prior    - Set port Priority (0-255)
      cost     - Set port Path Cost (1-65535, 0 for default)
      on       - Turn port's Spanning Tree ON
      off      - Turn port's Spanning Tree OFF
      cur      - Display current port Spanning Tree parameters
```

Spanning Tree port parameters are used to modify STG operation on an individual port basis. STG port parameters include:

- Port priority
- Port path cost

The **`port`** option of STG is turned on by default.

Table 6-18 Spanning Tree Port Menu (/cfg/l2/stg/port)

Command Syntax and Usage
`prior` *<new port Priority (0-255)>* 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 range is 0 to 255, and the default is 128.
`cost` *<new port Path Cost (1-65535, 0 for default)>* Configures the port path cost. The port path cost is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. The range is 1 to 65535. The default is 10 for 100Mbps ports, and 1 for Gigabit ports. A value of 0 indicates that the default cost will be computed for an auto negotiated link speed.
`on` Enables STG on the port.
`off` Disables STG on the port.
`cur` Displays the current STG port parameters.

/cfg/l2/trunk *<trunk group number>*

Trunk Configuration

```
[Trunk group 1 Menu]
     add     - Add port to trunk group
     rem     - Remove port from trunk group
     failovr - Enable/disable failover support
     ena     - Enable trunk group
     dis     - Disable trunk group
     del     - Delete trunk group
     cur     - Display current Trunk Group configuration
```

Trunk groups can provide super-bandwidth connections between GbE Switch Modules 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 2 trunk groups can be configured on the GbE Switch Module, with the following restrictions:

- Any physical switch port can belong to no more than one trunk group.
- Up to four ports/trunks can belong to the same trunk group.
- Best performance is achieved when all ports in a trunk are configured for the same speed.
- Trunking from non-Alteon devices must comply with Cisco® EtherChannel® technology.

By default, the trunk group is empty and disabled.

Table 6-19 Trunk Configuration Menu Options (/cfg/l2/trunk)

Command Syntax and Usage
`add` *<port alias or number (EXT1-EXT4)>* Adds a physical port to the current trunk group.
`rem` *<port alias or number (EXT1-EXT4)>* Removes a physical port from the current trunk group.
`failovr` Sets trunk group failover to enabled or disabled.
`ena` Enables the current trunk group.
`dis` Turns the current trunk group off.
`del` Removes the current trunk group configuration.
`cur` Displays current trunk group parameters.

/cfg/l2/thash

IP Trunk Hash menu

```
[IP Trunk Hash Menu]
     l2        - L2 IP Trunk Hash Settings Menu
     l3        - L3 IP Trunk Hash Settings Menu
     cur       - Display current IP trunk hash configuration
```

Use the following commands to configure IP trunk hash settings for the GbESM.

Table 6-20 IP Trunk Hash commands (/cfg/l2/thash)

Command Syntax and Usage
`l2` Displays the layer 2 Trunk Hash Settings menu. To view menu options, see page 193.
`l3` Displays the layer 3 Trunk Hash Settings menu. To view menu options, see page 194.
`cur` Display current trunk hash configuration.

/cfg/l2/thash/l2

Layer 2 IP Trunk Hash menu

```
[l2 IP Trunk Hash Settings Menu]
     smac      - Enable/disable smac hash
     dmac      - Enable/disable dmac hash
     sip       - Enable/disable sip hash
     dip       - Enable/disable dip hash
     cur       - Display current trunk hash setting
```

Trunk hash parameters are set globally for the GbE Switch Module. You can enable one or two parameters, to configure any of the following valid combinations:

- SMAC (source MAC only)
- DMAC (destination MAC only)
- SIP (source IP only)
- DIP (destination IP only)
- SIP + DIP (source IP and destination IP)

- SMAC + DMAC (source MAC and destination MAC)
- SMAC + SIP (source MAC and source IP)
- SMAC + DIP (source MAC and destination IP)

Use the following commands to configure layer 2 IP trunk hash parameters for the GbESM.

Table 6-21 Layer 2 IP Trunk Hash commands (/cfg/l2/thash/l2)

Command Syntax and Usage
`smac enable|disable` Enable or disable trunk hashing on the source MAC.
`dmac enable|disable` Enable or disable trunk hashing on the destination MAC.
`sip enable|disable` Enable or disable trunk hashing on the source IP.
`dip enable|disable` Enable or disable trunk hashing on the destination IP.
`cur` Display current layer 2 trunk hash setting.

/cfg/l2/thash/l3

Layer 3 IP Trunk Hash menu

```
[l3 IP Trunk Hash Settings Menu]
     smac     - Enable/disable smac hash
     dmac     - Enable/disable dmac hash
     sip      - Enable/disable sip hash
     dip      - Enable/disable dip hash
     cur      - Display current trunk hash setting
```

Use the following commands to configure layer 3 IP trunk hash settings for the GbESM.

Table 6-22 Layer 3 IP Trunk Hash commands (/cfg/l2/thash/l3)

Command Syntax and Usage
`smac enable|disable` Enable or disable trunk hashing on the source MAC.
`dmac enable|disable` Enable or disable trunk hashing on the destination MAC.
`sip enable|disable` Enable or disable trunk hashing on the source IP.
`dip enable|disable` Enable or disable trunk hashing on the destination IP.
`cur` Display current layer 3 trunk hash setting.

/cfg/l2/lacp

Link Aggregation Control Protocol menu

```
[LACP Menu]
     sysprio   - Set LACP system priority
     timeout   - Set LACP system timeout scale for timing out partner
                 info
     port      - LACP port Menu
     cur       - Display current LACP configuration
```

Use the following commands to configure Link Aggregation Control Protocol (LACP) for the GbESM.

Table 6-23 Link Aggregation Control Protocol (/cfg/l2/lacp)

Command Syntax and Usage
`sysprio` *<1-65535>* Defines the priority value for the GbESM. Lower numbers provide higher priority. The default value is 32768.
`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**: Nortel Networks recommends that you use a timeout value of **`long`**, to reduce LACPDU processing. If your GbESM's CPU utilization rate remains at 100% for periods of 90 seconds or more, consider using static trunks instead of LACP.
`port` *<port alias or number>* Displays the LACP Port menu. To view menu options, see page 196.
`cur` Display current LACP configuration.

/cfg/l2/lacp/port *<port alias or number>*

LACP Port menu

```
[LACP Port EXT1 Menu]
     mode      - Set LACP mode
     prio      - Set LACP port priority
     adminkey  - Set LACP port admin key
     cur       - Display current LACP port configuration
```

Use the following commands to configure Link Aggregation Control Protocol (LACP) for the selected port.

Table 6-24 Link Aggregation Control Protocol (/cfg/l2/lacp/port)

Command Syntax and Usage
`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.
`prio` *<1-65535>* Sets the priority value for the selected port. Lower numbers provide higher priority. Default is 128.
`adminkey` *<1-65535>* Set the admin key for this port. Only ports with the same admin key and oper key (operational state) can form a LACP trunk group.
`cur` Displays the current LACP configuration for this port.

/cfg/l2/vlan <*VLAN number*>
VLAN Configuration

```
[VLAN 1 Menu]
      name     - Set VLAN name
      stg      - Assign VLAN to a Spanning Tree Group
      add      - Add port to VLAN
      rem      - Remove port from VLAN
      def      - Define VLAN as list of ports
      jumbo    - Enable/disable Jumbo Frame support
      ena      - Enable VLAN
      dis      - Disable VLAN
      del      - Delete VLAN
      cur      - Display current VLAN configuration
```

The commands in this menu configure VLAN attributes, change the status of the VLAN, delete the VLAN, and change the port membership of the VLAN. For more information on configuring VLANs, see "Setup Part 3: VLANs" on page 33.

By default, the VLAN menu option is disabled except VLAN 1, which is enabled all the time. Internal server ports (INTx) and external ports (EXT1-EXT4) are in VLAN 1 by default.

Table 6-25 VLAN Configuration Menu Options (/cfg/l2/vlan)

Command Syntax and Usage
`name` Assigns a name to the VLAN or changes the existing name. The default VLAN name is the first one.
`stg` <*Spanning Tree Group index [1-16]*> Assigns a VLAN to a Spanning Tree Group.
`add` <*port alias or number*> Adds port(s) or trunk group(s) to the VLAN membership.
`rem` <*port alias or number*> Removes port(s) or trunk group(s) from this VLAN.
`def` <*list of port numbers*> Defines which ports are members of this VLAN. Every port must be a member of at least one VLAN. By default, internal server ports (INTx) and external ports (EXT1-EXT4) are in VLAN 1.
`jumbo` Define support for jumbo frames (enable/disable).

Table 6-25 VLAN Configuration Menu Options (/cfg/l2/vlan)

Command Syntax and Usage
`ena` Enables this VLAN.
`dis` Disables this VLAN without removing it from the configuration.
`del` Deletes this VLAN.
`cur` Displays the current VLAN configuration.

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 (see the `tag` command on page 181).

/cfg/l3
Layer 3 Menu

```
[Layer 3 Menu]
     if        - Interface Menu
     gw        - Default Gateway Menu
     route     - Static Route Menu
     frwd      - Forwarding Menu
     nwf       - Network Filters Menu
     rmap      - Route Map Menu
     rip1      - Routing Information Protocol Menu
     ospf      - Open Shortest Path First (OSPF) Menu
     bgp       - Border Gateway Protocol Menu
     igmp      - IGMP Menu
     port      - IP Port Menu
     dns       - Domain Name System Menu
     bootp     - Bootstrap Protocol Relay Menu
     vrrp      - Virtual Router Redundancy Protocol Menu
     rtrid     - Set router ID
     metrc     - Set default gateway metric
     cur       - Display current IP configuration
```

Table 6-26 Configuration Menu Options (/cfg/l3)

Command Syntax and Usage
`if` *<interface number (1-128)>* Displays the IP Interface Menu. To view menu options, see page 202.
`gw` *<default gateway number (1-132)>* Displays the IP Default Gateway Menu. To view menu options, see page 203.
`route` Displays the IP Static Route Menu. To view menu options, see page 205.
`frwd` Displays the IP Forwarding Menu. To view menu options, see page 206.
`nwf` *<Network filter number [1-256]>* Displays the Network Filter Configuration Menu. To view menu options see page 208.
`rmap` *<route map number [1-32]>* Displays the Route Map Menu. To view menu options see page 209.
`rip1` Displays the Routing Interface Protocol version 1 Menu. To view menu options, see page 213.

Table 6-26 Configuration Menu Options (/cfg/l3)

Command Syntax and Usage
`ospf` Displays the OSPF Menu. To view menu options, see page 215.
`bgp` Displays the Border Gateway Protocol Menu. To view menu options, see page 224.
`igmp` Displays the IGMP Menu. To view menu options, see page 230.
`port` *<port alias or number>* Displays the IP Port Menu. To view menu options, see page 233.
`dns` Displays the IP Domain Name System Menu. To view menu options, see page 234.
`bootp` Displays the Bootstrap Protocol Menu. To view menu options, see page 235.
`vrrp` Displays the Virtual Router Redundancy Configuration Menu. To view menu options, see page 236.
`rtrid` *<<IP address (such as, 192.4.17.101)>* Sets the router ID.
`metrc strict|roundrobin` Sets the default gateway metric for `strict` or `roundrobin`. The default gateway metric is `strict`. For more information on gateway metrics, see page 248.
`cur` Displays the current IP configuration.

`/cfg/l3/if` *<interface number>*

IP Interface Configuration

```
[IP Interface 1 Menu]
      addr    - Set IP address
      mask    - Set subnet mask
      vlan    - Set VLAN number
      relay   - Enable or disable BOOTP relay
      ena     - Enable interface
      dis     - Disable interface
      del     - Delete interface
      cur     - Display current interface configuration
```

The GbE Switch Module can be configured with up to 128 IP interfaces. Each IP interface represents the GbE Switch Module on an IP subnet on your network. The Interface option is disabled by default.

NOTE – To maintain connection between the management module and the GbE Switch Module, use the management module interface to change the IP address of the switch.

Table 6-27 IP Interface Menu Options (/cfg/l3/if)

Command Syntax and Usage
`addr` *<IP address (such as 192.4.17.101)>* Configures the IP address of the switch interface using dotted decimal notation.
`mask` *<IP subnet mask (such as 255.255.255.0)>* Configures the IP subnet address mask for the interface using dotted decimal notation.
`vlan` *<VLAN number (1-4095)>* Configures the VLAN number for this interface. Each interface can belong to one VLAN, though any VLAN can have multiple IP interfaces in it.
`relay disable|enable` Enables or disables the BOOTP relay on this interface. It is enabled by default.
`ena` Enables this IP interface.
`dis` Disables this IP interface.

Table 6-27 IP Interface Menu Options (/cfg/l3/if)

Command Syntax and Usage
`del` Removes this IP interface.
`cur` Displays the current interface settings.

`/cfg/l3/gw` *<gateway number>*

Default Gateway Configuration

```
[Default gateway 1 Menu]
      addr     - Set IP address
      intr     - Set interval between ping attempts
      retry   - Set number of failed attempts to declare gateway DOWN
      vlan     - Set VLAN number
      arp      - Enable/disable ARP only health checks
      ena      - Enable default gateway
      dis      - Disable default gateway
      del      - Delete default gateway
      cur      - Display current default gateway configuration
```

NOTE – The switch can be configured with up to 132 gateways. Gateways one to four are reserved for default gateway load balancing. Gateway 132 is reserved for the management VLAN.

This option is disabled by default.

Table 6-28 Default Gateway Options (/cfg/l3/gw)

Command Syntax and Usage
`addr` *<default gateway address (such as, 192.4.17.44)>* Configures the IP address of the default IP gateway using dotted decimal notation.
`intr` *<0-60 seconds>* The switch pings the default gateway to verify that it's up. The `intr` option sets the time between health checks. The range is from 1 to 120 seconds. The default is 2 seconds.
`retry` *<number of attempts (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.

Table 6-28 Default Gateway Options (/cfg/l3/gw)

Command Syntax and Usage
`vlan` *<VLAN number (1-4095)>* Sets the VLAN to be assigned to this default IP gateway.
`arp disable|enable` Enables or disables Address Resolution Protocol (ARP) health checks. This command is disabled by default.
`ena` Enables the gateway for use.
`dis` Disables the gateway.
`del` Deletes the gateway from the configuration.
`cur` Displays the current gateway settings.

Default Gateway Metrics

For information about configuring which gateway is selected when multiple default gateways are enabled, see page 204.

/cfg/l3/route

IP Static Route Configuration

```
[IP Static Route Menu]
     add      - Add static route
     rem      - Remove static route
     cur      - Display current static routes
```

Up to 128 static routes can be configured.

Table 6-29 IP Static Route Configuration Menu Options (cfg/l3/route)

Command Syntax and Usage
`add` *<destination>* *<mask>* *<gateway>* *<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.
`rem` *<destination>* *<mask>* Removes a static route. The destination address of the route to remove must be specified using dotted decimal notation.
`cur` Displays the current IP static routes.

/cfg/l3/frwd

IP Forwarding Configuration

```
[IP Forwarding Menu]
      local    - Local network definition for route caching menu
      dirbr    - Enable or disable forwarding directed broadcasts
      on       - Globally turn IP Forwarding ON
      off      - Globally turn IP Forwarding OFF
      cur      - Display current IP Forwarding configuration
```

Table 6-30 IP Forwarding Configuration Menu Options (/cfg/l3/frwd)

Command Syntax and Usage
local Displays the menu used to define local network for route caching. Up to five local networks (lnets) can be configured. To view menu options, see page 206.
dirbr disable|enable Enables or disables forwarding directed broadcasts. This command is disabled by default.
on Enables IP forwarding (routing) on the GbE Switch Module.
off Disables IP forwarding (routing) on the GbE Switch Module. Forwarding is turned off by default.
cur Displays the current IP forwarding settings.

/cfg/l3/frwd/local

Local Network Route Caching Definition

```
[IP Local Networks Menu]
      add      - Add local network definition
      rem      - Remove local network definition
      cur      - Display current local network definitions
```

Table 2 IP Local Networks Menu Options (/cfg/l3/frwd/local)

Command Syntax and Usage
add *<Local Network Address> <Local Network Mask>* Adds a definition for a local network. For details, see "Defining IP Address Ranges for the Local Route Cache" below.
rem *<Local Network Address> <Local Network Mask>* Removes a definition for a local network.
cur Displays the current local network definitions.

This menu is used for adding local networks by setting the local network address and netmask for the route cache, and to remove local networks.

Defining IP Address Ranges for the Local Route Cache

The Local Route Cache lets you use switch resources more efficiently, by reducing the size of the ARP table on the GbE Switch Module. The `/cfg/l3/frwd/local/add` parameters define a range of addresses that will be cached on the GbE Switch Module. The local network address is used to define the base IP address in the range which will be cached, and the local network mask is the mask which is applied to produce the range. To determine if a route should be added to the memory cache, the destination address is masked (bitwise AND) with the local network mask and checked against the local network address.

By default, the local network address and mask are both set to 0.0.0.0. This produces a range that includes all Internet addresses for route caching: 0.0.0.0 through 255.255.255.255.

Addresses to be cached are subnets that are directly connected and for which there is an interface configured on the GbE Switch Module. To limit the route cache to your local hosts, you could configure the parameters as shown in the examples in the following table.

Table 6-31 Local Routing Cache Address Ranges

Local Host Address Range	Address	Mask
0.0.0.0 - 127.255.255.255	0.0.0.0	128.0.0.0
128.0.0.0 - 255.255.255.255	128.0.0.0	128.0.0.0
205.32.0.0 - 205.32.255.255	205.32.0.0	255.255.0.0

NOTE – All addresses that fall outside the defined range are forwarded to the default gateway. The default gateways must be within range.

/cfg/l3/nwf

Network Filter Configuration

```
[IP Network Filter 1 Menu]
      addr    - IP Address
      mask    - IP Subnet mask
      enable  - Enable Network Filter
      disable - Disable Network Filter
      delete  - Delete Network Filter
      cur     - Display current Network Filter configuration
```

Table 6-32 IP Network Filter Menu Options (/cfg/l3/nwf)

Command Syntax and Usage
`addr` *<IP address, such as 192.4.17.44>* Sets the starting IP address for this filter. The default address is 0.0.0.0.
`mask` *<subnet mask, such as 255.255.255.0>* Sets the IP subnet mask that is used with `/cfg/l3/nwf/addr` to define the range of IP addresses that will be accepted by the peer when the filter is enabled. The default value is 0.0.0.0. For Border Gateway Protocol (BGP), assign the network filter to a route map, then assign the route map to the peer.
`enable` Enables the Network Filter configuration.
`disable` Disables the Network Filter configuration.
`delete` Deletes the Network Filter configuration.
`cur` Displays the current the Network Filter configuration.

/cfg/l3/rmap *<route map number>*

Routing Map Configuration

NOTE – The *map number* (1-32) represents the routing map you wish to configure.

```
[IP Route Map 1 Menu]
      alist    - Access List number
      aspath   - AS Filter Menu
      ap       - Set as-path prepend of the matched route
      lp       - Set local-preference of the matched route
      metric   - Set metric of the matched route
      type     - Set OSPF metric-type of the matched route
      prec     - Set the precedence of this route map
      weight   - Set weight of the matched route
      enable   - Enable route map
      disable  - Disable route map
      delete   - Delete route map
      cur      - Display current route map configuration
```

Routing maps control and modify routing information.

Table 6-33 Routing Map Menu Options (/cfg/l3/rmap)

Command Syntax and Usage
alist *<number 1-8>* Displays the Access List menu. For more information, see page 211.
aspath *<number 1-8>* Displays the Autonomous System (AS) Filter menu. For more information, see page 212.
ap *<AS number> [<AS number>] [<AS number>]* | **none** Sets the AS path preference of the matched route. One to three path preferences can be configured.
lp *<(0-4294967294)>* | **none** Sets the local preference of the matched route, which affects both inbound and outbound directions. The path with the higher preference is preferred.
metric *<(0-4294967294)>* | **none** Sets the metric of the matched route.

Table 6-33 Routing Map Menu Options (/cfg/l3/rmap) (Continued)

Command Syntax and Usage
`type` *<value (1|2)>* | **`none`** 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 2 routes have more cost than Type 2. ■ `none`—Removes the OSPF metric.
`prec` *<value (1-256)>* Sets the precedence of the route map. The smaller the value, the higher the precedence. Default value is 10.
`weight` *<value (0-65534)>* | **`none`** Sets the weight of the route map.
`enable` Enables the route map.
`disable` Disables the route map.
`delete` Deletes the route map.
`cur` Displays the current route configuration.

/cfg/l3/rmap *<route map number>*/alist *<access list number>*

IP Access List Configuration Menu

NOTE – The *route map number* (1-32) and the *access list number* (1-8) represent the IP access list you wish to configure.

```
[IP Access List 1 Menu]
      nwf     - Network Filter number
      metric  - Metric
      action  - Set Network Filter action
      enable  - Enable Access List
      disable - Disable Access List
      delete  - Delete Access List
      cur     - Display current Access List configuration
```

Table 6-34 IP Access List Menu Options (/cfg/l3/rmap/alist)

Command Syntax and Usage
nwf *<network filter number (1-256)>* Sets the network filter number. See "/cfg/l3/nwf" on page 208 for details.
metric *<(1-4294967294)>*|**none** Sets the metric value in the AS-External (ASE) LSA.
action permit|**deny** Permits or denies action for the access list.
enable Enables the access list.
disable Disables the access list.
delete Deletes the access list.
cur Displays the current Access List configuration.

/cfg/l3/rmap *<route map number>* **aspath** *<autonomous system path>*

Autonomous System Filter Path

NOTE – The *rmap number* (1-32) and the *path number* (1-8) represent the AS path you wish to configure.

```
[AS Filter 1 Menu]
      as      - AS number
      action  - Set AS Filter action
      enable  - Enable AS Filter
      disable - Disable AS Filter
      delete  - Delete AS Filter
      cur     - Display current AS Filter configuration
```

Table 6-35 AS Filter Menu Options (/cfg/l3/rmap/aspath)

Command Syntax and Usage
`as` *<AS number (1-65535)>* Sets the Autonomous System filter's path number.
`action` *<permit|deny (p|d)>* Permits or denies Autonomous System filter action.
`enable` Enables the Autonomous System filter.
`disable` Disables the Autonomous System filter.
`delete` Deletes the Autonomous System filter.
`current` Displays the current Autonomous System filter configuration.

/cfg/l3/rip1

Routing Information Protocol Configuration

```
[Routing Information Protocol Menu]
     updat   - Set update period in seconds
     spply   - Enable/disable supplying route updates
     lsten   - Enable/disable listening to route updates
     deflt   - Enable/disable listening to default routes
     statc   - Enable/disable supplying static routes
     poisn   - Enable/disable poisoned reverse
     vip     - Enable/disable vip advertisement
     on      - Globally turn RIP ON
     off     - Globally turn RIP OFF
     cur     - Display current RIP configuration
```

The RIP1 Menu is used for configuring Routing Information Protocol, version 1 (RIP1) parameters. This option is turned off by default.

NOTE – Do not configure RIP1 parameters if your routing equipment uses RIP version 2.

Table 6-36 Routing Information Protocol Menu (/cfg/l3/rip1)

Command Syntax and Usage
`updat` *<update period (1-120 seconds)>* Sets the RIP update period in seconds. It is set at 30 seconds by default.
`spply disable|enable` This command is disabled by default. When enabled, the switch supplies routes to other routers.
`lsten disable|enable` This command is disabled by default. When enabled, the switch learns routes from other routers.
`deflt disable|enable` 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. This command is disabled by default.
`statc disable|enable` This command is disabled by default. When enabled, the switch supplies static routes.
`poisn disable|enable` This command is disabled by default. When enabled, the switch uses split horizon with poisoned reverse. When disabled, the switch uses only split horizon.

Table 6-36 Routing Information Protocol Menu (/cfg/l3/rip1)

Command Syntax and Usage
`vip disable|enable` Enables or disables the advertisement of virtual IP addresses as Host Routes. If a VIP route exists in a routing table, it will always be advertised except when it is included in another network route that is already being advertised. **Note:** If all real servers behind a VIP go down, the route gets removed from the routing table, and will not be advertised. If we disable all the real servers using operation command, the VIP route does not get eliminated from the routing table, and the switch will continue to advertise the route.
`on` Globally turns RIP ON.
`off` Globally turns RIP OFF.
`cur` Displays the current RIP configuration.

/cfg/l3/ospf

Open Shortest Path First Configuration

```
[Open Shortest Path First Menu]
      aindex   - OSPF Area (index) menu
      range    - OSPF Summary Range menu
      if       - OSPF Interface menu
      virt     - OSPF Virtual Links menu
      md5key   - OSPF MD5 Key Menu
      host     - OSPF Host Entry menu
      redist   - OSPF Route Redistribute menu
      lsdb     - Set the LSDB limit
      default  - Originate default route information
      on       - Globally turn OSPF ON
      off      - Globally turn OSPF OFF
      cur      - Display current OSPF configuration
```

Table 6-37 OSPF Configuration Menu Options (/cfg/l3/ospf)

Command Syntax and Usage
aindex *<area index (0-2)>* Displays the area index menu. This area index does not represent the actual OSPF area number. See page 216 to view menu options.
range *<range number (1-16)>* Displays summary routes menu for up to 16 IP addresses. See page 218 to view menu options.
if *<interface number (1-128)>* Displays the OSPF interface configuration menu. See page 219 to view menu options.
virt *<virtual link (1-3)>* Displays the Virtual Links menu used to configure OSPF for a Virtual Link. See page 220 to view menu options.
md5key *<key ID [1-255>* Assigns a string to MD5 authentication key. See
host *<host entry number (1-128)>* Displays the menu for configuring 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 222 to view menu options.
redist *<fixed|static|rip|ebgp|ibgp>* Displays Route Distribution Menu See page 223 to view menu options.

Table 6-37 OSPF Configuration Menu Options (/cfg/l3/ospf)

Command Syntax and Usage
`lsdb` *<LSDB limit (0-2000, 0 for no limit)>* Sets the link state database limit.
`default` *<metric [1-16777215]> <metric-type 1|2>* | **`none`** Sets one default route among multiple choices in an area. Use `none` for no default.
`on` Enables OSPF on the GbE Switch Module.
`off` Disables OSPF on the GbE Switch Module.
`cur` Displays the current OSPF configuration settings.

/cfg/l3/ospf/aindex

Area Index Configuration Menu

```
[OSPF Area (index) 1  Menu]
     areaid  - Set area ID
     type    - Set area type
     metric  - Set stub area metric
     auth    - Set authentication type
     spf     - Set time interval between two SPF calculations
     enable  - Enable area
     disable - Disable area
     delete  - Delete area
     cur     - Display current OSPF area configuration
```

Table 6-38 Area Index Configuration Menu Options (/cfg/l3/ospf/aindex)

Command Syntax and Usage
`areaid` *<IP address (such as, 192.4.17.101)>* Defines the IP address of the OSPF area number.
`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. External routes from outside the Autonomous System (AS) can be advertised within the NSSA but are not distributed into other areas.
`metric` *<metric value [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.
`auth none|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.
`spf` *<interval [0-255]>* Sets time interval between two successive SPF (shortest path first) calculations of the shortest path tree using the Dijkstra's algorithm.
`enable` Enables the OSPF area.
`disable` Disables the OSPF area.
`delete` Deletes the OSPF area.
`cur` Displays the current OSPF configuration.

/cfg/l3/ospf/range

OSPF Summary Range Configuration Menu

```
[OSPF Summary Range 1  Menu]
      addr     - Set IP address
      mask     - Set IP mask
      aindex   - Set area index
      hide     - Enable/disable hide range
      enable   - Enable range
      disable  - Disable range
      delete   - Delete range
      cur      - Display current OSPF summary range configuration
```

Table 6-39 OSPF Summary Range Configuration Menu Options (/cfg/l3/ospf/range)

Command Syntax and Usage
`addr` *<IP Address (such as, 192.4.17.101)>* Displays the base IP address for the range.
`mask` *<IP address (such as, 192.4.17.101>* Displays the IP address mask for the range.
`aindex` *<area index [0-2]>* Displays the area index used by the GbE Switch Module.
`hide disable|enable` Hides the OSPF summary range.
`enable` Enables the OSPF summary range.
`disable` Disables the OSPF summary range.
`delete` Deletes the OSPF summary range.
`current` Displays the current OSPF summary range.

/cfg/l3/ospf/if

OSPF Interface Configuration Menu

```
[OSPF Interface 1  Menu]
      aindex  - Set area index
      prio    - Set interface router priority
      cost    - Set interface cost
      hello   - Set hello interval in seconds
      dead    - Set dead interval in seconds
      trans   - Set transit delay in seconds
      retra   - Set retransmit interval in seconds
      key     - Set authentication key
      mdkey   - Set MD5 key ID
      enable  - Enable interface
      disable - Disable interface
      delete  - Delete interface
      cur     - Display current OSPF interface configuration
```

Table 6-40 OSPF Interface Configuration Menu Options (/cfg/l3/ospf/if)

Command Syntax and Usage
`aindex` *<area index [0-2]>* Displays the OSPF area index.
`prio` *<priority value (0-127)>* Displays the assigned priority value to the GbE Switch Module's OSPF interfaces. (A priority value of 127 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).)
`cost` *<cost value (1-65535)>* Displays 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.
`hello` *<value [1-65535]>* Displays the interval in seconds between the `hello` packets for the intefaces.
`dead` *<value [1-65535]>* Displays the health parameters of a `hello` packet, which is set for an interval of seconds before declaring a silent router to be down.
`trans` *<value [0-3600]>* Displays the transit delay in seconds.
`retra` *<value [0-3600]>* Displays the retransmit interval in seconds.

Table 6-40 OSPF Interface Configuration Menu Options (/cfg/l3/ospf/if)

Command Syntax and Usage
`key` *<key>* | **`none`** Sets the authentication key to clear the password.
`mdkey` *<key ID [1-255]>* | **`none`** Assigns an MD5 key to the interface.
`enable` Enables OSPF interface.
`disable` Disables OSPF interface.
`delete` Deletes OSPF interface.
`cur` Displays the current settings for OSPF interface.

/cfg/l3/ospf/virt

OSPF Virtual Link Configuration Menu

```
[OSPF Virtual Link 1  Menu]
      aindex  - Set area index
      hello   - Set hello interval in seconds
      dead    - Set dead interval in seconds
      trans   - Set transit delay in seconds
      retra   - Set retransmit interval in seconds
      nbr     - Set router ID of virtual neighbor
      key     - Set authentication key
      mdkey   - Set MD5 key ID
      enable  - Enable interface
      disable - Disable interface
      delete  - Delete interface
      cur     - Display current OSPF interface configuration
```

Table 6-41 OSPF Virtual Link Configuration Menu Options (/cfg/l3/ospf/virt)

Command Syntax and Usage
`aindex` *<area index [0-2]>* Displays the OSPF area index.
`hello` *<value [1-65535]>* Displays the authentication parameters of a hello packet, which is set to be in an interval of seconds.
`dead` *<value [1-65535]>* Displays the health parameters of a hello packet, which is set to be in an interval of seconds. Default is 40 seconds.
`trans` *<value [1-3600]>* Displays the delay in transit in seconds. Default is one seconds.
`retra` *<value [1-3600]>* Displays the retransmit interval in seconds. Default is five seconds.
`nbr` *<NBR router ID (IP address)>* Displays the router ID of the virtual neighbor. Default is 0.0.0.0.
`key` *<password>* Displays the password (up to eight characters) for each virtual link. Default is `none`.
`mdkey` *<key ID [1-256]>* | **`none`** Sets MD5 key ID for each virtual link. Default is `none`.
`enable` Enables OSPF virtual link.
`disable` Disables OSPF virtual link.
`delete` Deletes OSPF virtual link.
`cur` Displays the current OSPF virtual link settings.

/cfg/l3/ospf/host

OSPF Host Entry Configuration Menu

```
[OSPF Host Entry 1 Menu]
       addr     - Set host entry IP address
       aindex   - Set area index
       cost     - Set cost of this host entry
       enable   - Enable host entry
       disable  - Disable host entry
       delete   - Delete host entry
       cur      - Display current OSPF host entry configuration
```

Table 6-42 OSPF Host Entry Configuration Menu Options (/cfg/l3/ospf/host)

Command Syntax and Usage
addr *<IP address (such as, 192.4.17.101)>* Displays the base IP address for the host entry.
aindex *<area index [0-2]>* Displays the area index of the host.
cost *<cost value [1-65535]>* Displays the cost value of the host.
enable Enables OSPF host entry.
disable Disables OSPF host entry.
delete Deletes OSPF host entry.
cur Displays the current OSPF host entries.

/cfg/l3/ospf/redist/ *<fixed|static|rip|ebgp|ibgp>*

OSPF Route Redistribution Configuration Menu.

```
[OSPF Redistribute Fixed  Menu]
     add     - Add rmap into route redistribution list
     rem     - Remove rmap from route redistribution list
     export  - Export all routes of this protocol
     cur     - Display current route-maps added
```

Table 6-43 OSPF Route Redistribution Menu Options (/cfg/l3/ospf/redist)

Command Syntax and Usage
`add` *(<route map [1-32]> <route map [1-32]>)*|**`all`** Adds selected routing maps to the rmap list.To add all the 32 route maps, enter `all`. To add specific route maps, enter routing map numbers one per line, NULL at the end. 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.
`rem` *(<route map [1-32]> <route map [1-32]>) ...* |**`all`** Removes the route map from the route redistribution list. Removes routing maps from the `rmap` list. To remove all 32 route maps, enter `all`. To remove specific route maps, enter routing map numbers one per line, NULL at end.
`export` *<metric [1-16777215]><metric type [1|2]>* |**`none`** 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`.
`cur` Displays the current route map settings.

/cfg/l3/ospf/md5key

OSPF MD5 Key Configuration Menu

```
[OSPF MD5 Key 1 Menu]
     key      - Set authentication key
     delete   - Delete key
     cur      - Display current MD5 key configuration
```

Table 6-44 OSPF MD5 Key Configuration Menu Options (/cfg/ip/ospf/md5key)

Command Syntax and Usage
`key` Sets the authentication key for this OSPF packet.
`delete` Deletes the authentication key for this OSPF packet.
`cur` Displays the current MD5 key configuration.

/cfg/l3/bgp

Border Gateway Protocol Configuration

```
[Border Gateway Protocol Menu]
     peer     - Peer menu
     aggr     - Aggregation menu
     as       - Set Autonomous System (AS) number
     pref     - Set Local Preference
     on       - Globally turn BGP ON
     off      - Globally turn BGP OFF
     cur      - Display current BGP 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.

The BGP Menu enables 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 Alteon OS implementation, the GbE Switch Module does not advertise BGP routes that are learned from other BGP "speakers".

The BGP menu option is turned off by default.

NOTE – Fixed routes are subnet routes. There is one fixed route per IP interface.

Table 6-45 Border Gateway Protocol Menu (/cfg/l3/bgp)

Command Syntax and Usage
`peer` *<peer number (1-16)>* Displays the menu used to configure each BGP *peer.* Each border router, within an autonomous system, exchanges routing information with routers on other external networks. To view menu options, see page 226.
`aggr` *<aggregate number (1-16)>* Displays the Aggregation Menu. To view menu options, see page 229.
`as` *<1 - 65535>* Set Autonomous System number.
`pref` *<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.
`on` Globally turns BGP on.
`off` Globally turns BGP off.
`cur` Displays the current BGP configuration.

`/cfg/l3/bgp/peer` *<peer number>*

BGP Peer Configuration Menu

```
[BGP Peer 1 Menu]
      redist   - Redistribution menu
      addr     - Set remote IP address
      ras      - Set remote autonomous system number
      hold     - Set hold time
      alive    - Set keep alive time
      advert   - Set min time between advertisements
      retry    - Set connect retry interval
      orig     - Set min time between route originations
      ttl      - Set time-to-live of IP datagrams
      addi     - Add rmap into in-rmap list
      addo     - Add rmap into out-rmap list
      remi     - Remove rmap from in-rmap list
      remo     - Remove rmap from out-rmap list
      enable   - Enable peer
      disable  - Disable peer
      delete   - Delete peer
      cur      - Display current peer configuration
```

This menu is used 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 6-46 BGP Peer Configuration Options (/cfg/l3/bgp/peer)

Command Syntax and Usage
`redist` Displays BGP Redistribution Menu. To view the menu options, see page 228.
`addr` *<IP address (such as 192.4.17.101)>* Defines the IP address for the specified peer (border router), using dotted decimal notation. The default address is 0.0.0.0.
`ras` *<AS number (0-65535)>* Sets the remote autonomous system number for the specified peer.
`hold` *<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. It is set at 90 seconds by default.
`alive` *<keepalive time (0, 1-21845)>* Sets the keep-alive time for the specified peer in seconds. It is set at 0 by default.

Table 6-46 BGP Peer Configuration Options (/cfg/l3/bgp/peer)

Command Syntax and Usage
`advert` *<min adv time (1-65535)>* Sets time in seconds between advertisements.
`retry` *<connect retry interval (1-65535)>* Sets connection retry interval in seconds.
`orig` *<min orig time (1-65535)>* Sets the minimum time between route originations in seconds.
`ttl` *<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 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.
`addi` *<route map ID (1-32)>* Adds route map into in-route map list.
`addo` *<route map ID (1-32)>* Adds route map into out-route map list.
`remi` *<route map ID (1-32)>* Removes route map from in-route map list.
`remo` *<route map ID (1-32)>* Removes route map from out-route map list.
`ena` Enables this peer configuration.
`dis` Disables this peer configuration.
`del` Deletes this peer configuration.
`cur` Displays the current BGP peer configuration.

/cfg/l3/bgp/peer/redist

BGP Redistribution Configuration Menu

```
[Redistribution Menu]
      metric  - Set default-metric of advertised routes
      default - Set default route action
      rip     - Enable/disable advertising RIP routes
      ospf    - Enable/disable advertising OSPF routes
      fixed   - Enable/disable advertising fixed routes
      static  - Enable/disable advertising static routes
      vip     - Enable/disable advertising VIP routes
      cur     - Display current redistribution configuration
```

Table 6-47 BGP Redistribution Configuration Menu Options (/cfg/l3/bgp/peer/redist)

Command Syntax and Usage
metric *<metric (1-4294967294)>*|**none** Sets default metric of advertised routes.
default none|**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 even though 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 in this redistribute submenu.
rip disable|**enable** Enables or disables advertising RIP routes
ospf disable|**enable** Enables or disables advertising OSPF routes.
fixed disable|**enable** Enables or disables advertising fixed routes.
static disable|**enable** Enables or disables advertising static routes.

Table 6-47 BGP Redistribution Configuration Menu Options (/cfg/l3/bgp/peer/redist)

Command Syntax and Usage

`vip disable|enable`
Enables or disables advertising VIP routes.

`current`
Displays current redistribution configuration.

`/cfg/l3/bgp/aggr` *(aggregation number)*

BGP Aggregation Configuration

```
[BGP Aggr 1 Menu]
      addr    - Set aggregation IP address
      mask    - Set aggregation network mask
      enable  - Enable aggregation
      disable - Disable aggregation
      delete  - Delete aggregation
      cur     - Display current aggregation configuration
```

This menu enables you to configure filters that specify the routes/range of IP destinations a peer router will accept from other peers. A route must match a filter to be installed in the routing table. By default, the first filter is enabled and the rest of the filters are disabled.

Table 6-48 BGP Filter Configuration Options (/cfg/l3/bgp/aggr)

Command Syntax and Usage

`addr` *<IP address (such as 192.4.17.101)>*
Defines the starting IP address for this filter, using dotted decimal notation. The default address is 0.0.0.0.

`mask` *<IP subnet mask (such as, 255.255.255.0)>*
This IP address mask is used with `addr` 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.

`ena`
Enables this BGP filter.

`dis`
Disables this BGP filter.

Table 6-48 BGP Filter Configuration Options (/cfg/l3/bgp/aggr)

Command Syntax and Usage
`del` Deletes this BGP filter.
`cur` Displays the current BGP filter configuration.

/cfg/l3/igmp
IGMP Configuration

```
[IGMP Menu]
     snoop     - IGMP Snooping Menu
     mrouter   - Static Multicast Router Port Menu
     robust    - Set IGMP robustness variable
     qinterval - Set IGMP query interval
     qmrt      - Set IGMP query max response time
     on        - Globally turn IGMP ON
     off       - Globally turn IGMP OFF
     cur       - Display current IGMP 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 6-49 IGMP Snoop Menu (/cfg/l3/igmp)

Command Syntax and Usage
`snoop` Displays the IGMP Snoop Menu. To view menu options, see page 231.
`mrouter` Displays the Static Multicast Router Port Menu. To view menu options, see page 232.
`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.

Table 6-49 IGMP Snoop Menu (/cfg/l3/igmp)

Command Syntax and Usage

`qinterval` *<1-3600>*

Configures the interval for IGMP Query Reports. The default value is 125 seconds.

`qmrt` *<1-600>*

Configures the maximum time allowed for IGMP Query responses from multicast routers, in tenths of a second. The default value is 100.

`on`

Turns IGMP on globally.

`off`

Turns IGMP off globally.

`cur`

Displays the current IGMP configuration parameters.

/cfg/l3/igmp/snoop

IGMP Snooping Configuration

```
[IGMP Snooping Menu]
     mrto      - Override multicast router timeout
     add       - Add VLAN(s) to IGMP Snooping
     rem       - Remove VLAN(s) from IGMP Snooping
     clear     - Remove all VLAN(s) from IGMP Snooping
     fastlv    - Enable/disable quick-leave processing in VLAN
     ena       - Enable IGMP Snooping
     dis       - Disable IGMP Snooping
     cur       - Display current IGMP Snooping configuration
```

Table 6-50 describes the commands used to configure IGMP Snooping.

Table 6-50 IGMP Snoop Menu (/cfg/l3/igmp/snoop)

Command Syntax and Usage

`mrto` *<1-255 seconds>*

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 255 seconds. The default is 60 seconds.

`add` *<VLAN number>*

Adds selected VLANs to IGMP Snooping.

Table 6-50 IGMP Snoop Menu (/cfg/l3/igmp/snoop)

Command Syntax and Usage
`remove` <*`VLAN number`*> Removes selected VLANs from IGMP Snooping.
`clear` Removes all VLANs from IGMP Snooping.
`fastlv` <*`VLAN number`*> **`disable`**|**`enable`** 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.
`ena` Enables IGMP Snooping.
`dis` Disables IGMP Snooping.
`cur` Displays the current IGMP Snooping parameters.

/cfg/l3/igmp/mrouter

IGMP Static Multicast Router Configuration

```
[Static Multicast Router Port Menu]
     add - Add Static Multicast Router Port
     rem - Remove Static Multicast Router Port
     cur - Display current Static Multicast Router Port configuration
```

Table 6-51 describes the commands used to configure a static multicast router.

NOTE – When you configure a static multicast router on a VLAN, the process of learning multicast routers is disabled for that VLAN.

Table 6-51 IGMP Static Multicast Router Menu (/cfg/l3/igmp/static)

Command Syntax and Usage
`add` *<port number> <VLAN number> <IGMP version number>* Selects a port/VLAN combination on which the static multicast router is connected, and configures the IGMP version (1 or 2) of the multicast router. **Note**: Port number must be an external port.
`remove` *<port number> <VLAN number>* Removes a static multicast router from the selected port/VLAN combination.
`cur` Displays the current IGMP Static Multicast Router parameters.

/cfg/l3/port *<port alias or number>*

IP Port Configuration

```
[IP Forwarding Port INT1 Menu]
       on       - Turn Forwarding ON
       off      - Turn Forwarding OFF
       cur      - Display current port configuration
```

The IP Port Menu allows you to turn IP forwarding on or off on a port-by-port basis. By default, the port forwarding option is turned on.

Table 6-52 IP Forwarding Port Options (/cfg/l3/port)

Command Syntax and Usage
`on` Enables IP forwarding for the current port.
`off` Disables IP forwarding for the current port.
`cur` Displays the current IP forwarding settings.

/cfg/l3/dns

Domain Name System Configuration

```
[Domain Name System Menu]
      prima    - Set IP address of primary DNS server
      secon    - Set IP address of secondary DNS server
      dname    - Set default domain name
      cur      - Display current DNS configuration
```

The Domain Name System (DNS) Menu is 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 6-53 Domain Name Service Menu Options (/cfg/l3/dns)

Command Syntax and Usage
`prima` *<IP address (such as 192.4.17.101)>* You will be prompted to set the IP address for your primary DNS server. Use dotted decimal notation.
`secon` *<IP address (such as 192.4.17.101)>* You will be prompted to set the IP address for your secondary DNS server. If the primary DNS server fails, the configured secondary will be used instead. Enter the IP address using dotted decimal notation.
`dname` *<dotted DNS notation>* | **`none`** Sets the default domain name used by the switch. For example: `mycompany.com`
`cur` Displays the current Domain Name System settings.

/cfg/l3/bootp

Bootstrap Protocol Relay Configuration

```
[Bootstrap Protocol Relay Menu]
      addr     - Set IP address of BOOTP server
      addr2    - Set IP address of second BOOTP server
      on       - Globally turn BOOTP relay ON
      off      - Globally turn BOOTP relay OFF
      cur      - Display current BOOTP relay configuration
```

The Bootstrap Protocol (BOOTP) Relay Menu is 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 two DHCP/BOOTP servers with IP addresses that have been configured on the GbE Switch Module.

BOOTP relay menu is turned off by default.

Table 6-54 Bootstrap Protocol Relay Configuration Menu Options (/cfg/l3/bootp)

Command Syntax and Usage
addr *<IP address (such as, 192.4.17.101>* Sets the IP address of the BOOTP server.
addr2 *<IP address (such as, 192.4.17.101>>* Sets the IP address of the second BOOTP server.
on Globally turns on BOOTP relay.
off Globally turns off BOOTP relay.
cur Displays the current BOOTP relay configuration.

/cfg/l3/vrrp
VRRP Configuration

```
[Virtual Router Redundancy Protocol Menu]
     vr       - VRRP Virtual Router menu
     group    - VRRP Virtual Router Group menu
     if       - VRRP Interface menu
     track    - VRRP Priority Tracking menu
     hotstan  - Enable/disable hot-standby processing
     trnkfo   - Enable/disable trunk failover
     on       - Globally turn VRRP ON
     off      - Globally turn VRRP OFF
     cur      - Display current VRRP configuration
```

Virtual Router Redundancy Protocol (VRRP) support on GbE Switch Modules 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. Alteon OS has extended VRRP to include virtual servers as well, allowing for full active/active redundancy between its Layer 4 switches. For more information on VRRP, see the "High Availability" chapter in the *Alteon OS 20.2 Application Guide*.

Table 6-55 Virtual Router Redundancy Protocol Options (/cfg/l3/vrrp)

Command Syntax and Usage
vr *<virtual router number (1-128)>* Displays the VRRP Virtual Router Menu. This menu is used for configuring up to 128 virtual routers on this switch. To view menu options, see page 237.
group Displays the VRRP virtual router group menu, used to combine all virtual routers together as one logical entity. Group options must be configured when using two or more Alteon switches in a hot-standby failover configuration where only one switch is active at any given time. To view menu options, see page 242.
if *<interface number (1-128)>* Displays the VRRP Virtual Router Interface Menu. To view menu options, see page 246.

Table 6-55 Virtual Router Redundancy Protocol Options (/cfg/l3/vrrp)

Command Syntax and Usage

`track`

Displays the VRRP Tracking Menu. This menu is used for weighting the criteria used when modifying priority levels in the master router election process. To view menu options, see page 247.

`hotstan disable|enable`

Enables or disables hot standby processing, in which two or more switches provide redundancy for each other. By default, this option is disabled.

`trnkfo disable|enable`

When enabled, allows L2 Trunk Failover to be enabled when VRRP is enabled (but not hot standby processing). By default, this option is disabled.

`on`

Globally enables VRRP on this switch.

`off`

Globally disables VRRP on this switch.

`cur`

Displays the current VRRP parameters.

`/cfg/l3/vrrp/vr` *<router number>*

Virtual Router Configuration

```
[VRRP Virtual Router 1 Menu]
      track    - Priority Tracking Menu
      vrid     - Set virtual router ID
      addr     - Set IP address
      if       - Set interface number
      prio     - Set renter priority
      adver    - Set advertisement interval
      preem    - Enable or disable preemption
      ena      - Enable virtual router
      dis      - Disable virtual router
      del      - Delete virtual router
      cur      - Display current VRRP virtual router configuration
```

This menu is used for configuring up to 128 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 6-56 VRRP Virtual Router Options (/cfg/l3/vrrp/vr)

Command Syntax and Usage
track Displays the VRRP Priority Tracking Menu for this virtual router. Tracking is an Alteon OS proprietary extension to VRRP, used for modifying the standard priority system used for electing the master router. To view menu options, see page 240.
vrid *<virtual router ID (1-255)>* Defines the virtual router ID. This is used in conjunction with `addr` (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: one that shares the same `vrid` and `addr` combination. 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 255. The default value is 1. All `vrid` values must be unique within the VLAN to which the virtual router's IP interface belongs.
addr *<IP address (such as, 192.4.17.101)>* Defines the IP address for this virtual router using dotted decimal notation. This is used in conjunction with the `vrid` (above) to configure the same virtual router on each participating VRRP device. The default address is 0.0.0.0.
if *<interface number (1-128)>* Selects a switch IP interface (between 1 and 128). If the IP interface has the same IP address as the `addr` option above, 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 preempt another virtual router which has assumed master routing authority. This preemption occurs even if the `preem` option below is disabled. The default value is 1.
prio *<priority (1-254)>* Defines the election priority bias for this virtual server. 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 (`/cfg/l3/vrrp/track` or `/cfg/l3/vrrp/vr #/track`), this base priority value can be modified according to a number of performance and operational criteria.

Table 6-56 VRRP Virtual Router Options (/cfg/l3/vrrp/vr)

Command Syntax and Usage
`adver` *<seconds (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.
`preem disable|enable` 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 `preem` is disabled, this virtual router will always preempt 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.
`ena` Enables this virtual router.
`dis` Disables this virtual router.
`del` Deletes this virtual router from the switch configuration.
`cur` Displays the current configuration information for this virtual router.

/cfg/l3/vrrp/vr *<router number>*/track

Virtual Router Priority Tracking Configuration

```
[VRRP Virtual Router 1 Priority Tracking Menu]
      vrs      - Enable/disable tracking master virtual routers
      ifs      - Enable/disable tracking other interfaces
      ports    - Enable/disable tracking VLAN switch ports
      l4pts    - Enable/disable tracking L4 switch ports
      reals    - Enable/disable tracking L4 real servers
      hsrp     - Enable/disable tracking HSRP
      hsrv     - Enable/disable tracking HSRP by VLAN
      cur      - Display current VRRP virtual router configuration
```

This menu is 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 Menu (see page 247).

Criteria are tracked dynamically, continuously updating virtual router priority levels when enabled. If the virtual router preemption option (see `preem` in Table 6-56 on page 238) is enabled, this virtual router can assume master routing authority when its priority level rises above that of the current master.

Some tracking criteria (`vrs`, `ifs`, and `ports` below) apply to standard virtual routers, otherwise called “virtual interface routers.” Other tracking criteria (`l4pts`, `reals`, and `hsrp`) apply to “virtual server routers,” which perform Layer 4 Server Load Balancing functions. A virtual *server* router is defined as any virtual router whose IP address (`addr`) is the same as any configured virtual server IP address.

Table 6-57 VRRP Priority Tracking Options (/cfg/l3/vrrp/vr #/track)

Command Syntax and Usage
`vrs disable|enable` 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.
`ifs disable|enable` 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.

Table 6-57 VRRP Priority Tracking Options (/cfg/l3/vrrp/vr #/track)

Command Syntax and Usage
`ports disable|enable` 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.
`l4pts disable|enable` When enabled for virtual server routers, the priority for this virtual router will be increased for each physical switch port which has active Layer 4 processing on this switch. This helps elect the main Layer 4 switch as the master. This command is disabled by default.
`reals disable|enable` When enabled for virtual server routers, the priority for this virtual router will be increased for each healthy real server behind the virtual server IP address of the same IP address as the virtual router on this switch. This helps elect the switch with the largest server pool as the master, increasing Layer 4 efficiency. This command is disabled by default.
`hsrp disable|enable` *<priority (1-254)>* Hot Standby Router Protocol (HSRP) is used with some types of routers for establishing router failover. In networks where HSRP is used, enable this switch option to increase the priority of this virtual router for each Layer 4 client-only port that receives HSRP advertisements. Enabling HSRP helps elect the switch closest to the master HSRP router as the master, optimizing routing efficiency. This command is disabled by default.
`hsrv disable|enable` Hot Standby Router on VLAN (HSRV) is used to work in VLAN-tagged environments. Enable this switch option to increment only that **`vrrp`** instance that is on the *same* VLAN as the tagged hsrp master flagged packet. This command is disabled by default.
`cur` Displays the current configuration for priority tracking for this virtual router.

/cfg/l3/vrrp/group

Virtual Router Group Configuration

```
[VRRP Virtual Router Group Menu]
      track    - Priority Tracking Menu
      vrid     - Set virtual router ID
      if       - Set interface number
      prio     - Set renter priority
      adver    - Set advertisement interval
      preem    - Enable or disable preemption
      ena      - Enable virtual router
      dis      - Disable virtual router
      del      - Delete virtual router
      cur      - Display current VRRP virtual router configuration
```

The Virtual Router Group menu is used for associating all virtual routers into a single logical virtual router, which forces all virtual routers on the GbE Switch Module 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 GbE Switch Modules in a hot-standby failover configuration, where only one switch is active at any time.

Table 6-58 VRRP Virtual Router Group Options (/cfg/l3/vrrp/group)

Command Syntax and Usage
`track` Displays the VRRP Priority Tracking Menu for the virtual router group. Tracking is an Alteon OS proprietary extension to VRRP, used for modifying the standard priority system used for electing the master router. To view menu options, see page 244.
`vrid` *<virtual router ID (1-255)>* Defines the virtual router ID. 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 255. All `vrid` values must be unique within the VLAN to which the virtual router's IP interface (see `if` below) belongs. The default virtual router ID is 1.
`if` *<interface number (1-128)>* Selects a switch IP interface (between 1 and 128). The default switch IP interface number is 1.

Table 6-58 VRRP Virtual Router Group Options (/cfg/l3/vrrp/group)

Command Syntax and Usage
prio *<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 (`/cfg/l3/vrrp/track` or `/cfg/l3/vrrp/vr #/track`), this base priority value can be modified according to a number of performance and operational criteria.
adver *<seconds (1-255)>* Defines the time interval between VRRP master advertisements. This can be any integer between 1 and 255 seconds. The default is 1.
preem disable|enable Enables or disables master preemption. When enabled, if the virtual router group 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 `preem` is disabled, this virtual router will always preempt 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.
ena Enables the virtual router group.
dis Disables the virtual router group.
del Deletes the virtual router group from the switch configuration.
cur Displays the current configuration information for the virtual router group.

/cfg/l3/vrrp/group/track

Virtual Router Group Priority Tracking Configuration

```
[Virtual Router Group Priority Tracking Menu]
     vrs      - Enable/disable tracking master virtual routers
     ifs      - Enable/disable tracking other interfaces
     ports    - Enable/disable tracking VLAN switch ports
     l4pts    - Enable/disable tracking L4 switch ports
     reals    - Enable/disable tracking L4 real servers
     hsrp     - Enable/disable tracking HSRP
     hsrv     - Enable/disable tracking HSRP by VLAN
     cur      - Display current VRRP Group 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 6-59 Virtual Router Group Priority Tracking Options (/cfg/l3/vr/group/track)

Command Syntax and Usage
`vrs disable|enable` 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.
`ifs disable|enable` 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.
`ports disable|enable` 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.
`l4pts disable|enable` When enabled for virtual server routers, the priority for this virtual router will be increased for each physical switch port which has active Layer 4 processing on this switch. This helps elect the main Layer 4 switch as the master. This command is disabled by default.

Table 6-59 Virtual Router Group Priority Tracking Options (/cfg/l3/vr/group/track)

Command Syntax and Usage
`reals disable|enable` When enabled for virtual server routers, the priority for this virtual router will be increased for each healthy real server. This helps elect the switch with the largest server pool as the master, increasing Layer 4 efficiency. This command is disabled by default.
`hsrp disable|enable` Enables Hot Standby Router Protocol (HSRP) for this virtual router group. HSRP is used with some types of routers for establishing router failover. In networks where HSRP is used, enable this switch option to increase the priority of this virtual router for each Layer 4 client-only port that receives HSRP advertisements. This helps elect the switch closest to the master HSRP router as the master, optimizing routing efficiency. This command is disabled by default.
`hsrv disable|enable` Hot Standby Router on VLAN (HSRV) is used to work in VLAN-tagged environments. Enable this switch option to increment only that **`vrrp`** instance that is on the *same* VLAN as the tagged hsrp master flagged packet. This command is disabled by default.
`cur` Displays the current configuration for priority tracking for this virtual router.

`/cfg/l3/vrrp/if` *<interface number>*

VRRP Interface Configuration

NOTE – The *interface-number* (1 to 128) represents the IP interface on which authentication parameters must be configured.

```
[VRRP Interface 1 Menu]
      auth     - Set authentication types
      passw    - Set plain-text password
      del      - Delete interface
      cur      - Display current VRRP interface configuration
```

This menu is used for configuring VRRP authentication parameters for the IP interfaces used with the virtual routers.

Table 6-60 VRRP Interface Menu Options (/cfg/l3/vrrp/if)

Command Syntax and Usage
`auth none|password` Defines the type of authentication that will be used: `none` (no authentication), or `password` (password authentication).
`passw` *<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 **`auth`** above).
`del` Clears the authentication configuration parameters for this IP interface. The IP interface itself is not deleted.
`cur` Displays the current configuration for this IP interface's authentication parameters.

/cfg/l3/vrrp/track

VRRP Tracking Configuration

```
[VRRP Tracking Menu]
     vrs      - Set priority increment for virtual router tracking
     ifs      - Set priority increment for IP interface tracking
     ports    - Set priority increment for VLAN switch port tracking
     l4pts    - Set priority increment for L4 switch port tracking
     reals    - Set priority increment for L4 real server tracking
     hsrp     - Set priority increment for HSRP tracking
     hsrv     - Set priority increment for HSRP by VLAN tracking
     cur     - Display current VRRP Priority Tracking configuration
```

This menu is 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 Menu” on page 240), the priority level for the virtual router is increased by an amount defined through this menu.

Table 6-61 VRRP Tracking Options (/cfg/l3/vrrp/track)

Command Syntax and Usage
`vrs` *<0-254>* Defines the priority increment value (1 through 254) for virtual routers in master mode detected on this switch. The default value is 2.
`ifs` *<0-254>* Defines the priority increment value (1 through 254) for active IP interfaces detected on this switch. The default value is 2.
`ports` *<0-254>* Defines the priority increment value (1 through 254) for active ports on the virtual router’s VLAN. The default value is 2.
`l4pts` *<0-254>* Defines the priority increment value (1 through 254) for physical switch ports with active Layer 4 processing. The default value is 2.
`reals` *<0-254>* Defines the priority increment value (1 through 254) for healthy real servers behind the virtual server router. The default value is 2.
`hsrp` *<0-254>* Defines the priority increment value (1 through 254) for switch ports with Layer 4 client-only processing that receive HSRP broadcasts. The default value is 10.

Table 6-61 VRRP Tracking Options (/cfg/l3/vrrp/track)

Command Syntax and Usage
`hsrv` *<0-254>* Defines the priority increment value (1 through 254) for vrrp instances that are on the same VLAN. The default value is 10.
`cur` Displays the current configuration of priority tracking increment values.

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 Menu (see page 240) are enabled.

`/cfg/l3/metrc` *<metric name>*

Default Gateway Metrics

If multiple default gateways are configured and enabled, a metric can be set to determine which primary gateway is selected. There are two metrics, which are described in the table .

Table 6-62 Default Gateway Metrics (/cfg/l3/metrc)

Option	Description
`strict`	The gateway number determines its level of preference. Gateway #1 acts as the preferred default IP gateway until it fails or is disabled, at which point the next in line will take over as the default IP gateway.
`roundrobin`	This provides basic gateway load balancing. The switch sends each new gateway request to the next healthy, enabled gateway in line. All gateway requests to the same destination IP address are resolved to the same gateway.

/cfg/setup
Setup

The setup program steps you through configuring the system date and time, BOOTP, IP, Spanning Tree, port speed/mode, VLAN parameters, and IP interfaces.

To start the setup program, at the Configuration# prompt, enter:

```
Configuration# setup
```

For a complete description of how to use setup, see Chapter 2, “First-Time Configuration.”

/cfg/dump
Dump

The dump program writes the current switch configuration to the terminal screen. To start the dump program, at the Configuration# prompt, enter:

```
Configuration# dump
```

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 TFTP, as described on page 250.

/cfg/ptcfg *<TFTP server> <filename>* Saving the Active Switch Configuration

When the ptcfg command is used, the switch's active configuration commands (as displayed using /cfg/dump) will be uploaded to the specified script configuration file on the TFTP server. To start the switch configuration upload, at the Configuration# prompt, enter:

```
Configuration# ptcfg <TFTP server> <filename>
```

Where *server* is the TFTP server IP address or hostname, and *filename* is the name of the target script configuration file.

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 TFTP server is running SunOS or the Solaris operating system, the specified ptcfg file must exist prior to executing the ptcfg 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.

/cfg/gtcfg *<TFTP server> <filename>* Restoring the Active Switch Configuration

When the gtcfg 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. The configuration loaded using gtcfg is not activated until the apply command is used. If the apply command is found in the configuration script file loaded using this command, the apply action will be performed automatically.

To start the switch configuration download, at the Configuration# prompt, enter:

```
Configuration# gtcfg <TFTP server> <filename>
```

Where *server* is the TFTP server IP address or hostname, and *filename* is the name of the target script configuration file.

CHAPTER 7

The SLB Configuration Menu

This chapter discusses how to use the Command Line Interface (CLI) for configuring Server Load Balancing (SLB) on the GbE Switch Module.

/cfg/slb
SLB Configuration

```
[Layer 4 Menu]
      real     - Real Server Menu
      group    - Real Server Group Menu
      virt     - Virtual Server Menu
      filt     - Filtering Menu
      port     - Layer 4 Port Menu
      layer7   - Layer 7 Resource Definition Menu
      wap      - WAP Menu
      sync     - Config Synch Menu
      adv      - Layer 4 Advanced Menu
      advhc    - Layer 4 Advanced Health Check Menu
      pip      - Proxy IP Address Menu
      peerpip  - Peer Proxy IP Address Menu
      on       - Globally turn Layer 4 processing ON
      off      - Globally turn Layer 4 processing OFF
      cur      - Display current Layer 4 configuration
```

Table 7-1 Server Load Balancing Configuration Menu Options (/cfg/slb)

Command Syntax and Usage
`real` *<real server number (1-63)>* Displays the menu for configuring real servers. To view menu options, see page 254.
`group` *<real server group number (1-64)>* Displays the menu for placing real servers into real server groups. To view menu options, see page 259.

Table 7-1 Server Load Balancing Configuration Menu Options (/cfg/slb)

Command Syntax and Usage

`virt` *<virtual server number (1-64)>*

Displays the menu for defining virtual servers. To view menu options, see page 264.

`filt` *<filter ID (1-1024)>*

Displays the menu for Filtering and Application Redirection. To view menu options, see page 272.

`port` *<port alias or number>*

Displays the menu for setting physical switch port states for Layer 4 activity. To view menu options, see page 283.

`layer7`

Displays later 7 Resource Definition Menu. To view menu options, see page 285.

`wap`

Displays WAP Menu. To view menu options, see page 288

`sync`

Displays the Synch Peer Switch Menu. To view menu options, see page 289.

`adv`

Displays the Layer 4 Advanced Menu. To view menu options, see page 291.

`advhc`

Displays the Layer 4 Advanced Health Check Menu. To view menu options, see page 294.

`pip`

This menu is used to set the switch proxy IP address using dotted decimal notation. When the `pip` is defined, client address information in Layer 4 requests is replaced with this proxy IP address.To view options, see page 297.

`peerpip`

Displays Peer Proxy IP address Menu. When this command is enabled, the switch is able to forward traffic from the other switch, using Layer 2, without performing server processing on the packets of the other switch. This happens because the peer switches are aware of each otherís proxy IP addresses. This prevents the dropping of a packet or being sent to the backup switch in the absence of the proxy IP address of the peer switch.

To view menu options, see page 298.

`on`

Globally turns on Layer 4 software services for Server Load Balancing and Application Redirection. Enabling Layer 4 services is not necessary for using filters only to allow, deny, or NAT traffic.

`off`

Globally disables Layer 4 services. All configuration information will remain in place (if `applied` or `saved`), but the software processes will no longer be active in the switch

Table 7-1 Server Load Balancing Configuration Menu Options (/cfg/slb)

Command Syntax and Usage
`cur` Displays the current Server Load Balancing configuration.

Filtering and Layer 4 (Server Load Balancing)

Filters configured to allow, deny, or perform Network Address Translation (NAT) on traffic do not require Layer 4 software to be activated. These filters are not affected by the Server Load Balancing `on` and `off` commands in this menu.

Application Redirection filters, however, require Layer 4 software services. Layer 4 processing must be turned on before redirection filters will work.

/cfg/slb/real *<server number>*
Real Server SLB Configuration

```
[Real server 1  Menu]
   layer7   - Real Server Layer 7 Command Menu
   rip      - Set IP addr of real server
   name     - Set server name
   weight   - Set server weight
   maxcon   - Set maximum number of connections
   tmout    - Set minutes inactive connection remains open
   backup   - Set backup real server
   inter    - Set interval between health checks
   retry    - Set number of failed attempts to declare server DOWN
   restr    - Set number of successful attempts to declare server UP
   addport  - Add real port to server
   remport  - Remove real port to server
   proxy    - Enable/disable client proxy operation
   fasthc   - Enable/disable  fast health check operation
   submac   - Enable/disable source MAC address substitution
   ena      - Enable real server
   dis      - Disable real server
   del      - Delete real server
   cur      - Display current real server configuration
```

This menu is used for configuring information about real servers that participate in a server pool for Server Load Balancing or Application Redirection. The required parameters are:

- Real server IP address
- Real server enabled (disabled by default)

Table 7-2 Real Server Configuration Menu Options (/cfg/slb/real)

Command Syntax and Usage
`layer7` Displays the Layer 7 Menu. To view menu options, see page 258.
`rip` *<real server IP address>* Sets the IP address of the real server in dotted decimal format. When this command is used, the address entered is `PING`ed to determine if the server is up, and the administrator will be warned if the server does not respond.
`name` *<string, maximum 31 characters>*| **`none`** Defines a 15-character alias for each real server. This will enable the network administrator to quickly identify the server by a natural language keyword value.
`weight` *<real server weight (1-48)>* Sets the weighting value (1 to 48) that this real server will be given in the load balancing algorithms. Higher weighting values force the server to receive more connections than the other servers configured in the same real server group. By default, each real server is given a weight setting of 1. A setting of 10 would assign the server roughly 10 times the number of connections as a server with a weight of 1. Weights are not applied when using the `hash` or `minmisses` metrics (see "Server Load Balancing Metrics" on page 262).
`maxcon` *<maximum connections (0-200000)>* Sets the maximum number of connections that this server should simultaneously support. By default, the number of maximum connections is set at 20,000. This option sets a threshold as an artificial barrier, such that new connections will not be issued to this server if the `maxcon` limit is reached. New connections will be issued again to this server once the number of current connections has decreased below the `maxcon` setting. If all servers in a real server group for a virtual server reach their `maxcon` limit at the same time, client requests will be sent to the backup/overflow server or backup/overflow server group. If no backup servers/server group are configured, client requests will be dropped by the virtual server.

Table 7-2 Real Server Configuration Menu Options (/cfg/slb/real)

Command Syntax and Usage

`tmout` *<even number of minutes (2-30)>*

Sets the number of minutes an inactive session remains open (in even numbered increments).

Every client-to-server session being load balanced is recorded in the switch's Session Table. When a client makes a request, the session is recorded in the table, the data is transferred until the client ends the session, and the session table entry is then removed.

In certain circumstances, such as when a client application is abnormally terminated by the client's system, TCP/UDP connections will remain registered in the switch's binding table. In order to prevent table overflow, these orphaned entries must be aged out of the binding table.

Using the tmout option, you can set the number of minutes to wait before removing orphan table entries. Settings must be specified in even numbered increments between 2 and 30 minutes. The default setting is 10.

This option is also used with the Persistent option (see `/cfg/slb/virt/pbind`). When persistent is activated, this option sets how long an idle client is allowed to remain associated with a particular server.

`backup` *<real server number (1-1023)>* | **`none`**

Sets the real server used as the backup/overflow server for this real server.

To prevent loss of service if a particular real server fails, use this option to assign a backup real server number. Then, if the real server becomes inoperative, the switch will activate the backup real server until the original becomes operative again.

The backup server is also used in overflow situations. If the real server reaches its `maxcon` (maximum connections) limit, the backup comes online to provide additional processing power until the original server becomes desaturated.

The same backup/overflow server may be assigned to more than one real server at the same time

`inter` *<number of seconds between health checks (0-60)>*

Sets the interval between real server health verification attempts.

Determining the health of each real server is a necessary function for Layer 4 switching. For TCP services, the switch verifies that real servers and their corresponding services are operational by opening a TCP connection to each service, using the defined service ports configured as part of each virtual service. For UDP services, the switch pings servers to determine their status.

The `inter` option lets you choose the time between health checks. The range is from 1 to 60 seconds. The default interval is 2 seconds. An interval of "0" disables health checking for the server.

`retry` *<number of consecutive health checks (1-63)>*

Sets the number of failed health check attempts required before declaring this real server inoperative. The range is from 1 to 63 attempts. The default is 4 attempts

`restr` *<number of consecutive health checks (1-63)>*

Sets the number of successful health check attempts required before declaring a UDP service operational. The range is from 1 to 63 attempts. The default is 8 attempts

Table 7-2 Real Server Configuration Menu Options (/cfg/slb/real)

Command Syntax and Usage
`addport` <*real server port (2–65534)*> Add multiple service ports to the server.
`remport` <*real server port (2–65534)*> Remove multiple service ports from the server.
`proxy disable|enable` Enables or disables proxy IP address translation. With this option enabled (default), a client request from any application can be proxied using a load-balancing Proxy IP address (PIP).
`fasthc` Enables or disables Fast Health Check operation. When enabled, the real server goes down operationally as soon as the physical port connected to the real server goes down. When disabled, the real server will go down only after the configured health check interval. This command is enabled by default.
`submac disable|enable` Enables or disables source MAC address substitution. By default, this option is disabled.
`enable` You *must* perform this command to enable this real server for Layer 4 service. When enabled, the real server can process virtual server requests associated with its real server group. This option, when the `apply` and `save` commands are used, enables this real server for operation until explicitly disabled. See `/oper/slb/ena` on page 302 for an operations-level command.
`dis` Disables this real server from Layer 4 service. Any disabled server will no longer process virtual server requests as part of the real server group to which it is assigned. This option, when the `apply` is used, disables this real server until it is explicitly re-enabled. This option *does not* perform a graceful server shutdown. See `/oper/slb/dis` on page 302 for an operations-level command.
`del` Deletes this real server from the Layer 4 switching software configuration. This removes the real server from operation within its real server groups. Use this command with caution, as it will delete any configuration options that have been set for this real server. This option *does not* perform a graceful server shutdown.
`cur` Displays the current configuration information for this real server.

/cfg/slb/real *<server number>*/layer7

Real Server Layer 7 Configuration

```
[Layer 7 Commands  Menu]
     addlb    - Add URL path for URL load balance
     remlb    - Remove URL path for URL load balance
     cookser  - Enable/disable cookie assignment server
     exclude  - Enable/disable exclusionary string matching
     cur      - Display current real server configuration
```

This menu is used for entering commands and strings for Layer 7 processing.

Table 7-3 Layer 7 Commands Menu Options (/cfg/slb/real/layer7)

Command Syntax and Usage
`addlb` *<URL path ID [1-512]>* Adds the predefined URL loadbalance string ID to the real server.
`remlb` *<URL path ID [1-512]>* Removes the predefined URL loadbalance string ID from the real server.
`cookser disable|enable` Enables or disables the real server to handle client requests that don't contain a cookie. This option is used if you want to designate a specific server to assign cookies only. This server gets the client request, assigns the cookie, and embeds the IP address of the real server that will handle the subsequent requests from the client. By default, this option is disabled.
`exclude disable|enable` Enables or disables *exclusionary string* matching. By default, this option is disabled.
`cur` Displays the current real server configuration.

/cfg/slb/group *<real server group number>* Real Server Group SLB Configuration

```
[Real server group 1 Menu]
     metric  - Set metric used to select next server in group
     rmetric - Set metric used to select next rport in server
     content - Set health check content
     health  - Set health check type
     backup  - Set backup real server or group
     name    - Set real server group name
     realthr - Set real server failure threshold
     idsrprt - Set Intrusion Detection Port
     mhash   - Set minmisses hash parameter
     viphlth - Enable/disable VIP health checking in DSR mode
     ids     - Enable/disable Intrusion Detection
     idsfld  - Enable/disable Intrusion Detection Group Flood
     add     - Add real server
     rem     - Remove real server
     del     - Delete real server group
     cur     - Display current group configuration
```

This menu is used for combining real servers into real server groups. Each real server group should consist of all the real servers which provide a specific service for load balancing. Each group must consist of at least one real server. Each real server can belong to more than one group. Real server groups are used both for Server Load Balancing and Application Redirection.

Table 7-4 Real Server Group Configuration Menu Options (/cfg/slb/group)

Command Syntax and Usage
`metric leastconns|roundrobin|minmisses|hash|response|bandwidth` Set the load balancing metric used for determining which real server in the group will be the target of the next client request. The default setting is `leastconns`. See "Server Load Balancing Metrics" on page 262.
`rmetric` Sets the load balancing metric used for determining which port in the real server will be the target of the next client request.
`content` *<filename>*`|//`*<host>*`/`*<filename>* | **`none`** This option defines the specific content which is examined during health checks. The content depends on the type of health check specified in the `health` option (see below).

Table 7-4 Real Server Group Configuration Menu Options (/cfg/slb/group)

Command Syntax and Usage
`health link|arp|icmp|tcp|http|dns|pop3|smtp|nntp|ftp|imap|radius|sslh|script<n>|udpdns|wsp|wtls|ldap` Sets the type of health checking performed. The default is `tcp`. The options are as follows: `link` For IDSLB group only, checks status of port for each server. `arp` For Layer 2 health checking, sends an ARP request. `icmp` For Layer 3 health checking, `pings` the server. `tcp` For TCP service, opens and closes a TCP/IP connection to the server. `http` For HTTP service, use HTTP 1.1 `GETS` when a `HOST:` header is required to check that the URL content is specified in `content` command. Otherwise, an `HTTP/1.0 GET` occurs. **Note:** If the content is not specified, the health check will revert back to TCP on the port that is being load balanced. `dns` For Domain Name Service, check that the domain name specified in `content` can be resolved by the server. `pop3` For user mail service, check that the *user:password* account specified in `content` exists on the server. `smtp` For mail-server services, check that the user specified in `content` is accessible on the server. `nntp` For newsgroup services, check that the newsgroup name specified in `content` is accessible on the server. `ftp` For FTP services, check that the filename specified in `content` is accessible on the server through anonymous login. `imap` For user mail service, check that the *user:password* value specified in `content` exists on the serve `radius` For RADIUS remote access server authentication, check that the *user:password* value specified in `content` exists on the GbE Switch Module and the server. To perform application health checking to a RADIUS server, the network administrator must also configure the `/cfg/slb/secrt` parameter. The `secrt` value is a field of up to 32 alphanumeric characters that is used by the switch to encrypt a password during the RSA Message Digest Algorithm (MD5) and by the RADIUS server to decrypt the password during verification. `sslh` Enables the switch to query the health of the SSL servers by sending an SSL client “Hello” packet and then verify the contents of the server’s “Hello” response. During the handshake, the user and server exchange security certificates, negotiate an encryption and compression method, and establish a session ID for each session. `script` Enables the use of script-based health checks in send/expect format to check for application and content availability. <n> denotes the health script number (1-8). `wsp` Enables connectionless WSP content health checks for WAP gateways. The content under `/cfg/slb/advhc/waphc` (see page 296) must also be configured. `udpdns` Allows the user to perform health checking using UDP DNS queries. `wtls` Provides Wireless Transport Layer Security (WTLS) Hello-based health check for encrypted and connection-oriented WTLS traffic on port 9203. `ldap` Sets the health check type to LDAP.

Table 7-4 Real Server Group Configuration Menu Options (/cfg/slb/group)

Command Syntax and Usage

`backup r`*<real server number (1-64)>*|**`g`***<group number>*|**`none`**

Sets the real server or real server group used as the backup/overflow server/server group for this real server group.

To prevent loss of service if the entire real server group fails, use this option to assign a backup real server/real server group number. Then, if the real server group becomes inoperative, the switch will activate the backup real server /server group until one of the original real servers becomes operative again.

The backup server/server group is also used in overflow situations. If all the servers in the real server group reach their `maxcon` (maximum connections) limit, the backup server/server group comes online to provide additional processing power until one of the original servers becomes desaturated.

The same backup/overflow server/server group may be assigned to more than one real server group at the same time.

`name` *<string, maximum 31 characters>*|**`none`**

Defines a 15-character alias for each Real Server Group. This will enable the network administrator to quickly identify the server group by a natural language keyword value.

`realthr` *<real servers (1-15, 0 for disabled)>*

Specifies a minimum number of real servers available. If any time, the number reaches this minimum limit, a SYSLOG ALERT message is sent to the configured SYSLOG servers stating that the real server threshold has been reached for the concerned server load balancing group. The default threshold is 0, which also means the option is disabled

`idsrprt` *<real server port (2-65534)>*|**`any`**

Sets real server port for Intrusion Detection Server.

`mhash 24`|**`32`** *<number of sip bits used for minmisses hash>*

Defines the minmisses hash parameter for this real server as either 24 or 32 bits. By default the `minmiss` algorithm uses the upper 24-bits of the source IP address to calculate the real server that the traffic should be sent to when the minmiss metric is selected.You can also select all 32-bits of the source IP address to hash to the real server.

`viphlth disable`|**`enable`**

Enables or disables VIP health checking in a service. This feature is enabled by default. However, it works only when the service has DSR (Direct Server Return) feature enabled. When **`viphlth`** is disabled, the switch uses RIP to perform all health checks, whether DSR is enabled or disabled.

`ids disable`|**`enable`**

Enables or disables this group of servers for IDS load balancing.

`idsfld disable`|**`enable`**

Enables or disables the Intrusion Detection flood.

Table 7-4 Real Server Group Configuration Menu Options (/cfg/slb/group)

Command Syntax and Usage
`add` *<real server number (1-63)>* Adds a real server to this real server group. You will be prompted to enter the number of the real server to add to this group.
`rem` *<real server number (1-63)>* Remove a real server from this real server group. You will be prompted for the ID number for the real server to remove from this group.
`del` Deletes this real server group from the Layer 4 software configuration. This removes the group from operation under all virtual servers it is assigned to. Use this command with caution: if you remove the only group that is assigned to a virtual server, the virtual server will become inoperative.
`cur` Displays the current configuration parameters for this real server group.

Server Load Balancing Metrics

Using the `metric` command, you can set a number of metrics for selecting which real server in a group gets the next client request. These metrics are described in the following table:

Table 7-5 Real Server Group Metrics (/cfg/slb/group/metric)

Option and Description
`minmisses` Minimum misses. This metric is optimized for Application Redirection. When `minmisses` is specified for a real server group performing Application Redirection, all requests for a specific IP destination address will be sent to the same server. This is particularly useful in caching applications, helping to maximize successful cache hits. Best statistical load balancing is achieved when the IP address destinations of load balanced frames are spread across a broad range of IP subnets. Minmisses can also be used for Server Load Balancing. When specified for a real server group performing Server Load Balancing, all requests from a specific client will be sent to the same server. This is useful for applications where client information must be retained on the server between sessions. Server load with this metric becomes most evenly balanced as the number of active clients increases.

Table 7-5 Real Server Group Metrics (/cfg/slb/group/metric)

Option and Description
`hash` Like `minmisses`, the `hash` metric uses IP address information in the client request to select a server. For Application Redirection, all requests for a specific IP destination address will be sent to the same server. This is particularly useful for maximizing successful cache hits. For Server Load Balancing, all requests from a specific client will be sent to the same server. This is useful for applications where client information must be retained between sessions. The `hash` metric should be used if the statistical load balancing achieved using `minmisses` is not as optimal as desired. Although the `hash` metric can provide more even load balancing at any given instance, it is not as effective as `minmisses` when servers leave and reenter service. If the Load Balancing statistics indicate that one server is processing significantly more requests over time than other servers, consider using the `hash` metric.
`leastconns` Least connections. With this option, the number of connections currently open on each real server is measured in real time. The server with the fewest current connections is considered to be the best choice for the next client connection request. This option is the most self-regulating, with the fastest servers typically getting the most connections over time, due to their ability to accept, process, and shut down connections faster than slower servers.
`roundrobin` Round robin. With this option, new connections are issued to each server in turn: the first real server in this group gets the first connection, the second real server gets the next connection, followed by the third real server, and so on. When all the real servers in this group have received at least one connection, the issuing process starts over with the first real server.
`response` Real server response time. With this option, the switch monitors and records the amount of time that each real server takes to reply to a health check. The response time is used to adjust the real server weights. The weights are adjusted so they are inversely proportional to a moving average of response time.
`bandwidth` Bandwidth Metric. With this option, the real server weights are adjusted so they are inversely proportional to the number of octets that the real server processes during a given interval. The higher the bandwidth used, the smaller is the weight assigned to that server.

NOTE – Under the `leastconns` and `roundrobin` metrics, when real servers are configured with weights (see the `weight` option on page 255), a higher proportion of connections are given to servers with higher weights. This can improve load balancing among servers of different performance levels. Weights are not applied when using the `hash` or `minmisses` metrics.

`/cfg/slb/virt` *<virtual server number>* Virtual Server SLB Configuration

```
[Virtual Server 1 Menu]
      service - Virtual Service Menu
      vip     - Set IP addr of virtual server
      dname   - Set domain name of virtual server
      layr3   - Enable/disable layer 3 only balancing
      ena     - Enable virtual server
      dis     - Disable virtual server
      del     - Delete virtual server
      cur     - Display current virtual configuration
```

This menu is used for configuring the virtual servers which will be the target for client requests for Server Load Balancing. Configuring a virtual server requires the following parameters:

- Creating a virtual server IP address
- Adding TCP/UDP port and real server group
- Enabling the virtual server (disabled by default)

Table 7-6 Virtual Server Configuration Menu Options (/cfg/slb/virt)

Command Syntax and Usage
`service` *<virtual port or name>* Displays the Virtual Services Menu. The virtual port name can be a well-known port name, such as http, ftp, the service number, and so on. To get more information about well-known ports, see the **`sport`** command on page 274. To view services menu options, see page 266.
`vip` *<virtual server IP address>* Sets the IP address of the virtual server using dotted-decimal notation. The virtual server created within the switch will respond to `ARP`s and `PING`s from network ports as if it was a normal server. Client requests directed to the virtual server's IP address will be balanced among the real servers available to it through real server group assignments.

Table 7-6 Virtual Server Configuration Menu Options (/cfg/slb/virt)

Command Syntax and Usage
`dname` *<34 character domain name>*|**`none`** Sets the domain name for this virtual server. The domain name typically includes the name of the company or organization, and the Internet group code (.com, .edu, .gov, .org, and so forth). An example would be foocorp.com. It does not include the hostname portion (www, www2, ftp, and so forth). The maximum number of characters that can be used in a domain name is 34. To define the hostname, see `hname` below. To clear the `dname`, specify the name as **`none`**.
`layr3 disable`|**`enable`** Normally, the client IP address is used with the client Layer 4 port number to produce a session identifier. When the `layr3` option is enabled (disabled by default), the switch uses only the client IP address as the session identifier. It associates all the connections from the same client with the same real server while any connection exists between them. This option is necessary for some server applications where state information about the client system is divided across different simultaneous connections, and also in applications where TCP fragments are generated. If the real server to which the client is assigned becomes unavailable, the Layer 4 software will allow the client to connect to a different server.
`ena` Enables this virtual server. This option activates the virtual server within the switch so that it can service client requests sent to its defined IP address.
`dis` This option disables the virtual server so that it no longer services client requests.
`del` This command removes this virtual server from operation within the switch and deletes it from the Layer 4 switching software configuration. Use this command with caution, as it will delete the options that have been set for this virtual server.
`cur` Displays the current configuration of the specified virtual server.

/cfg/slb/virt *<server number>*/service *<virtual port or name>*

Virtual Server Service Configuration

This menu is used for configuring services assigned to a virtual server. The following example shows a menu for http (port 80) services.

NOTE – Select virtual service port 554 to configure RTSP traffic. See page 270 to view the menu options for configuring virtual services on port 554 for RTSP.

```
[Virtual Server 1 http Service Menu]
      group   - Set real server group number
      rport   - Set real port
      hname   - Set hostname
      httpslb - Set HTTP SLB processing
      pbind   - Set persistent binding type
      rcount  - Set multi response count
      dbind   - Enable/disable delayed binding
      udp     - Enable/disable UDP balancing
      frag    - Enable/disable remapping UDP server fragments
      nonat   - Enable/disable only substituting MAC addresses
      dnsslb  - Enable/disable DNS query load balancing
      del     - Delete virtual service
      cur     - Display current virtual service configuration
```

Table 7-7 Virtual Server Service Configuration Options (/cfg/slb/virt/service)

Command Syntax and Usage
`group` *<real server group number (1-64)>* Sets a real server group for this service. The default is set at 1. You will be prompted to enter the number (1 to 64) of the real server group to add to this service.
`rport` *<real server port (0-65534)>* Defines the real server TCP or UDP port assigned to this service. By default, this is the same as the virtual port (service virtual port). If `rport` is configured to be different than the virtual port defined in `/cfg/slb/virt` *<number>*`/service` *<virtual port>*, the switch will map the virtual port to this real port.
`hname` *<hostname>*|**`none`** Sets the hostname for a service added. This is used in conjunction with dname (above) to create a full host/domain name for individual services. The format for this command is: # **`hname`** *<hostname>* For example, to add a hostname for Web services, you could specify *www* as the hostname. If a `dname` of "foocorp.com" was defined (above), "www.foocorp.com" would be the full host/domain name for the service. To clear the hostname for a service, use the command: # **`hname none`**
`dbind disable`|**`enable`** Enables or disables Layer 4 Delayed Binding for TCP service and ports. Enabling this command protects the server from Denial of Service (DoS) attacks. This option is disabled by default.
`httpslb urlslb`|**`host`**|**`cookie`**|**`browser`**|**`urlhash`**|**`headerhash`**|**`others`**|**`none`** Load balances on the following applications: ■ `urlslb`: Enable or disable URL SLB ■ `host`: Enable or disable for virtual hosting ■ `cookie`: Enable or disable cookie-based SLB for cookie-based preferential load balancing. You will be prompted for the following: Cookie name, starting point of the cookie value, number of bytes to be extracted, enable/disable checking for cookie in URI ■ `browser`: Enable or disable SLB, based on browser type ■ `urlhash`: Enable or disable URL hashing based on URI ■ `headerhash`: Hashes on any HTTP header value. ■ `others`: Requires inputs for a particular header field ■ `none`: To clear all applications for `httpslb`, specify `none`. You may choose to combine or select applications to load balance using the commands *and* and/or *or*. For example: ■ **`httpslb`** *<application>* ■ **`httpslb`** *<application>* and|or *<application>*

Table 7-7 Virtual Server Service Configuration Options (/cfg/slb/virt/service)

Command Syntax and Usage

`pbind clientip|cookie`<*p*|*r*|*i*>|**`sslid|disable`**

Enables or disables persistent bindings for a real server (disabled by default). This may be necessary for some server applications where state information about the client system is retained on the server over a series of sequential connections, such as with SSL (Secure Socket Layer, HTTPS), Web site search results, or multi-page Web forms.

- The `clientip` option uses the client IP address as an identifier, and associates all connections from the same client with the same real server until the client becomes inactive and the connection is aged out of the binding table. The connection timeout value (set in the Real Server Menu) is used to control how long these inactive but persistent connections remain associated with their real servers. When the client resumes activity *after* their connection has been aged out, they will be connected to the most appropriate real server based on the load balancing metric.
  An alternative approach may be to use the real server group metrics `minmisses` or `hash` (see Server Load Balancing Metrics).
- The `cookie` option uses a cookie defined in the HTTP header or placed in the URI for hashing. For more information on `cookie` option, see "Cookie-Based Persistence" on page 271. For detailed information on Cookie-Based Persistence, see the *Persistence* chapter in the *Alteon OS Application Guide*.
- The `sslid` option is for Secure Sockets Layer (SSL), which is a set of protocols built on top of TCP/IP that allow an application server and user to communicate over an encrypted HTTP session. SSL provides authentication, non-repudiation, and security. The session ID is a value comprising 32 random bytes chosen by the SSL server that gets stored in a session hash table. By enabling the `sslid` option, all subsequent SSL sessions which present the same session ID will be directed to the same real server.
- The `disable` option enables you to disable presistent binding, if it has previously been enabled for a particular application.

`rcount` <*response count number (1–16)*>

Sets the maximum response counter for cookie-based persistence. The GbE Switch Module will examine each server response until the cookie is found, or until the maximum count is reached. The default number is 1.

`udp disable|enable|stateless`

Enables or disables UDP load balancing for a virtual port (disabled by default). You can configure this option if the service(s) to be load balanced include UDP and TCP: for example, DNS uses UDP and TCP. In those environments, you must activate UDP balancing for the particular virtual servers that clients will communicate with using UDP.

When stateless is enabled, no session table entry is created.

Since no session is created, you have to bind to a new server every time.

Note: If applying a filter to the same virtual server IP address on which UDP load balancing is enabled, *disable caching on that filter for optimal performance*. For more information, see the **`cache`** command in Table 7-12 on page 278.

Table 7-7 Virtual Server Service Configuration Options (/cfg/slb/virt/service)

Command Syntax and Usage
`frag disable|enable` Enables or disables remapping server fragments for virtual port. This option is enabled by default.
`nonat disable|enable` Enables or disables substituting only the MAC address of the real server (disabled by default). This option does not substitute IP addresses. This option is used for Direct Server Return (DSR) in an one-armed load balancing setup, so that frames returning from server to the client do not have to pass through the switch.
`dnsslb disable|enable` Enables or disables DNS-based Layer 7 content load balancing.
`del` This command removes this virtual service from operation within the switch and deletes it from the Layer 4 switching software configuration. Use this command with caution, as it will delete the options that have been set for this virtual service.
`cur` Displays the current configuration of services on the specified virtual server.

/cfg/slb/virt *<server number>*/service 554

Virtual Server RTSP Configuration

This menu displays virtual services configured on service port 554 for RTSP traffic. See "/cfg/slb/virt <server number>/service <virtual port or name>" on page 266 to view the menu options for configuring virtual services on port 80.

```
[Virtual Server 1 rtsp Service Menu]
     group    - Set real server group number
     hname    - Set hostname
     rtspslb  - Set RTSP URL load balancing type
     del      - Delete virtual service
     cur      - Display current virtual service configuration
```

Table 7-8 Virtual Server Service Configuration Menu Options (/cfg/slb/virt 1/service 554)

Command Syntax and Usage

`group` *<real server group number (1-64)>*

Sets real server group number.

`hname`

Sets the hostname for a service added. This is used in conjunction with dname (above) to create a full host/domain name for individual services.

The format for this command is: `# hname` *<hostname>*

For example, to add a hostname for Web services, you could specify *www* as the hostname. If a `dname` of "foocorp.com" was defined (above), "www.foocorp.com" would be the full host/domain name for the service.

To clear the hostname for a service, use the command: `# hname none`

`rtspslb hash|patternMatch|disable`

This Layer 7 load balancing option sets the type of `rtspslb` (`hash|patternMatch`, thereby enabling the service), or disables `rtspslb` service altogether with `disable` command.

To enable Layer 7 load balancing for RTSP service, `group` must be configured under the menu `/cfg/slb/virt` *<virtual server number>*`/service 80`. If you don't configure `group`, service 80 and service RTSP will load balance the default group, which is `group 1`. See command `group` in the table "Virtual Server Service Configuration Options (/cfg/slb/virt/service)" on page 267 for details on how to configure `group`.

`del`

Deletes this virtual service.

`cur`

Displays the current virtual service configuration.

Cookie-Based Persistence

The `cookie` option is used to establish cookie-based persistence, and has the following command syntax and usage:

```
pbind cookie <mode> <name> <offset> <length> <URI>
```

Each parameter is explained in the following table.

Table 7-9 Command Syntax and Usage for `pbind cookie` Options (/cfg/slb/virt/service/pbind cookie)

Option	Description
<mode>	Specify the mode for cookie-based persistence. The following three modes are available: ■ **`p:`** Passive mode. In this mode, the network administrator configures the Web server to embed a cookie in the server response that the switch looks for in subsequent requests from the same client. ■ **`r:`** Rewrite mode. In active cookie mode (or cookie rewrite mode), the switch, and not the network administrator, generates the cookie value on behalf of the server. The switch intercepts this persistence cookie and rewrites the value to include server-specific information before sending it to the client. ■ **`i:`** Insert mode. When a client sends a request *without* a cookie, the server responds with the data, and the switch inserts an *Alteon persistence cookie* into the data packet. The switch uses this cookie to bind to the appropriate server. Insert cookie mode expiration parameters are as follows: Enter insert-cookie expiration as either: ■ ... a date *<MM/dd/yy[@hh:mm]>* (e.g. 12/31/01@23:59) ■ ... a duration *<days[:hours[:minutes]]>* (e.g. 45:30:90) ■ ... or none *<return>*
<name>	Enter the name of the cookie.
<offset>	Enter the starting point of the cookie value (1-64)
<length>	Enter number of bytes to extract (1-64). For cookie rewrite, the extracting length must be 8 or 16.
<URI>	Look for cookie in the URI. If you want to look for cookie name or value in the URI, enter **`e`** to enable this option. To look for cookie in the HTTP header, enter **`d`** to disable this option.

For more information on Cookie-Based Persistence, see the *Alteon OS 20.2 Application Guide*.

/cfg/slb/filt *<filter number>*
SLB Filter Configuration

```
[Filter 1   Menu]
      adv     - Filter Advanced Menu
      name    - Set filter name
      smac    - Set source MAC address
      dmac    - Set destination MAC address
      sip     - Set source IP address
      smask   - Set source IP mask
      dip     - Set destination IP address
      dmask   - Set destination IP mask
      proto   - Set IP protocol
      sport   - Set source TCP/UDP port or range
      dport   - Set destination TCP/UDP port or range
      action  - Set action
      group   - Set real server group for redirection
      rport   - Set real server port for redirection
      nat     - Set which addresses are network address translated
      vlan    - Set vlan id
      invert  - Enable/disable filter inversion
      ena     - Enable filter
      dis     - Disable filter
      del     - Delete filter
      cur     - Display current filter configuration
```

The switch supports up to 1024 traffic filters. Each filter can be configured to allow, deny, redirect or perform Network Address Translation on traffic according to a variety of address and protocol specifications, and each physical switch port can be configured to use any combination of filters. This command is disabled by default.

There are several options available in the Filter Advanced Menu (`/cfg/slb/filt/adv`, page 277) that can be used to provide more information through syslog. The types of information include:

- IP protocol
- TCP/UDP ports
- TCP flags
- ICMP message type

The following parameters are required for filtering:

- Set the address, masks, and/or protocol that will be affected by the filter
- Set the filter action (allow, deny, redirect, nat)
- Enable the filter
- Add the filter to a switch port
- Enable filtering on the GbE Switch Module port

Table 7-10 Filter Configuration Menu Options (/cfg/slb/filt)

Command Syntax and Usage
adv Displays the Filter Advanced Menu. To view menu options, see page 277.
name *<31 character name>* | **none** Allows the user to assign a name to a filter.
smac *<MAC address (such as, 00:60:cf:40:56:00)>* | **any** Sets the source MAC address. The default is `any`.
dmac *<MAC address (such as, 00:60:cf:40:56:00)>* | **any** Sets the destination MAC address. The default is `any`.
sip *<IP address>* | **any** If defined, traffic with this source IP address will be affected by this filter. Specify an IP address in dotted decimal notation, or `any`. A range of IP addresses is produced when used with the `smask` below. The default is `any` if the source MAC address is `any`.
smask *<<IP subnet mask (such as, 255.255.255.0>* This IP address mask is used with the `sip` to select traffic which this filter will affect. See details below for more information on producing address ranges. For more information, see "Defining IP Address Ranges for Filters" on page 276.
dip *<IP address>* | **any** If defined, traffic with this destination IP address will be affected by this filter. Specify an IP address in dotted decimal notation, or `any`. A range of IP addresses is produced when used with the `dmask` below. The default is `any` if the destination MAC address is `any`. For more information, see "Defining IP Address Ranges for Filters" on page 276.
dmask *<IP subnet mask (such as, 255.255.255.0)>* This IP address mask is used with the `dip` to select traffic which this filter will affect.

Table 7-10 Filter Configuration Menu Options (/cfg/slb/filt)

Command Syntax and Usage

`proto` *<number>* | *<name>* | **`any`**

If defined, traffic from the specified protocol is affected by this filter. Specify the protocol number, name, or "**`any`**". The default is `any`. Listed below are some of the well-known protocols.

Number	Name
1	`icmp`
2	`igmp`
6	`tcp`
17	`udp`
89	`ospf`
112	`vrrp`

`sport` *<name>* | *<port>* | *<port>-<port>* | **`any`**

If defined, traffic with the specified TCP or UDP source port will be affected by this filter. Specify the port number, range, name, or "**`any`**". The default is `any`. Listed below 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`
109	`pop2`
110	`pop3`

`dport` *<name>*|*<port>*|*<port>*`-`*<port>* | **`any`**

If defined, traffic with the specified real server TCP or UDP destination port will be affected by this filter. Specify the port number, range, name, or "**`any`**", just as with `sport` above. The default is set at `any`.

Table 7-10 Filter Configuration Menu Options (/cfg/slb/filt)

Command Syntax and Usage

`action allow|deny|redir|nat`

Specify the action this filter takes:

`allow`	Allow the frame to pass (by default).
`deny`	Discard frames that fit this filter's profile. This can be used for building basic security profiles.
`redir`	Redirect frames that fit this filter's profile, such as for web cache redirection. In addition, Layer 4 processing must be activated (see the `/cfg/slb/on` command on page 251).
`nat`	Perform generic Network Address Translation (NAT). This can be used to map the source or destination IP address and port information of a private network scheme to/from the advertised network IP address and ports. This is used in conjunction with the `nat` option below and can also be combined with proxies.

`group` *<real server group number (1-64)>*

This option applies only when `redir` is specified at the filter action. Define a real server group (1 to 16) to which redirected traffic will be sent. The default is group 1

`rport` *<real server port (0-65535)>*

This option applies only when `redir` is specified at the filter action. This defines the real server TCP or UDP port to which redirected traffic will be sent. For valid Layer 4 health checks, this must be configured whenever TCP protocol traffic is redirected. Also, if transparent proxies are used for Network Address Translation (NAT) on the GbE Switch Module (see the `pip` option in Table 7-17 on page 283), `rport` must be configured for all Application Redirection filters. The default is set at 0.

`nat source|dest`

When `nat` is set as the filter action (see above), this command specifies whether Network Address Translation (NAT) is performed on the source or the destination information. Destination (`dest`) is set as the default filter. If `source` is specified, the frame's source IP address (`sip`) and port number (`sport`) are replaced with the `dip` and `dport` values. If `dest` is specified, the frame's destination IP address (`dip`) and port number (`dport`) are replaced with the `sip` and `sport` values.

`vlan` **<***VLAN ID (1 - 4095)***>|any**

Sets the ID of the VLAN that is to be filtered. This option allows you to match the VLAN ID of the switch against the VLAN ID of the incoming packet. The default is `any`, which means the switch will match any VLAN ID of the incoming packet

This command allows filters to be configured on per VLAN basis, and applies a filter to a VLAN that already has been configured. A VLAN has a set of member ports. But by applying this filter to a VLAN, the filter does not get applied to all the member ports of this VLAN. You have to manually add the filter to the port.

`inver disable|enable`

Inverts the filter logic. If the conditions of the filter are met, *don't* act. If the conditions for the filter are *not met,* perform the assigned action. This option is disabled by default.

Table 7-10 Filter Configuration Menu Options (/cfg/slb/filt)

Command Syntax and Usage
`ena` Enables this filter.
`dis` Disables this filter.
`del` Deletes this filter.
`cur` Displays the current configuration of the filter.

Defining IP Address Ranges for Filters

You can specify a range of IP address for filtering both the source and/or destination IP address for traffic. When a range of IP addresses is needed, the `sip` (source) or `dip` (destination) defines the base IP address in the desired range, and the `smask` (source) or `dmask` (destination) is the mask which is applied to produce the range.

For example, to determine if a client request's destination IP address should be redirected to the cache servers attached to a particular switch, the destination IP address is masked (bitwise AND) with the `dmask` and then compared to the `dip`.

As another example, you could configure the switch with two filters so that each would handle traffic filtering for one half of the Internet. To do this, you could define the following parameters:

Table 7-11 Filtering IP Address Ranges

Filter	Internet Address Range	dip	dmask
#1	0.0.0.0 - 127.255.255.255	0.0.0.0	128.0.0.0
#2	128.0.0.0 - 255.255.255.255	128.0.0.0	128.0.0.0

/cfg/slb/filt *<filter number>*/adv

Advanced Filter Configuration

```
[Filter 2 Advanced Menu]
     tcp       - TCP Advanced Menu
     ip        - IP Advanced Menu
     layer7    - Layer 7 Advanced Menu
     icmp      - Set ICMP message type
     tmout     - Set NAT session timeout
     idshash   - Set hash parameter for intrusion detection SLB
     thash     - Set hash parameter for Filter
     cache     - Enable/disable caching sessions that match filter
     log       - Enable/disable logging
     linklb    - Enable/disable WAN link load balancing
     dbind     - Enable/disable delayed binding for redirection
     proxy     - Enable/disable client proxy
     cur       - Display current advanced filter configuration
```

Table 7-12 Advanced Filter Menu (/cfg/slb/filt/adv)

Command Syntax and Usage
tcp Displays the TCP Flags Advanced Menu. To view menu options, see page 279.
ip Sets IP advanced menu. To view menu options, see page 280.
layer7 Displays the Layer 7 Advanced Menu. To view menu options, see page 281.
icmp *<number>*|*<type; "icmp list" for list>*|**any** Sets the ICMP message type. The default is set at any. For a list of ICMP message types, see Table 7-16 on page 282. For a detailed description of filtering and ICMP, see the *Alteon OS 20.2 Application Guide.*
tmout *<even number of minutes, 4-30>* Sets the Network Address Translation (NAT) session timeout in an even number of minutes (4–30). The default is set at 4 minutes.
idshash sip|**dip**|**both** Sets the hash metric parameter for Intrusion Detection System Server Load Balancing

Table 7-12 Advanced Filter Menu (/cfg/slb/filt/adv)

Command Syntax and Usage
`thash auto|sip|dip|both|sip+sport` Allows you to choose hash parameter to use for filter redirection. The Default is `auto`. The `sip` option allows you to perform tunable hash on source IP address for this filter. The option `dip` allows you to perform tunable hash on destination IP address for this filter. The option `both` allows you to perform tunable hash on both source IP address and the destination IP address at the same time. The option `sip+sport` allows you to perform tunable hash on both source IP address and source port at the same time.
`cache disable|enable` Enables or disables caching sessions that match the filter. Exercise caution while applying cache-enabled and cache-disabled filters to the same switch port. A cache-enabled filter creates a session entry in the switch, so that the switch can bypass checking for subsequent frames that match the same criteria. Cache is enabled by default. **Note:** Cache should be disabled if applying a filter to virtual server IP address while performing UDP load balancing (see "udp disable|enable|stateless" on page 268).
`log disable|enable` Enables or disables logging filter messages. This option is disabled by default.
`linklb disable|enable` Enables or disables WAN Link Load Balancing. By default, this option is disabled.
`dbind disable|enable` Enables or disables delayed binding for redirection on this filter.
`proxy disable|enable` Enables or disables client proxy. This option applies only when `redir` or `nat` is specified as the filter action. Enable or disable proxy IP address translation for traffic matching the filter criteria. By default, this is enabled. If disabled, any proxy defined for the switch port using the `pip` command (see page 283) is not performed for traffic meeting the filter criteria. This is useful when certain traffic must retain original IP address information, or when other forms of translation (such as Application Redirection or NAT) are preferred.
`cur` Displays the current advanced filter configuration.

/cfg/slb/filt *<filter number>*/adv/tcp

Advanced Filter TCP Configuration

```
[TCP advanced menu Menu]
      urg     - Enable/disable TCP URG matching
      ack     - Enable/disable TCP ACK matching
      psh     - Enable/disable TCP PSH matching
      rst     - Enable/disable TCP RST matching
      syn     - Enable/disable TCP SYN matching
      fin     - Enable/disable TCP FIN matching
      ackrst  - Enable/disable TCP ACK or RST matching
      tcplim  - Enable/disable TCP connection rate limiting
      maxconn - Set maximum connections for TCP rate limiting
      cur     - Display current TCP configuration
```

These commands can be used to configure packet filtering for specific TCP flags.

Table 7-13 Advanced Filter TCP Menu (/cfg/slb/filt/adv/tcp)

Command Syntax and Usage
urg disable|enable Enables or disables TCP URG (urgent) flag matching. By default, this option is disabled.
ack disable|enable Enables or disables TCP ACK (acknowledgement) flag matching. By default, this option is disabled.
psh disable|enable Enables or disables TCP PSH (push) flag matching. By default, this option is disabled.
rst disable|enable Enables or disables TCP RST (reset) flag matching. By default, this option is disabled.
syn disable|enable Enables or disables TCP SYN (synchronize) flag matching. By default, this option is disabled.
fin disable|enable Enables or disables TCP FIN (finish) flag matching. By default, this option is disabled.
ackrst disable|enable Enables or disables TCP acknowledgement or reset flag matching. By default, this option is disabled.
tcplim disable|enable Enables or disables TCP connection rate limiting. By default, this option is disabled.

Table 7-13 Advanced Filter TCP Menu (/cfg/slb/filt/adv/tcp)

Command Syntax and Usage
`maxconn` *<number of connections in units of 10 (0-255)>* Sets the maximum limit for new TCP connections in units of 10. To set the maximum number of connections (2,550), enter 250. To set the minimum number of connections (10, from the same user), enter 1. The default is 10 (100 connections).
`cur` Displays the current Access Control List TCP filter configuration.

`/cfg/slb/filt` *<filter number>* `/adv/ip`

IP Advanced Menu

```
[IP advanced menu]
      tos      - Set IP Type of Service
      tmask    - Set IP TOS mask
      newtos   - Set new IP TOS
      option   - Enable/disable IP option matching
      cur      - Display current IP configuration
```

Table 7-14 IP Advanced Menu Options (/cfg/slb/filt #/adv/ip)

Command Syntax and Usage
`tos` *<0-255>* Sets IP type of service (ToS) and the value of the type of service. For more information on ToS, refer to RFC 1340 and 1349.
`tmask` *<0-255>* Sets IP type of service mask.
`newtos` *<0-255>* Sets new IP type of service.
`option disable|enable` Enables or disables IP option matching.
`cur` Displays current advanced IP settings for the selected filter.

/cfg/slb/filt *<filter number>* /adv/layer7

Layer 7 Advanced Menu

```
[Layer 7 Advanced Menu]
     addstr   - Add string for layer 7 filtering
     remstr   - Remove string for layer 7 filtering
     rdsnp    - Enable/disable WAP RADIUS Snooping
     ftpa     - Enable/disable active FTP NAT
     l7lkup   - Enable/disable Layer 7 content lookup
     cur      - Display current layer 7 configuration
```

Table 7-15 Layer 7 Advanced Menu Options (/cfg/slb/filt #/adv/layer7)

Command Syntax and Usage
`addstr` *<string id (1-512)>* Adds the string ID to this filter for L7 filtering. The string is defined under: `/cfg/slb/layer7/slb/add`.
`remstr` *<string id (1-512)>* Removes the string ID for Layer 7 filtering. The string is defined under: `/cfg/slb/layer7/slb/add`.
`rdsnp disable|enable` Enables or disables WAP RADIUS Snooping capability of a filter. By default, this option is disabled.
`ftpa disable|enable` Enables or disables active FTP Client Network Address Translation (NAT). When a client in active FTP mode sends a `PORT` command to a remote FTP server, the switch will look into the data part of the frame and replace the client ’s private IP address with a proxy IP (`PIP`) address. The real server port (`RPORT`) will be replaced with a proxy port (`PPORT`), that is `PIP:PPORT`. By default, this option is disabled.
`l7lkup` Enable/disable Layer 7 content lookup.
`cur` Displays current advanced Layer 7 settings for the selected filter.

ICMP Message Types

The following ICMP message types are used with the `/cfg/slb/filt/adv/icmp` command. You can list all ICMP message types with the `/cfg/slb/filt/adv/icmp list` command.

Table 7-16 ICMP Message Types

Type #	Message Type	Description
0	`echorep`	ICMP echo reply
3	`destun`	ICMP destination unreachable
4	`quench`	ICMP source quench
5	`redir`	ICMP redirect
8	`echoreq`	ICMP echo request
9	`rtradv`	ICMP router advertisement
10	`rtrsol`	ICMP router solicitation
11	`timex`	ICMP time exceeded
12	`param`	ICMP parameter problem
13	`timereq`	ICMP timestamp request
14	`timerep`	ICMP timestamp reply
15	`inforeq`	ICMP information request
16	`inforep`	ICMP information reply
17	`maskreq`	ICMP address mask request
18	`maskrep`	ICMP address mask reply

`/cfg/slb/port` *<port alias or number>*
Port SLB Configuration

```
[SLB port INT1 Menu]
      client  - Enable/disable client processing
      server  - Enable/disable server processing
      rts     - Enable/disable RTS processing
      hotstan - Enable/disable hot-standby processing
      intersw - Enable/disable inter-switch processing
      proxy   - Enable/disable use of PIP for ingress traffic
      filt    - Enable/disable filtering
      add     - Add filter to port
      rem     - Remove filter from port
      idslb   - Enable/disable intrusion detection server load balancing
      cur     - Display current port configuration
```

Alteon OS switch software allows you to enable or disable processing independently for each type of Layer 4 traffic (client and server) on a *per port* basis, expanding your topology options.

NOTE – When changing the filters on a given port, it may take some time before the port session information is updated so that the filter changes take effect. To make port filter changes take effect immediately, clear the session binding table for the port (see the `clear` command in Table 8-3 on page 302).

Table 7-17 Port Configuration Menu Options (/cfg/slb/port)

Command Syntax and Usage

`client disable|enable`

For Server Load Balancing, the port can be enabled or disabled to process client Layer 4 traffic. Ports configured to process client request traffic bind servers to clients and provide address translation from the virtual server IP address to the real server IP address, re-mapping virtual server IP addresses and port values to real server IP addresses and ports. Traffic not associated with virtual servers is switched normally. Maximizing the number of these ports on the Layer 4 switch will improve the switch's potential for effective Server Load Balancing. This option is disabled by default.

`server disable|enable`

Ports configured to provide real server responses to client requests require real servers to be connected to the Layer 4 switch, directly or through a hub, router, or another switch. When server processing is enabled, the switch port re-maps real server IP addresses and Layer 4 port values to virtual server IP addresses and Layer 4 ports. Traffic not associated with virtual servers is switched normally. This option is disabled by default.

Table 7-17 Port Configuration Menu Options (/cfg/slb/port)

`rts disable|enable`

Enables or disables Return to Sender (RTS) load balancing on this port. This option is used for firewall load balancing or VPN load balancing applications. Enable `rts` on all client-side ports to ensure that traffic ingresses and egresses through the same port. This option is disabled by default.

For more information on using `rts`, see the "Firewall Load Balancing" and "VPN Load Balancing" chapters in the *Alteon OS 20.2 Application Guide*.

`hotstan disable|enable`

Enables or disables hot-standby processing. Use this option and the `intersw` option in conjunction with VRRP hot-standby failover. This option is disabled by default.

`intersw disable|enable`

Enables or disables inter-switch processing. This option is enabled for ports connected to a peer switch and is disabled by default.

`proxy disable|enable`

Enables or disables a proxy for traffic that ingresses this port. When the PIP is defined, client address information in Layer 4 requests is replaced with this proxy IP address.

In Server Load Balancing applications, this forces response traffic to return through the switch, rather than around it, as is possible in complex routing environments.

Proxies are also useful for Application Redirection and Network Address Translation (NAT). When `pip` is used with Application Redirection filters, each filter's `rport` parameter must also be defined (see `rport` on page 273). This option is disabled by default.

`filt disable|enable`

Enables or disables filtering on this port. Enabling the filter sets up the Real Server to look into the VPN session table. This option is disabled by default.

`add` *<filter ID (1 to 1024)|block of IDs (first-last)>*

Adds a filter or a block of filters for use on this port. Enter filter ID (1 to 1024) or a contiguous block of filter IDs. For example, 1-100.

`rem` *<filter ID (1 to 1024)|block of IDs (first-last)>*

Removes a filter or a block of filters from use on this port. Enter filter ID (1 to 1024) or a contiguous block of filter IDs. For example, 1-100.

`idslb disable|enable`

Enables or disables Intrusion Detection System Server Load Balancing for this port. This option is disabled by default.

`cur`

Displays current system parameters.

/cfg/slb/layer7
Layer 7 SLB Resource Definition Menu

```
[Layer 7 Resource Definition Menu]
     redir   - Web Cache Redirection Menu
     slb     - Server Load Balancing Menu
     dbindtm - Set timeout for incomplete delayed binding connections
     cur     - Display current Layer 7 configuration
```

Table 7-18 Layer 7 Resource Definition Menu Options (/cfg/slb/layer7)

Command Syntax and Usage
`redir` Displays the Web Cache Redirection Menu. To view menu options, see page 286.
`slb` Displays the Server Load Balancing Menu. To view menu options, see page 287.
`dbindtm` *<10-60 seconds>* Sets the timeout for incomplete delayed binding connections.
`cur` Displays the current Layer 7 configuration.

/cfg/slb/layer7/redir

Web Cache Redirection Configuration

```
[Web Cache Redirection Menu]
     urlal   - Enable/disable auto-ALLOW for non-GETs to origin servers
     cookie  - Enable/disable auto-ALLOW for Cookie to origin servers
     nocache - Enable/disable no-cache control header to origin servers
     hash    - Enable/disable URL hashing based on URI
     header  - Enable/disable server loadbalance based on HTTP header
     cur     - Display current WCR configuration
```

Table 7-19 Web Cache Redirection Menu Options (/cfg/slb/layer7/redir)

Command Syntax and Usage

`urlal disable|enable`

Enables or disables auto-ALLOW for non-GETs to origin servers.

- If this command is enabled, the switch will redirect all non-GET requests to the origin server.
- If this command is disabled, the switch will compare the URI against the expression table to determine whether all non-GET requests should be redirected to a cache server or origin server.

This option is enabled by default.

`cookie disable|enable`

Enables or disables auto-ALLOW for cookie to origin servers.

- If this command is enabled, the switch will redirect all requests that contain *Cookie:* in the HTTP header to the origin server.
- If this command is disabled, the switch will compare the URI against the expression table to determine whether it should redirect all requests that contain *Cookie:* in the HTTP header to a cache server or origin server.

This option is disabled by default.

`nocache disable|enable`

Enables or disables no-cache control header to origin servers.

- If this command is enabled, the switch will redirect all requests that contain *Cache-Control: no-cache* in HTTP/1.1 header, or *Pragma: no-cache* in HTTP/1.0 header to the origin server.
- If this command is disabled, the switch will compare the URI against the expression table to determine whether it should redirect requests that contain *Cache-Control: no-cache* in HTTP/1.1 header, or *Pragma: no-cache* in HTTP/1.0 header to a cache server or origin server.

This option is enabled by default.

`hash disable|enable` *<number (1-255)>*

Enables or disables URL hashing based on the URI.

- If hashing is enabled, you can set the length of URI that will be used to hash into the cache server.
- If hashing is disabled, the switch will only use the host header field to calculate the hash key.

This option is disabled by default.

Table 7-19 Web Cache Redirection Menu Options (/cfg/slb/layer7/redir)

Command Syntax and Usage

`header disable|enable`

Enables or disables server load balancing based on HTTP header. This option is disabled by default.

`cur`

Displays the current URL expression table.

/cfg/slb/layer7/slb

Server Load Balance Resource Configuration Menu

```
[Server Loadbalance Resource Menu]
     message - Set HTTP error message
     addstr  - Add SLB string for load balance
     remstr  - Remove SLB string for load balance
     rename  - Rename SLB string for load balance
     addmeth - Add HTTP method type
     remmeth - Remove HTTP method type
     cur     - Display current configuration
```

Table 7-20 Server Load Balance Resource Menu Options (/cfg/slb/layer7/slb)

Command Syntax and Usage

`message` *<64 byte error message>*

Sets the message that will be displayed when an error occurs. The default message is “No available server to handle this request.”

`addstr` *<SLB string>*

Adds the SLB string for load balancing.

`remstr` *<SLB string>*

Removes the SLB string for load balancing.

`rename` *<SLB string ID> <SLB string>*

Renames the SLB string for load balancing.

Table 7-20 Server Load Balance Resource Menu Options (/cfg/slb/layer7/slb)

Command Syntax and Usage
`addmeth` *<Method, 1-32>* Allows you to add HTTP request methods of maximum 32 characters to your switch software. HTTP allows an open-ended set of methods to be used to indicate the purpose of a request. Alteon OS 20.2 supports 22 request methods by default. The methods GET and HEAD *must* be supported by all general-purpose servers. All other methods are optional. You can see a list of supported default methods by using the command `cur` in this menu. A method is case-sensitive. The software supports both HTTP 1.0 and HTTP 1.1 to perform HTTP request methods.
`remmeth` *<Method ID>* Allows you to remove HTTP methods from your switch software.
`cur` Displays the current configuration of SLB string.

/cfg/slb/wap
WAP Configuration

```
[WAP Options Menu]
      tpcp     - Enable/disable WAP TPCP external notification
      debug    - WAP debug level
      cur      - Display current WAP configuration
```

Table 7-21 WAP Configuration Menu Options (/cfg/slb/wap)

Command Syntax and Usage
`tpcp disable|enable` Enables or disables the TPCP external notification for `Add/Delete` session requests. This option is disabled by default.
`debug` *<wap debug level (0-9)>* Sets the debug level for tracing the WAP related messages. The default is set at 0.
`cur` Displays the current WAP configuration

/cfg/slb/sync
Synchronize Peer Switch Configuration

```
[Config Synchronization Menu]
     peer    - Synch peer switch menu
     filt    - Enable or disable syncing filter configuration
     ports   - Enable or disable syncing port configuration
     prios   - Enable or disable syncing VRRP priorities
     pips    - Enable or disable syncing proxy IP addresses
     reals   - Enable/disable syncing real server configuration
     state   - Enable or disable syncing persistent session state
     update  - Set stateful failover update period
     cur     - Display current Layer 4 sync configuration
```

To synchronize the configuration between two switches, a peer must be configured and enabled on each switch. Switches being synchronized must use the same administrator password. Peers are sent SLB, FILT, and VRRP configuration updates using `/oper/slb/synch`.

Table 7-22 Synchronization Menu Options (/cfg/slb/sync)

Command Syntax and Usage
`peer` *<peer switch number (1-2)>* Displays the Sync Peer Switch Menu. This option is enabled by default. To view menu options, see page 290.
`filt disable|enable` Enables or disables synchronizing filter configuration.
`ports disable|enable` Enables or disables synchronizing Layer 4 port configuration. This option is enabled by default.
`prios disable|enable` Enables or disables syncing VRRP priorities. This option is enabled by default.
`pips disable|enable` Enables or disables synchronizing proxy IP addresses. This option is disabled by default.
`reals` Enables or disables synchronizing real server configuration. This option is disabled by default.
`state disable|enable` Enables or disables stateful failover for synchronizing the persistent session state. This option is disabled by default.

Table 7-22 Synchronization Menu Options (/cfg/slb/sync)

Command Syntax and Usage
`update` *<seconds, 1–60>* Sets the stateful failover update interval. The active server sends update packets of persistent binding entries to the backup switch at the specified update interval. The default value is 30 seconds.
`cur` Displays the current Layer 4 synchronization configuration.

/cfg/slb/sync/peer *<peer switch number>*

Peer Switch Configuration

```
[Peer Switch 1 Menu]
     addr    - Set peer switch IP address
     ena     - Enable peer switch
     dis     - Disable peer switch
     del     - Delete peer switch
     cur     - Display current peer switch configuration
```

To synchronize the configuration between two switches, a peer must be configured and enabled on each switch. Switches being synchronized must use the same administrator password.

Table 7-23 Peer Switch Configuration Menu Options (/cfg/slb/sync/peer)

Command Syntax and Usage
`addr` *<IP address>* Sets the peer switch IP address. The default is 0.0.0.0
`ena` Enables the peer for this switch. By default, this option is disabled.
`dis` Disables the peer for this switch.
`del` Deletes the peer for this switch
`cur` Displays the current peer switch configuration.

/cfg/slb/adv
Advanced Layer 4 Configuration

```
[Layer 4 Advanced Menu]
     synatk    - SYN Attack Detection Menu
     imask     - Set virtual and real IP address mask
     mnet      - Set managment network
     mmask     - Set management subnet mask
     pmask     - Set persistent mask
     timewin   - Set time window for TCP rate limiting
     holddur   - Set hold down duration for TCP rate limiting
     submac    - Enable/Disable Source MAC address substitution
     direct    - Enable/disable Direct Access Mode
     grace     - Enable/disable graceful real server failure
     matrix    - Enable/disable Virtual Matrix Architecture
     tpcp      - Enable/disable Transparent Proxy Cache Protocol
     fastage   - Session table fast-age (1 sec) period bit shift
     slowage   - Session table slow-age (2 min) period bit shift
     cur       - Display current Layer 4 advanced configuration
```

Table 7-24 Layer 4 Advanced Menu Options (/cfg/slb/adv)

Command Syntax and Usage
synatk Displays SYN Attack Detection Menu. To view menu options, see page 293.
imask *<IP subnet mask (such as 255.255.255.0)>* Configures the real and virtual server IP address mask using dotted decimal notation. The default is 255.255.255.255.
mnet *<IP address>* If defined, management traffic with this source IP address will be allowed direct (non-Layer 4) access to the real servers. Specify an IP address in dotted decimal notation. A range of IP addresses is produced when used with the `mmask` option.
mmask *<IP subnet mask (such as 255.255.255.0)>* This IP address mask is used with the `mnet` to select management traffic which is allowed direct access to real servers. The default is 255.255.255.255.
pmask *<IP subnet mask (such as 255.255.255.0)>* Sets persistent mask. The default is 255.255.255.255.

Table 7-24 Layer 4 Advanced Menu Options (/cfg/slb/adv)

Command Syntax and Usage
`timewin` *<multiple of fastage period (1-65535)>* Sets the parameter for time window for TCP rate limiting, which is a multiple of the `fastage` period. For example, if the `fastage` parameter is 2 seconds, and the `timewin` is 3, then the resulting time window is 6 seconds.
`holddur` *<multiple of slowage period (1-65535)>* This command configures the hold down duration, which is a multiple of `slowage`. Hold down (blocking of new TCP connections) occurs when the number of received SYN packets exceeds the threshold of a pre-defined time window. For example, the parameter of `slowage` is 2 minutes, and `holddur` is 5, then the resulting hold down duration is 10 minutes.
`submac disable|enable` Enables or disables Source MAC address substitution. Typically, the source MAC is not modified for the packets going to the servers in an SLB environment. But if you enable this command, the switch will substitute the source MAC address (for the packets going to the server) with the mac address of the switch.
`direct disable|enable` Enable/disables Direct Access Mode to real servers/services. This option also allows any virtual server to load balance any real server. By default, this option is disabled.
`grace disable|enable` Enables or disables graceful real server failure. Allows existing connections to newly failed server to gracefully continue. By default, this option is disabled.
`matrix disable|enable` Enables or disables the use of Virtual Matrix Architecture on the GbE Switch Module. By default, this option is enabled.
`tpcp disable|enable` Enables or disables the TPCP (Transparent Proxy Cache Protocol). This command is used for security reasons—the UDP port can be closed. By default, this option is disabled.
`fastage` *<shift the fast-age (1sec) period 0-7 bits>* Controls how frequently a *fastage scan* is performed. The default interval is two seconds. Each incremental increase of the value doubles the length of the interval. The `fastage` scan is used to remove TCP sessions that have been closed with a FIN and sessions that have been identified by the `slowage` scan as idle for the maximum allowed period. If a large value of `fastage` is used, a session can remain in the session table for a few minutes. The default is 0.

Table 7-24 Layer 4 Advanced Menu Options (/cfg/slb/adv)

Command Syntax and Usage

`slowage` *<shift the slow-age (2min) period 0-15 bits>*

Controls how frequently a *slowage scan* is performed. The default interval is two minutes. Each incremental increase of the value doubles the length of the interval. (Value is set in bits rather than seconds, which causes the time to double per increment).

The `slowage` scan is used to remove idle or non-TCP sessions from the session at the specified intervals. If a large value of slowage is used, a session can remain in the session table for months. The default is 0.

`cur`

Displays the current Layer 4 advanced configuration.

/cfg/slb/adv/synatk

SYN Attack Detection Configuration

```
[SYN Attack Detection Menu]
     intrval - Set SYN attack detection interval
     thrshld - Set SYN attack alarm threshold
     cur     - Display current SYN attack detection configuration
```

Table 7-25 SYN Attack Detection Menu Options (/cfg/slb/adv/synatk)

Command Syntax and Usage

`intrval` *<SYN attack check interval in seconds (2-3600)>*

Sets the interval of SYN attack inspection.

`thrshld` *<SYN attack alarm threshold (new half-open sessions/second) (1-100000)>*

Sets the threshold of SYN attack alarm.

`cur`

Displays the current SYN attack detection configuration.

/cfg/slb/advhc

Advanced Layer 4 Health Check

```
[Layer 4 Advanced Health Check Menu]
     script    - Scriptable Health Check Menu
     waphc     - WAP Health Check Menu
     aphttp    - Enable/disable Allow HTTP Health Check on any port
     ldapver   - LDAP version
     secret    - Set RADIUS secret
    minter    - Set interval of response and bandwidth metric updates
     cur       - Display current Layer 4 advanced health check
                 configuration
```

Table 7-26 Advanced Health Check Menu Options (/cfg/slb/advhc)

Command Syntax and Usage
`script` *<health script number (1-8)>* Displays the Scriptable Health Check Menu. To view menu options, see page 295.
`waphc` Displays the WAP Health Check Menu. To view menu options, see page 296.
`aphttp disable│enable` Enables or disables HTTP health checks on any port. By default, this option is disabled. When disabled, you can use HTTP health checks only for HTTP service. Enabling it will allow you to use it on any port, like HTTPs.
`ldapver` *<LDAP version>* Sets the LDAP version to 2 or 3. The default is 2.
`secret` *<1-32 character secret>* To perform application health checking to a RADIUS server, the network administrator must configure two parameters in the switch: the `/cfg/slb/advhc/secret` value and the `cntnt` parameter with a *username:password* value. The `secret` value is a field of up to 32 alphanumeric characters that is used by the switch to encrypt a password during the RSA Message Digest Algorithm (MD5) and by the RADIUS server to decrypt the password during verification. The default is **`none`**.
`minter` *<number of seconds between updates (1-256)>* This command sets the interval of response and bandwidth metric updates. The default is set at 10.
`cur` Displays the current Layer 4 advanced health check configuration.

`/cfg/slb/advhc/script` *<health script number>*

Scriptable Health Checks Configuration

```
[Health Script 1 Menu]
      open     - Add open command to end of script
      send     - Add send command to end of script
      expect   - Add expect command to end of script
      close    - Add close command to end of script
      rem      - Remove last command from script
      del      - Delete script
      cur      - Display current script configuration
```

The Health Script menu provides commands that can be used to define the health “script.” The total number of characters cannot exceed 1024 bytes. Up to eight scripts can be configured.

Table 7-27 Scriptable Health Check Menu Options (/cfg/slb/advhc/script)

Command Syntax and Usage
`open` *<real port or name (such as: http)>* Sets the TCP port to be opened.
`send` *<text string>* Sends an ASCII string through open TCP port. For example, an HTTP request, such as, `"GET /default.asp HTTP/1.1\\r\\nHOST: www.alteon.com\\r\\n\\r\\n."`
`expect` *<text string>* Expects an ASCII string for successful health check on open TCP port, such as an HTTP response: `HTTP/1.1 200`
`close` Closes TCP connection.
`rem` Removes the last entered line from the script.
`del` Deletes the current script.
`cur` Lists the current script configuration.

/cfg/slb/advhc/waphc

WAP Health Check Configuration

```
[WAP Health Check Menu]
     wspport - WSP port number to health check
     wtlsprt - WTLS port number to health check
     offset  - Offset in received WSP packet
     sndcnt  - Content to be sent to the WAP gateway
     rcvcnt  - Content to be received from the WAP gateway
     cur     - Display current WAP health check configuration
```

Table 7-28 WAP Health Check Menu Options (/cfg/slb/advhc/waphc)

Command Syntax and Usage

`wspport` *<port number (0-65534)>*

Enter the port number on which WSP health checks will be performed. The default port number is 9200.

`wtlsprt` *<port number (0-65534)>*

Enter the port number on which WTLS health checks will be performed. The default port number is 9203.

`offset` *<Offset in the received WSP packet (0-256)>*

Enter the offset value content of the received WSP packages. An offset value of 0 (default) sets the switch to start comparisons from the beginning of the content of the received packet.

`sndcnt` *<send content as a hexadecimal string>*

Enter a hexidecimal string that represents a connectionless WSP request to a WSP gateway. This string will be delivered to the WSP gateway.

`rcvcnt` *<receive content as a hexadecimal string>*

Enter a hexadecimal string that represents the content that the switch expects to receive from the WSP gateway.

`cur`

Displays the current WAP Health Check configuration.

/cfg/slb/pip

Proxy IP Address Configuration Menu

```
[Proxy IP Address Menu]
      pip1     - Set Proxy IP address for odd-numbered ports
      pip2     - Set Proxy IP address for even-numbered ports
      cur      - Display current Proxy IP address configuration
```

Table 7-29 Proxy IP Address Configuration Menu Options (/cfg/slb/pip)

Command Syntax and Usage
`pip1` *<IP address>* Sets the proxy IP address for odd-numbered ports using dotted decimal notation. When the `pip` is defined, client address information in Layer 4 requests is replaced with this proxy IP address.
`pip2` *<IP address>* Sets the proxy IP address for even-numbered ports.
`cur` Display current Proxy IP address configuration.

/cfg/slb/peerpip

SLB Peer Proxy IP Address Configuration Menu

When this command is enabled, the switch is able to forward traffic from the other switch, using Layer 2, without performing server processing on the packets of the other switch. This happens because the peer switches are aware of each otherís proxy IP addresses. This prevents the dropping of a packet or being sent to the backup switch in the absence of the proxy IP address of the peer switch.

```
[Peer Proxy IP Address Menu]
     add       - Add peer Proxy IP address
     rem       - Rem peer Proxy IP address
     cur       - Display current peer Proxy IP address configuration
```

Table 7-30 Proxy IP Address Configuration Menu Options (/cfg/slb/peerpip)

Command Syntax and Usage
add *<IP address>* Allows you to add a proxy IP address to the server load balancing peer.
remove *<IP address>* Allows you to remove a proxy IP address from the server load balancing peer.
cur Displays the current proxy address configuration of the peer.

CHAPTER 8

The Operations Menu

The Operations Menu is generally used for commands that affect switch performance immediately, but do not alter permanent switch configurations. For example, you can use the Operations Menu 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.

/oper
Operations Menu

```
[Operations Menu]
      port    - Operational Port Menu
      slb     - Operational Server Load Balancing Menu
      vrrp    - Operational Virtual Router Redundancy Menu
      ip      - Operational IP Menu
      clrlog  - Clear syslog messages
```

The commands of the Operations Menu enable you to alter switch operational characteristics without affecting switch configuration.

Table 8-1 Operations Menu Options (/oper)

Command Syntax and Usage
port *<port alias or number>* Displays the Operational Port Menu. To view menu options, see page 301.
slb Displays the Operational Layer 4 Menu. To view menu options, see page 302.
vrrp Displays the Operational Virtual Router Redundancy Menu. To view menu options, see page 303.

Table 8-1 Operations Menu Options (/oper)

Command Syntax and Usage
`ip` Displays the IP Operations Menu, which has one sub-menu/option, the Operational Border Gateway Protocol Menu. To view menu options, see page 303.
`clrlog` Clears all Syslog messages.

`/oper/port` *<port alias or number>*
Operations-Level Port Options

```
[Operations Port INT1 Menu]
      rmon     - Enable/Disable RMON for port
      ena      - Enable port
      dis      - Disable port
      cur      - Current port state
```

Operations-level port options are used for temporarily disabling or enabling a port, and for changing Remote Monitoring (RMON) status on a port.

Table 8-2 Operations-Level Port Menu Options (/oper/port)

Command Syntax and Usage
`rmon disable|enable` Temporarily enables/disables Remote Monitoring on the port. The port will be returned to its configured operation mode when the switch is reset.
`ena` Temporarily enables the port. The port will be returned to its configured operation mode when the switch is reset.
`dis` Temporarily disables the port. The port will be returned to its configured operation mode when the switch is reset.
`cur` Displays the current settings for the port.

/oper/slb
Operations-Level SLB Options

```
[Server Load Balancing Operations Menu]
      sync    - Synchronize SLB, VRRP and other configurations on peers
      ena     - Enable real server
      dis     - Disable real server
      clear   - Clear session table
      cur     - Current layer 4 operational state
```

When the optional Layer 4 software is enabled, the operations-level Server Load Balancing options are used for temporarily disabling or enabling real servers and synchronizing the configuration between the active/active switches.

Table 8-3 Server Load Balancing Operations Menu Options (/oper/slb)

Command Syntax and Usage
sync Synchronizes the SLB, filter, VRRP, port, and VR priorities on a peer switch (a switch that owns the IP address). To take effect, peers must be configured on the GbE Switch Module and the administrator password on the switch must be identical.
ena *<real server number (1-63)>* Temporarily enables a real server. The real server will be returned to its configured operation mode when the switch is reset.
dis *<real server number (1-63)>* **p|n** The disable command is used to temporarily disable real servers as follows: ■ Using the **n** (none) option, disables the real server entirely, removing it from operation within its real server group and virtual server ■ Using the **p** (persistent) option, temporarily disables sessions except for persistent http 1.0 sessions. The real server will be returned to its configured operation mode when the switch is reset.
clear Clears all session tables and allows port filter changes to take effect immediately. **Note:** This command disrupts current Server Load Balancing and Application Redirection sessions.
cur Displays the current SLB operational state.

/oper/vrrp
Operations-Level VRRP Options.

```
[VRRP Operations Menu]
       back    - Set virtual router to backup
```

Table 8-4 Virtual Router Redundancy Operations Menu Options (/oper/vrrp)

Command Syntax and Usage

`back` *<virtual router number (1-128)>*

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.

/oper/ip
Operations-Level IP Options

```
[IP Operations Menu]
     bgp     - Operational Border Gateway Protocol Menu
```

Table 8-5 IP Operations Menu Options (/oper/ip)

Command Syntax and Usage

`bgp`

Displays the Border Gateway Protocol Operations Menu. To view the menu options see page 304.

/oper/ip/bgp

Operations-Level BGP Options

```
[Border Gateway Protocol Operations Menu]
      start   - Start peer session
      stop    - Stop peer session
      current - Current BGP operational state
```

Table 8-6 IP Operations Menu Options (/oper/ip)

Command Syntax and Usage
`start` *<peer number (1-16)>* Starts the peer session.
`stop` *<peer number (1-16)>* Stops the peer session.
`cur` Displays the current BGP operational state.

CHAPTER 9
The Boot Options Menu

To use the Boot Options Menu, you must be logged in to the switch as the administrator. The Boot Options Menu provides 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 TFTP

In addition to the Boot Menu, you can use SNMP to work with switch image and configuration files. Refer to "Working with Switch Images and Configuration Files" on page 340.

/boot
Boot Menu

```
[Boot Options Menu]
        image - Select software image to use on next boot
        conf  - Select config block to use on next boot
        gtimg - Download new software image via TFTP
        ptimg - Upload selected software image via TFTP
        reset - Reset switch [WARNING: Restarts Spanning Tree]
        cur   - Display current boot options
```

Each of these options is discussed in greater detail in the following sections.

Updating the Switch Software Image

The switch software image is the executable code running on the GbE Switch Module. 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. To get the latest version of software available for your GbE Switch Module, go to:

`http://www.ibm.com/pc/support`

Click on software updates. Use `/boot/cur` to determine the current software version.

Upgrading the software image on your switch requires the following:

- Loading the new image onto a TFTP server on your network
- Downloading the new image from the TFTP server to your switch
- Selecting the new software image to be loaded into switch memory the next time the switch is reset

Downloading 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 download 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 download a new software to your switch, you will need the following:

- The image or boot software loaded on a TFTP server on your network
- The hostname or IP address of the TFTP server
- The name of the new software image or boot file

NOTE – The DNS parameters must be configured if specifying hostnames. See "Domain Name System Configuration" on page 234.

When the above requirements are met, use the following procedure to download the new software to your switch.

1. **At the `Boot Options#` prompt, enter:**

```
Boot Options# gtimg
```

2. **Enter the name of the switch software to be replaced:**

```
Enter name of switch software image to be replaced
 ["image1"/"image2"/"boot"]: <image>
```

3. **Enter the hostname or IP address of the TFTP server.**

```
Enter hostname or IP address of TFTP server: <server name or IP address>
```

4. **Enter the name of the new software file on the server.**

```
Enter name of file on TFTP server: <filename>
```

   The exact form of the name will vary by TFTP server. However, the file location is normally relative to the TFTP directory (usually `/tftpboot`).

5. **The system prompts you to confirm your request.**

   You should next select a software image to run, as described below.

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. **At the `Boot Options#` prompt, enter:**

```
Boot Options# image
```

2. **Enter the name of the image you want the switch to use upon the next boot.**

   The system informs you of which image is currently set to be loaded at the next reset, and prompts you to enter a new choice:

```
Currently set to use switch software "image1" on next reset.
Specify new image to use on next reset ["image1"/"image2"]:
```

Uploading a Software Image from Your Switch

You can upload a software image from the switch to a TFTP server.

1. **At the `Boot Options#` prompt, enter:**

```
Boot Options# ptimg
```

2. **The system prompts you for information. Enter the desired image:**

```
Enter name of switch software image to be uploaded
["image1"|"image2"|"boot"]: <image> <hostname or server-IP-addr> <server-file-name>
```

3. **Enter the name or the IP address of the TFTP server:**

```
Enter hostname or IP address of TFTP server: <server name or IP address>
```

4. **Enter the name of the file into which the image will be uploaded on the TFTP server:**

```
Enter name of file on TFTP server: <filename>
```

5. **The system then requests confirmation of what you have entered. To have the file uploaded, enter Y.**

```
image2 currently contains Software Version 20.0.1.0
Upload will transfer image2 (1889411 bytes) to file "test"
 on TFTP server 192.1.1.1.
Confirm upload operation [y/n]: y
```

Selecting a Configuration Block

When you make configuration changes to the GbE Switch Module, you must save the changes so that they are retained beyond the next time the switch is reset. When you perform the `save` command, 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 GbE Switch Module 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 GbE Switch Module is moved to a network environment where it will be re configured for a different purpose.

Use the following procedure to set which configuration block you want the switch to load the next time it is reset:

1. **At the `Boot Options#` prompt, enter:**

```
Boot Options# conf
```

2. **Enter the name of the configuration block you want the switch to use:**

The system informs you of which configuration block is currently set to be loaded at the next reset, and prompts you to enter a new choice:

```
Currently set to use active configuration block on next reset.
Specify new block to use ["active"/"backup"/"factory"]:
```

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.

NOTE – Resetting the switch causes the date and time to revert to default values. Use `/cfg/sys/date` and `/cfg/sys/time` to reenter the current date and time.

To reset the switch, at the `Boot Options#` prompt, enter:

```
>> Boot Options# reset
```

You are prompted to confirm your request.

CHAPTER 10

The Maintenance Menu

The Maintenance Menu is used to manage dump information and forward database information. It also includes a debugging menu to help with troubleshooting.

/maint Maintenance Menu

NOTE – To use the Maintenance Menu, you must be logged in to the switch as the administrator.

```
[Maintenance Menu]
      sys      - System Maintenance Menu
      fdb      - Forwarding Database Manipulation Menu
      arp      - ARP Cache Manipulation Menu
      route    - IP Route Manipulation Menu
      igmp     - IGMP Multicast Menu
      debug    - Debugging Menu
      uudmp    - Uuencode FLASH dump
      ptdmp    - tftp put FLASH dump to tftp server
      cldmp    - Clear FLASH dump
      lsdmp    - List FLASH dump
      panic    - Dump state information to FLASH and reboot
      tsdmp    - Tech support dump
```

Dump information contains internal switch state data that is written to flash memory on the GbE Switch Module after any one of the following occurs:

- The switch administrator forces a switch *panic*. The `panic` option, found in the Maintenance Menu, causes the switch to dump state information to flash memory, and then causes the switch to reboot.
- 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.

Table 10-1 Maintenance Menu Options (/maint)

Command Syntax and Usage
`sys` Displays the System Maintenance Menu. To view menu options, see page 313.
`fdb` Displays the Forwarding Database Manipulation Menu. To view menu options, see page 313.
`arp` Displays the ARP Cache Manipulation Menu. To view menu options, see page 316.
`route` Displays the IP Route Manipulation Menu. To view menu options, see page 317.
`igmp` Displays the IGMP Maintenance Menu.
`debug` Displays the Debugging Menu. To view menu options, see page 315.
`uudmp` Displays dump information in uuencoded format. For details, see page 321.
`ptdmp hostname, filename [-mgmt|-data]` Saves the system dump information via TFTP. For details, see page 322.
`cldmp` Clears dump information from flash memory. For details, see page 322.
`lsdmp` Displays list flash dump.
`panic` Dumps MP information to FLASH and reboots. For details, see page 323.
`tsdmp` Dumps all GbE Switch Module information, statistics, and configuration.You can log the tsdump output into a file.

/maint/sys
System Maintenance Options

This menu is reserved for use by IBM Service Support. The options are used to perform system debugging.

```
[System Maintenance Menu]
      flags    - Set NVRAM flag word
```

Table 10-2 System Maintenance Menu Options (/maint/sys)

Command Syntax and Usage
`flags` *<new NVRAM flags word as 0xXXXXXXXX>* This command sets the flags that are used for debugging purposes by Tech support group.

/maint/fdb
Forwarding Database Options

```
[FDB Manipulation Menu]
      find     - Show a single FDB entry by MAC address
      port     - Show FDB entries for a single port
      trunk    - Show FDB entries on a single trunk
      vlan     - Show FDB entries for a single VLAN
      refpt    - Show FDB entries referenced by a single port
      dump     - Show all FDB entries
      del      - Delete an FDB entry
      clear    - Clear entire FDB
```

The Forwarding Database Manipulation Menu can be used to view information and to delete a MAC address from the forwarding database or clear the entire forwarding database. This is helpful in identifying problems associated with MAC address learning and packet forwarding decisions.

Table 10-3 FDB Manipulation Menu Options (/maint/fdb)

Command Syntax and Usage
`find` *<MAC address>* [*<VLAN>*] 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 `xx:xx:xx:xx:xx:xx` format (such as `08:00:20:12:34:56`) or `xxxxxxxxxxxx` format (such as `080020123456`).
`port` *<port alias or number, 0 for unknown>>* Displays all FDB entries for a particular port. Use “0” for unknown port number.
`trunk` Displays all FDB entries on a single trunk.
`vlan` *<VLAN number (1-4095)>* Displays all FDB entries on a single VLAN.
`refpt` *<SP number (1-4)>* Displays all FDB entries reference by a single port.
`dump` Displays all entries in the Forwarding Database. For details, see page 59.
`del` *<MAC address> [<VLAN>]* Removes a single FDB entry.
`clear` Clears the entire Forwarding Database from switch memory.

/maint/debug
Debugging Options

```
[Miscellaneous Debug Menu]
      tbuf     - Show MP trace buffer
      sptb     - Show SP trace buffer
      spall    - Show All SP trace buffers
      clrcfg   - Clear all flash configs
      vmasp    - Show designated SP for IP address
```

The Miscellaneous Debug Menu displays trace buffer information about events that can be helpful in understanding switch operation. You can view the following information using the debug menu:

- Events traced by the Management Processor (MP)
- Events traced by the Switch Processor (SP)
- Events traced to a buffer area when a reset occurs

If the switch resets for any reason, the MP trace buffer and SP trace buffers are saved into the snap trace buffer area. The output from these commands can be interpreted by IBM Service Support.

Table 10-4 Miscellaneous Debug Menu Options (/maint/debug)

Command Syntax and Usage

`tbuf`
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.

`snap` Displays the Management Processor snap (or post-mortem) trace buffer. This buffer contains information traced at the time that a reset occurred.
`sptb` *<port number (1-4)>* Displays the Switch Processor trace buffer. Header information similar to the following is shown: `SP 1 trace buffer at 10:56:35 Tue Jul 30, 2002; mask: 0x00800008` The buffer information is displayed after the header.

`spall`
Displays the Switch Processor trace buffer. Header information similar to the following is shown:
`SP 1 trace buffer at 10:56:35 Tue Jul 30, 2002; mask: 0x00800008.`
The buffer information is displayed after the header. Displays all SP trace buffers.

`clrcfg` Deletes all flash configuration blocks.

Table 10-4 Miscellaneous Debug Menu Options (/maint/debug)

Command Syntax and Usage
`vmasp` *<IP address>* Displays the assigned SP (Switch Processor) for this IP address.

/maint/arp
ARP Cache Options

```
[Address Resolution Protocol Menu]
     find    - Show a single ARP entry by IP address
     port    - Show ARP entries on a single port
     vlan    - Show ARP entries on a single VLAN
     refpt   - Show ARP entries referenced by a single port
     dump    - Show all ARP entries
     add     - Add a permanent ARP entry
     del     - Delete an ARP entry
     clear   - Clear ARP cache
     addr    - Show ARP address list
```

Table 10-5 Address Resolution Protocol Menu Options (/maint/arp)

Command Syntax and Usage
`find` *<IP address (such as, 192.4.17.101)>* Shows a single ARP entry by IP address.
`port` *<port alias or number>* Shows ARP entries on a single port.
`vlan` *<VLAN number>* Shows ARP entries on a single VLAN.
`refpt` *<SP number (1-4)>* Shows all ARP entries referenced by a single port.
`dump` Shows all ARP entries.
`add` *<IP address> <MAC address> <VLAN number> <port>* Adds a single ARP entry from switch memory.
`del` *<IP address (such as, 192.4.17.101)>* Removes a single ARP entry from switch memory.
`clear` Clears the entire ARP list from switch memory.
`addr` Shows the list of IP addresses which the switch will respond to for ARP requests.

NOTE – To display all ARP entries currently held in the switch, or a portion according to one of the options listed on the menu above (`find`, `port`, `vlan`, `refpt`, `dump`), you can also refer to "ARP Information" on page 70.

/maint/route
IP Route Manipulation

```
[IP Routing Menu]
       find   - Show a single route by destination IP address
       gw     - Show routes to a single gateway
       type   - Show routes of a single type
       tag    - Show routes of a single tag
       if     - Show routes on a single interface
       dump   - Show all routes
       clear  - Clear route table
```

Table 10-6 IP Route Manipulation Menu Options (/maint/route)

Command Syntax and Usage
`find` *<IP address (such as, 192.4.17.101)>* Shows a single route by destination IP address.
`gw` *<default gateway address (such as, 192.4.17.44)>* Shows routes to a default gateway.
`type indirect|direct|local|broadcast|martian|multicast` Shows routes of a single type. For a description of IP routing types, see Table 4-9 on page 69
`tag fixed|static|addr|rip|ospf|bgp|broadcast|martian|vip` Shows routes of a single tag. For a description of IP routing tags, see Table 4-10 on page 70
`if` *<interface number (1-128)>* Shows routes on a single interface.
`dump` Shows all routes.
`clear` Clears the route table from switch memory.

NOTE – To display all routes, you can also refer to “IP Routing Information” on page 68.

/maint/igmp
IGMP Configuration

```
[IGMP Menu]
     snoop     - IGMP Snooping Menu
     mrouter   - IGMP Multicast Router Port Menu
     dump      - Dump all IGMP items
     clear     - Clear all IGMP tables
```

Table 10-7 describes the IGMP Maintenance commands.

Table 10-7 IGMP Multicast Group Menu Options (/maint/igmp)

Command Syntax and Usage
snoop Displays IGMP multicast group information.
mrouter Displays static Multicast Router information.
dump Displays all IGMP information.
clear Clears all IGMP tables.

/maint/igmp/snoop
IGMP Multicast Router Port Information

```
[IGMP Snooping Menu]
     find     - Show a single group by IP group address
     vlan     - Show groups on a single vlan
     port     - Show groups on a single port
     dump     - Show all groups
     clear    - Clear group table
```

Table 10-8 describes the IGMP Snooping Maintenance commands.

Table 10-8 IGMP Multicast Group Menu Options (/maint/igmp/snoop)

Command Syntax and Usage
`find` *<IP address>* Displays a single IGMP multicast group by its IP address.
`vlan` *<VLAN number>* Displays all IGMP multicast groups on a single VLAN.
`port` *<Port number or alias>* Displays all IGMP multicast groups on a single port.
`dump` Displays information for all multicast groups.
`clear` Clears the IGMP group table.

/maint/igmp/mrouter
IGMP Multicast Router Port Information

```
[IGMP Multicast Router Ports Menu]
     vlan  - Show all learned multicast router ports on a single vlan
     dump     - Show all learned multicast router ports
     versions - Show last detected multicast router IGMP versions
     clear    - Clear multicast router port table
```

Table 10-9 describes the multicast router maintenacne commands.

Table 10-9 IGMP Multicast Router Menu Options (/maint/igmp/mrouter)

Command Syntax and Usage
`vlan` Displays information for all multicast groups learned on the selected VLAN.
`dump` Displays information for all multicast groups learned by the switch.
`versions` Displays the IGMP version of the most recent multicast group learned by the switch.
`clear` Clears the IGMP multicast router port table.

/maint/uudmp
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 `uudmp` command. This will ensure that you do not lose any information. Once entered, the `uudmp` command will cause approximately 23,300 lines of data to be displayed on your screen and copied into the file.

Using the `uudmp` 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 322.

To access dump information, at the `Maintenance#` prompt, enter:

```
Maintenance# uudmp
```

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.
```

/maint/ptdmp *<server> <filename>* TFTP System Dump Put

Use this command to `put` (save) the system dump to a TFTP server.

NOTE – If the TFTP server is running SunOS or the Solaris operating system, the specified `ptdmp` file must exist *prior* to executing the `ptdmp` 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 dump data.

To save dump information via TFTP, at the `Maintenance#` prompt, enter:

```
Maintenance# ptdmp <server> <filename>
```

Where *server* is the TFTP server IP address or hostname, and *filename* is the target dump file.

/maint/cldmp Clearing Dump Information

To clear dump information from flash memory, at the `Maintenance#` prompt, enter:

```
Maintenance# cldmp
```

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.
```

/maint/panic
Panic Command

The `panic` command causes the switch to immediately dump state information to flash memory and automatically reboot.

To select `panic`, at the `Maintenance#` prompt, enter:

```
>> Maintenance# panic
A FLASH dump already exists.
Confirm replacing existing dump and reboot [y/n]:
```

Enter **y** to confirm the command:

```
Confirm dump and reboot [y/n]: y
```

The following messages are displayed:

```
Starting system dump...done.

Rebooted because of PANIC command.
Booting complete  0:01:01 Thu Jul  1, 2003:
Version 1.0.0.18 from FLASH image1, active config block.

No POST errors (0xff).

Production Mode.
```

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 October 30, 2002. Use /maint/uudmp to
      extract the dump for analysis and /maint/cldmp to
      clear the FLASH region. The region must be cleared
      before another dump can be saved.
```

APPENDIX A
Alteon OS Syslog Messages

The following syntax is used when outputting syslog messages:

<Time stamp><Log Label>`Web OS`*<Thread ID>*`:`*<Message>*

where

- *<Timestamp>*

  The time of the message event is displayed in month day hour:minute:second format. For example: `Aug 19 14:20:30`

- *<Log Label>*

  The following types of log messages are recorded: `LOG_EMERG`, `LOG_ALERT`, `LOG_CRIT`, `LOG_ERR`, `LOG_WARNING`, `LOG_NOTICE`, `LOG_INFO`, and `LOG_DEBUG`

- *<Thread ID>*

  This is the software thread that reports the log message. The following thread IDs are recorded: `stg`, `ip`, `slb`, `console`, `telnet`, `vrrp`, `system`, `web server`, `ssh`, and `bgp`

- *<Message>*: The log message

Following is a list of potential syslog messages. To keep this list as short as possible, only *<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_WARNING

FILTER “filter *<filter number>* fired on port *<port number>*, *<source IP address>* -> *<destination IP address>*, [*<ICMP type>*], [*<IP protocol>*], [*<layer-4 ports>*], [*<TCP flags>*]”

LOG_ALERT

stp:	own BPDU received from port <port_id>
IP	cannot contact default gateway <ip_address>
vrrp:	received errored advertisement from <ip_address>
vrrp:	received incorrect password from <ip_address>
vrrp:	received incorrect addresses from <ip_address>
vrrp:	received incorrect advertisement interval <seconds> from <ip_address>
slb:	cannot contact real server <ip_address>
slb:	real server <ip_address> has reached maximum connections
slb:	cannot contact real service <ip_address:real_port>
slb:	real server failure threshold (<threshold>) has been reach for group <group_id>
slb:	real server <ip_address> disabled through configuration
slb:	Virtual Service Pool full. gSvcPool=MAX_SERVICES
bgp:	notification (<reason>) received from <BGP peer ip_address>
bgp:	session with <BGP peer ip_address> failed (<reason>)
vrrp:	Synchronization from non-configured peer <ip_address>
vrrp:	Synchronization from non-configured peer <ip_address> was blocked
dps:	hold down triggered: <ip_address> for <min> minutes
dps:	manual hold down: <ip_address>
syn_atk	SYN attack detected: <count> new half-open sessions per second
tcplim	hold down triggered: <ip_address> for <min> minutes

LOG_CRIT

SYSTEM:	temperature at sensor <sensor_id> exceeded threshold
SYSTEM:	internal power supply failed
SYSTEM:	redundant power supply failed

LOG_CRIT (Continued)

SYSTEM:	fan failure detected
SSH	can’t allocate memory in load_MP_INT

LOG_ERR

mgmt:	PANIC at <file>:<line> in thread <thread id>
mgmt:	VERIFY at <file>:<line> in thread <thread id>
mgmt:	ASSERT at <file>:<line> in thread <thread id>
ntp:	cannot contact NTP server <ip_address>
ntp:	unable to listen to NTP port
isd:	unable to listen to BOOTP_SERVER_PORT port
stp:	Error: Error writing STG config to FLASH
stp:	Error: Error writing config to FLASH
mgmt:	Apply not done
mgmt:	Save not done
mgmt:	“ <“““apply”””|“““save”””> is issued by another user. Try later”
cli:	Error: Error writing %s config to FLASH
cli:	New Path Cost for Port <port_id> is invalid
cli:	PVID <vlan_id> for port <port_id> is not created
cli:	RADIUS secret must be 1-32 characters long
cli:	Please configure primary RADIUS server address
cli:	STP changes can't be applied since STP is OFF
cli:	Switch reset is required to turn STP on/off
cli:	Trunk group <trunk_id> contains ports with different PVIDs
cli:	Trunk group <trunk_id> has more than <max_trunk_ports> ports
cli:	Trunk group <trunk_id> contains no ports but is enabled
cli:	Not all ports in trunk group <trunk_id> are in VLAN <vlan_id>
cli:	Trunk groups <trunk_id> and <trunk_id> can not share the same port

LOG_ERR (Continued)

port_mirr: Port Mirroring changes are not applied

cli: Broadcast address for IP interface <interface_id> is invalid

cli: IP Interfaces <interface_id> and <interface_id> are on the same subnet

cli: Multiple static routes have same destination

cli: Virtual router <vr_id> must have sharing disabled when hotstandby is enabled

cli: Virtual router group must be enabled when hotstandby is enabled

cli: At least one virtual router must be enabled when group is enabled

cli: Virtual router group must have sharing disabled when hotstandby is enabled

cli: Virtual router group must have preemption enabled when hotstandby is enabled

cli: Virtual router <vr_id> must have an IP address

cli: Virtual router <vr_id> cannot have same VRID and VLAN as <vlan_id>

cli: Virtual router <vr_id> cannot have same IP address as <ip_address>

cli: Virtual router <vr_id> corresponding virtual server <server_id> is not enabled

cli: Hot-standby must be enabled when a virtual router has a PIP address

cli: Virtual router <vr_id> IP interface should be <interface_id>

cli: Enabled real server <server_id> has no IP address

cli: Real server <server_id> has same IP address as IP interface <interface_id>

cli: Real server <server_id> has same IP address as switch

cli: Real server <server_id> (Backup for <server_id>) is not enabled

cli: Real server <server_id> has same IP address as virtual server <server_id>

cli: Real server <server_id> has same IP address as real server <server_id>

cli: Real server group <group_id> cannot backup itself

cli: Real server <server_id> cannot be added to same group

cli: Enabled virtual server <server_id> has no IP address

cli: Virtual server <server_id> has same IP address as IP interface <interface_id>

cli: Virtual server <server_id> has same IP address as switch

LOG_ERR (Continued)

cli: Virtual servers <server_id> and <server_id> with same IP address must support same layr3 configuration

cli: Real server <server_id> cannot be backup server for both real server <server_id> and group <group_id>

cli: Virtual server <server_id> has same IP address and vport as virtual server <server_id>

cli: RS <server_id> can't exist for VS <server_id> vport <virtual_port>

cli: Switch port <port_id> has same proxy IP address as port <port_id>

cli: Switch port <port_id> has same IP address as IP interface <interface_id>

cli: A hot-standby port cannot also be an inter-switch port

cli: There must be at least one inter-switch port if any hot-standby port exist

cli: "With VMA, ports 1-8 must all have a PIP if any one does"

cli: Client bindings are not supported with proxy IP addresses

cli: DAM must be turned on or a PIP must be enabled for port <port_id> in order for virtual server to support FTP parsing

cli: Real server <server_id> and group %u cannot both have backups configured

cli: Virtual server <server_id> : port mapping but layer3 bindings

cli: Extracting length has to set to 8 or 16 for cookie rewrite mode

cli: DAM must be turned on or a PIP must be enabled for port <port_id> in order for virtural server <server_id> to support URL parsing

cli: Port filtering must be disabled on port <port_id> in order to support cookie based persistence for virtual server <server_id>

cli: Virtual server <server_id>: port mapping but Direct Access Mode

cli: Virtual server %lu: support nonat IP but not layer 3 bindings

cli: Virtual servers: all that support IP must use same group

cli: Virtual servers <server_id> and <server_id> that include the same real server <server_id> cannot map the same real port or balance UDP

cli: Virtual server <server_id>: UDP service <virtual_port> with out-of-range port number

cli: Switch cannot support more than <MAX_VIRT_SERVICES> virtual services

cli: Switch cannot support more than <MAX_SMT> real services

cli: Trunk group (<trunk_id>) ports must have same L4 config

LOG_ERR (Continued)

cli:	Trunk group (<trunk_id>) ports must all have a PIP
cli:	DAM must be turned on or a PIP must be enabled for ports <port_id> in order to do URL based redirection
cli:	“Two services have same hostname, <host_name>.<domain_name>”
cli:	Direct access mode is not supported with default gateway load balancing
cli:	SLB Radius secret must be 16 characters long
cli:	Dynamic NAT filter <filter_id> must be cached
cli:	NAT filter <filter_id> must have same smask and dmask
cli:	NAT filter <filter_id> cannot have port ranges
cli:	NAT filter <filter_id> must be cached
cli:	NAT filter <filter_id> dest range includes VIP <server_id>
cli:	NAT filter <filter_id> dest range includes RIP <server_id>
cli:	Redirection filter <filter_id> must be cached
cli:	Filter with L4 ports configured <port_id> must have IP protocol configured
cli:	Remote site <site_id> does not have a primary IP address
cli:	Primary and secondary remote site <site_id> switches must differ
cli:	Remote sites <site_id> and <site_id> must use different addresses
cli:	Remote site <site_id> and real server <server_id> must use different addresses
cli:	Remote site <site_id> and virtual server <server_id> must use different addresses
cli:	Only <MAX_SLB_SITES> remote servers are allowed per group
cli:	Only <MAX_SLB_SERVICES> remote services are supported
cli:	Enabled external lookup IP address has no IP address
cli:	domain name must be configured
cli:	Network <static_network_id> has no VIP address
cli:	duplicate default entry
cli:	BGP peer <bgp_peer_id> must have an IP address
cli:	BGP peers <bgp_peer_id> and <bgp_peer_id> have same address

LOG_ERR (Continued)

cli:	BGP peer <bgp_peer_id> have same address as IP interface <ip_interface_id>
cli:	BGP peer <bgp_peer_id> IP interface <ip_interface_id> is not enabled
cli:	Filter with ICMP types configured (<icmp_type>) must have IP protocol configure to ICMP
cli:	“Two services have same hostname, <host_name>.<domain_name>”
cli:	Loadbalance string must be added to real server <server_id> in order to enable exclusionary string matching
cli:	intrval input value must be in the range [0-24]
mgmt:	unapplied changes reverted
mgmt:	unsaved changes reverted
mgmt:	Attempting to redirect a previously redirected output
vrrp:	Attempting to redirect a previously redirected output
vrrp:	cfg_sync_tx_putsn: ABORTED
vrrp:	Synchronization TX Error
vrrp:	Synchronization TX connection RESET
vrrp:	Synchronization TX connection TIMEOUT
vrrp:	Synchronization TX connection UNREACEABLE
vrrp:	Synchronization TX connection UNKNOWN CLOSE
vrrp:	Synchronization RX connection RESET
vrrp:	Synchronization RX connection TIMEOUT
vrrp:	Synchronization RX connection UNREACEABLE
vrrp:	Synchronization RX connection UNKNOWN CLOSE
vrrp:	Synchronization connection RCLOSE by peer
vrrp:	Synchronization connection RCLOSE before RX
vrrp:	Synchronization connection early RCLOSE in RX
vrrp:	Synchronization connection Wait-For-Close Timeout
vrrp:	Synchronization connection Transmit Timeout
vrrp:	Synchronization Receive Timeout

LOG_ERR (Continued)

vrrp: Synchronization Receive UNKNOWN Timeout

vrrp: Sync transmit in progress … cannot start Sync

vrrp: Sync receive in progress … cannot start Sync

vrrp: Sync already in progress … cannot start Sync

vrrp: Config Sync route find error

vrrp: Config Sync tcp_open error

vrrp: Config Synchronization Timeout - Resuming Console thread

vrrp: “<""apply""|""save""> is issued by another user. Try later”

vrrp: new configuration did not validate (rc =)

vrrp: new configuration did not apply (rc =)

vrrp: new configuration did not save (rc =)

vrrp: Sync config apply error

vrrp: Restoring Current Config

vrrp: Sync rx tcp open error

vrrp: Sync Version/Password Failed-No Version/Password Line

vrrp: Sync Version Failed - peer:%s config:%s

vrrp: Sync Password Failed-Bad Password

vrrp: Sync receive already in progress … cannot start Sync receive

vrrp: Sync transmit in progress … cannot start Sync receive

LOG_NOTICE

system: internal power supply ok

system: redundant power supply present and ok

system: temperature ok

system: fan ok

system: rebooted <last_reset_information>

system: rebooted <last_reset_information> administrator logged in

mgmt: boot config block changed

mgmt: boot image changed

mgmt: switch reset from CLI

mgmt: syslog host changed to <ip_address>

mgmt: syslog host changed to this host

mgmt: second syslog host changed to <ip_address>

mgmt: second syslog host changed to this host

mgmt: Next boot will use active config block

mgmt: user password changed

mgmt: SLB operator password changed

mgmt: L4 operator password changed

mgmt: operator password changed

mgmt: SLB administrator password changed

mgmt: L4 administrator password changed

mgmt: administrator password changed

ssh: scp <login_level> login

ssh: “scp <login_level> <""connection closed""|""idle timeout""|""logout"">”

mgmt: RADIUS server timeouts

mgmt: Failed login attempt via TELNET from host %s

mgmt: PASSWORD FIX-UP MODE IN USE

mgmt: <login_level> login on Console

LOG_NOTICE (Continued)

mgmt: “<login_level> <""idle timeout""|""logout""> from Console”

mgmt: PANIC command from CLI

port_mirr: “port mirroring is <""enabled""|""disabled"">”

vlan: Default VLAN can not be deleted

mgmt: <login_level> login from host <ip_address>

mgmt: “<login_level> <""connection closed""|""idle timeout""|""logout""> from”

IP “default gateway <ip_address> <""enabled""|""disabled"">”

IP default gateway <ip_address> operational

vrrp: virtual router <ip_address> is now master

vrrp: virtual router <ip_address> is now backup

slb: “backup server <ip_address> <""enabled""|""diabled""> for real server <server_id>”

slb: “backup server <ip_address> <""enabled""|""disabled""> for real server group <group_id>”

slb: “backup group server <ip_address> <""enabled""|""disabled""> for real server group group_id>”

slb: “overflow server <ip_address> <""enabled""|""disabled""> for real server <server_id>”

slb: “overflow server <ip_address> <""enabled""|""disabled""> for real server group <group_id>”

slb: “overflow group server <ip_address> <""enabled""|""disabled""> for real server group <group_id>”

slb: real server <ip_address> operational

slb: real service <ip_address:real_port> operational

slb: No services are available for Virtual Server <virtual_server>

slb: Services are available for Virtual Server <virtual_server>

bgp: session established with <BGP_peer_ip_address>

LOG_INFO

SYSTEM: bootp response from <ip_address>

mgmt: new configuration applied

mgmt: new configuration saved

mgmt: unsaved changes reverted

mgmt: Could not revert unsaved changes

mgmt: " <image1|image2> downloaded from host <ip_address>, file <file_name> <software_version>"

mgmt: serial EEPROM downloaded from host <ip_address> file <file_name>

ssh: scp <login_level> login

ssh: " scp <login_level> <""connection closed""|""idle timeout""|""logout"">"

mgmt: <login_level> login on Console

mgmt: " <login_level> <""idle timeout""|""logout""> from Console"

mgmt: <login_level> login from host <ip_address>

mgmt: " <login_level> <""connection closed""|""idle timeout""|""logout""> from Telnet/SSH."

ssh: server key autogen starts

ssh: server key autogen completes

ssh: server key autogen timer timeouts

vrrp: new synch configuration applied

vrrp: new synch configuration saved

vrrp: Synchronizing from <host_name>

vrrp: Synchronizing to <host_name>

vrrp: Config Synchronization Transmit Successful

vrrp: Config Synchronization Receive Successful

vrrp: new configuration VALIDATED

APPENDIX B
Alteon OS SNMP Agent

The Alteon OS SNMP agent supports SNMP Version 1. Security is provided through SNMP community strings. The default community strings are “public” for `SNMP GET` operation and “private” for `SNMP SET` operation. The community string can be modified only through the Command Line Interface (CLI). Alteon WebSystems is registered as Vendor 1872. Detailed SNMP MIBs and trap definitions of the Alteon OS SNMP agent can be found in the following Alteon OS enterprise MIB documents:

- `Altroot.mib-`
- `AOSSwitch.mib`
- `AOSPhysical.mib`
- `AOSNetwork.mib`
- `AOSLayer4.mib`
- `AOSLayer7.mib`
- `AOSTrap.mib`

Users may specify up to two trap hosts for receiving SNMP Traps. The agent will send the SNMP Trap to the specified hosts when appropriate. Traps will not be sent if there is no host specified.

Alteon OS SNMP agent supports the following standard MIBs:

- RFC 1213 - MIB II (System, Interface, Address Translation, IP, ICMP, TCP, UDP, SNMP Groups)
- RFC 1573 - MIB II Extension (IFX table)
- RFC 1643 - EtherLike MIB
- RFC 1493 - Bridge MIB
- RFC 1757 - RMON MIB (Statistics, History, Alarm, Event Groups)
- RFC 1850 for OSPF
- RFC 1657 for BGP
- RFC 2037

Alteon OS SNMP agent supports the following generic traps as defined in RFC 1215:

- ColdStart
- WarmStart
- LinkDown
- LinkUp
- AuthenticationFailure

The SNMP agent also supports two Spanning Tree traps as defined in RFC 1493:

- NewRoot
- TopologyChange

The following are the enterprise SNMP traps supported in Alteon OS:

Table 10-10 Alteon OS-Supported Enterprise SNMP Traps

Trap Name	Description
altSwDefGwUp	Signifies that the default gateway is alive.
altSwDefGwDown	Signifies that the default gateway is down.
altSwDefGwInService	Signifies that the default gateway is up and in service
altSwDefGwNotInService	Signifies that the default gateway is alive but not in service
altSwSlbRealServerUp	Signifies that the real server is up and operational
altSwSlbRealServerDown	Signifies that the real server is down and out of service
altSwSlbRealServerMaxConnReached	Signifies that the real server has reached maximum connections
altSwSlbBkupRealServerAct	Signifies that the backup real server is activated due to availablity of the primary real server
altSwSlbBkupRealServerDeact	Signifies that the backup real server is deactivated due to the primary real server is available
altSwSlbBkupRealServerActOverflow	Signifies that the backup real server is deactivated due to the primary real server is overflowed
altSwSlbBkupRealServerDeactOverflow	Signifies that the backup real server is deactivated due to the primary real server is out from overflow situation

Table 10-10 Alteon OS-Supported Enterprise SNMP Traps

Trap Name	Description
altSwfltFilterFired	Signifies that the packet received on a switch port matches the filter rule
altSwSlbRealServerServiceUp	Signifies that the service port of the real server is up and operational
altSwSlbRealServerServiceDown	Signifies that the service port of the real server is down and out of service
altSwVrrpNewMaster	The newMaster trap indicates that the sending agent has transitioned to 'Master' state.
altSwVrrpNewBackup	The newBackup trap indicates that the sending agent has transitioned to 'Backup' state.
altSwVrrpAuthFailure	A vrrpAuthFailure trap signifies that a packet has been received from a router whose authentication key or authentication type conflicts with this router's authentication key or authentication type. Implementation of this trap is optional.
altSwLoginFailure	A altSwLoginFailure trap signifies that someone failed to enter a valid username/password combination.
altSwSlbSynAttack	A altSwSlbSynAttack trap signifies that a SYN attack has been detected.
altSwTcpHoldDown	A altSwTcpHoldDown trap signifies that new TCP connection requests from a particular client will be blocked for a pre-determined amount of time since the rate of new TCP connections from that client has reached a pre-determined threshold.
altSwTempExceedThreshold	A altSwTempExceedThreshold trap signifies that the switch temperature has exceeded maximum safety limits.

Working with Switch Images and Configuration Files

This section describes how to use MIB calls to work with switch images and configuration files. You can use a standard SNMP tool to perform the actions, using the MIBs listed in Table 10-11.

The examples in this section use the MIB name, but you can also use the OID.

Table 10-11 lists the MIBS used to perform operations associated with the GbESM Switch Image and Configuration files. These MIBS are contained within in the file “aosswitch.mib”

Table 10-11 MIBs for Switch Image and Configuration Files

MIB Name	MIB IOD
aqTftpServer	1.3.6.1.4.1872.2.5.1.1.7.1
aqTftpImage	1.3.6.1.4.1872.2.5.1.1.7.2
aqTftpImageFileName	1.3.6.1.4.1872.2.5.1.1.7.3
aqTftpCfgFileName	1.3.6.1.4.1872.2.5.1.1.7.4
aqTftpDumpFileName	1.3.6.1.4.1872.2.5.1.1.7.5
aqTftpAction	1.3.6.1.4.1872.2.5.1.1.7.6
aqTftpLastActionStatus	1.3.6.1.4.1872.2.5.1.1.7.7
aqTftpPort	1.3.6.1.4.1872.2.5.1.1.7.8

The following SNMP actions can be performed using the MIBs listed in Table 10-11.

- Load a new Switch image (boot or running) from a TFTP server
- Load a previously saved switch configuration from a TFTP server
- Save the switch configuration to a TFTP server
- Save a switch dump to a TFTP server

Loading a new switch image

To load a new switch image with the name “MyNewImage-1.img” into `image2`, follow the steps below. This example assumes you have a TFTP server at 192.168.10.10.

1. **Set the TFTP server address where the switch image resides:**

   ```
   Set aqTftpServer.0 "192.168.10.10"
   ```

2. **Set the area where the new image will be loaded:**

   ```
   Set aqTftpImage.0 "image2"
   ```

3. **Set the name of the image:**

   ```
   Set aqTftpImageFileName.0 "MyNewImage-1.img"
   ```

4. **Set the port for the TFTP data transfer. Enter 1 to perform the transfer across the data port. Enter 2 to perform the transfer across the management port:**

   ```
   Set aqTftpPort.0 "1"
   ```

5. **Initiate the transfer. To transfer a switch image, enter 2 (gtimg):**

   ```
   Set aqTftpAction.0 "2"
   ```

Loading a saved switch configuration

To load a saved switch configuration with the name “MyRunningConfig.cfg” into the switch, follow the steps below. This example assumes you have a TFTP server at 192.168.10.10.

1. **Set the TFTP server address where the switch Configuration File resides:**

   ```
   Set aqTftpServer.0 "192.168.10.10"
   ```

2. **Set the name of the configuration file:**

   ```
   Set aqTftpCfgFileName.0 "MyRunningConfig.cfg"
   ```

3. **Set the port for the TFTP data transfer. Enter 1 to perform the transfer across the data port. Enter 2 to perform the transfer across the management port.**

   ```
   Set aqTftpPort.0 "1"
   ```

4. **Initiate the transfer. To restore a running configuration, enter 3:**

   ```
   Set aqTftpAction.0 "3"
   ```

Saving the switch configuration

To save the switch configuration to a TFTP server follow the steps below. This example assumes you have a TFTP server at 192.168.10.10.

1. **Set the TFTP server address where the configuration file is saved:**

```
Set aqTftpServer.0 "192.168.10.10"
```

2. **Set the name of the configuration file:**

```
Set aqTftpCfgFileName.0 "MyRunningConfig.cfg"
```

3. **Set the port for the TFTP data transfer. Enter 1 to perform the transfer across the data port. Enter 2 to perform the transfer across the management port.**

```
Set aqTftpPort.0 "1"
```

4. **Initiate the transfer. To save a running configuration file, enter 4:**

```
Set aqTftpAction.0 "4"
```

Saving a switch dump

To save a switch dump to a TFTP, follow the steps below. This example assumes you have a TFTP server at 192.168.10.10.

1. **Set the TFTP server address where the configuration will be saved:**

```
Set aqTftpServer.0 "192.168.10.10"
```

2. **Set the name of dump file:**

```
Set aqTftpDumpFileName.0 "MyDumpFile.dmp"
```

3. **Set the port for the TFTP data transfer. Enter 1 to perform the transfer across the data port. Enter 2 to perform the transfer across the management port.**

```
Set aqTftpPort.0 "1"
```

4. **Initiate the transfer. To save a dump file, enter 5:**

```
Set aqTftpAction.0 "5"
```

Saving a switch image

To save a switch image with the name “MySavedImage.img” to a TFTP server, follow the steps below. This example assumes you have a TFTP server at IP address 192.168.10.10.

1. **Set the TFTP server address where the switch image resides:**

   ```
   Set aqTftpServer.0 "192.168.10.10"
   ```

2. **Set the Image that you want to save to TFTP:**

   ```
   Set aqTftpImage.0 "image2"
   ```

3. **Set the name of the image:**

   ```
   Set aqTftpImageFileName.0 "MySavedImage.img"
   ```

4. **Set the port for the TFTP data transfer. Enter 1 to perform the transfer across the data port. Enter 2 to perform the transfer across the management port:**

   ```
   Set aqTftpPort.0 "1"
   ```

5. **Initiate the transfer. To transfer a switch image, enter 2 (img-put):**

   ```
   Set aqTftpAction.0 "7"
   ```

Glossary

DIP (Destination IP Address)

The destination IP address of a frame.

Dport (Destination Port)

The destination port (application socket: for example, http-80/https-443/DNS-53)

NAT (Network Address Translation)

Any time an IP address is changed from one source IP or destination IP address to another address, network address translation can be said to have taken place. In general, half NAT is when the destination IP or source IP address is changed from one address to another. Full NAT is when both addresses are changed from one address to another. No NAT is when neither source nor destination IP addresses are translated. Virtual server-based load balancing uses half NAT by design, because it translates the destination IP address from the Virtual Server IP address, to that of one of the real servers.

Preemption

In VRRP, preemption will cause a Virtual Router that has a lower priority to go into backup should a peer Virtual Router start advertising with a higher priority.

Priority

In VRRP, the value given to a Virtual Router to determine its ranking with its peer(s). Minimum value is 1 and maximum value is 254. Default is 100. A higher number will win out for master designation.

Proto (Protocol)

The protocol of a frame. Can be any value represented by a 8-bit value in the IP header adherent to the IP specification (for example, TCP, UDP, OSPF, ICMP, and so on.)

Real Server Group

A group of real servers that are associated with a Virtual Server IP address, or a filter.

Redirection or Filter-Based Load Balancing

A type of load balancing that operates differently from virtual server-based load balancing. With this type of load balancing, requests are transparently intercepted and “redirected” to a server group. “Transparently” means that requests are not specifically destined for a Virtual Server IP address that the switch owns. Instead, a filter is configured in the switch. This filter intercepts traffic based on certain IP header criteria and load balances it. Filters can be configured to filter on the SIP/Range (via netmask), DIP/Range (via netmask), Protocol, SPort/Range or DPort/Range. The action on a filter can be Allow, Deny, Redirect to a Server Group, or NAT (translation of either the source IP or destination IP address). In redirection-based load balancing, the destination IP address is not translated to that of one of the real servers. Therefore, redirection-based load balancing is designed to load balance devices that normally operate transparently in your network—such as a firewall, spam filter, or transparent Web cache.

RIP (Real Server)

Real Server IP Address. An IP addresses that the switch load balances to when requests are made to a Virtual Server IP address (VIP).

SIP (Source IP Address)

The source IP address of a frame.

SPort (Source Port)

The source port (application socket: for example, HTTP-80/HTTPS-443/DNS-53).

Tracking

In VRRP, a method to increase the priority of a virtual router and thus master designation (with preemption enabled). Tracking can be very valuable in an active/active configuration.

You can track the following:

- Vrs: Virtual Routers in Master Mode (increments priority by 2 for each)
- Ifs: Active IP interfaces on the GbE Switch Module (increments priority by 2 for each)
- Ports: Active ports on the same VLAN (increments priority by 2 for each)
- l4pts: Active Layer 4 Ports, client or server designation (increments priority by 2 for each
- reals: healthy real servers (increments by 2 for each healthy real server)
- hsrp: HSRP announcements heard on a client designated port (increments by 10 for each)

VIP (Virtual Server IP Address)

An IP address that the switch owns and uses to load balance particular service requests (like HTTP) to other servers.

VIR (Virtual Interface Router)

A VRRP address that is an IP interface address shared between two or more virtual routers.

Virtual Router

A shared address between two devices utilizing VRRP, as defined in RFC 2338. One virtual router is associated with an IP interface. This is one of the IP interfaces that the switch is assigned. All IP interfaces on the GbE Switch Module must be in a VLAN. If there is more than one VLAN defined on the GbE Switch Module, then the VRRP broadcasts will only be sent out on the VLAN of which the associated IP interface is a member.

Virtual Server Load Balancing

Classic load balancing. Requests destined for a Virtual Server IP address (VIP), which is owned by the switch, are load balanced to a real server contained in the group associated with the VIP. Network address translation is done back and forth, by the switch, as requests come and go.

Frames come to the switch destined for the VIP. The switch then replaces the VIP and with one of the real server IP addresses (RIP's), updates the relevant checksums, and forwards the frame to the server for which it is now destined. This process of replacing the destination IP (VIP) with one of the real server addresses is called half NAT. If the frames were not half NAT'ed to the address of one of the RIPs, a server would receive the frame that was destined for it's MAC address, forcing the packet up to Layer 3. The server would then drop the frame, since the packet would have the DIP of the VIP and not that of the server (RIP).

VRID (Virtual Router Identifier)

In VRRP, a value between 1 and 255 that is used by each virtual router to create its MAC address and identify its peer for which it is sharing this VRRP address. The VRRP MAC address as defined in the RFC is 00-00-5E-00-01-{VRID}. If you have a VRRP address that two switches are sharing, then the VRID number needs to be identical on both switches so each virtual router on each switch knows whom to share with.

VRRP (Virtual Router Redundancy Protocol)

A protocol that acts very similarly to Cisco's proprietary HSRP address sharing protocol. The reason for both of these protocols is so devices have a next hop or default gateway that is always available. Two or more devices sharing an IP interface are either advertising or listening for advertisements. These advertisements are sent via a broadcast message to an address such as 224.0.0.18.

With VRRP, one switch is considered the master and the other the backup. The master is always advertising via the broadcasts. The backup switch is always listening for the broadcasts. Should the master stop advertising, the backup will take over ownership of the VRRP IP and MAC addresses as defined by the specification. The switch announces this change in ownership to the devices around it by way of a Gratuitous ARP, and advertisements. If the backup switch didn't do the Gratuitous ARP the Layer 2 devices attached to the switch would not know that the MAC address had moved in the network. For a more detailed description, refer to RFC 2338.

VSR (Virtual Server Router)

A VRRP address that is a shared Virtual Server IP address. VSR is Alteon WebSystems' proprietary extension to the VRRP specification. The switches must be able to share Virtual Server IP addresses, as well as IP interfaces. If they didn't, the two switches would fight for ownership of the Virtual Server IP address, and the ARP tables in the devices around them would have two ARP entries with the same IP address but different MAC addresses.

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