Nortel Ethernet Switch 460/470

Configuration — System Monitoring

ATTENTION
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Revision History

Version	Reason for revision
01.01	Updated software and document references for Release 3.7 software.

Contents

Preface

About this guide

This guide provides information about system logging, displaying system statistics, and configuring network monitoring on the Nortel Ethernet Switch 460 and Nortel Ethernet Switch 470.

Network management tools and interfaces

The following are the management tools and interfaces available with the switch (for basic instructions on these tools, refer to the *Nortel Ethernet Switch 460/470 Overview — System Configuration (NN47210-501)*):

- Console interface

  The console interface (CI) allows you to configure and manage the switch locally or remotely. Access the CI menu and screens locally through a console terminal attached to your Ethernet Switch, remotely through a dial-up modem connection, or in-band through a Telnet session.

- Web-based management

  You can manage the network from the World Wide Web and can access the Web-based Graphical User Interface (GUI) through the HTML-based browser located on your network. The GUI allows you to configure, monitor, and maintain your network through web browsers. You can also download software using the web.

- Java-based Device Manager

  The Device Manager is a set of Java-based graphical network management applications that is used to configure and manage Ethernet Switches 460 and 470.

- Command Line Interface (CLI)

  The CLI is used to automate general management and configuration of the Ethernet Switches 460 and 470. Use the CLI through a Telnet connection or through the serial port on the console.

- Any generic SNMP-based network management software

You can use any generic SNMP-based network management software to configure and manage Ethernet Switches 460 and 470.

- Telnet

  Telnet allows you to access the CLI and CI menu and screens locally using an in-band Telnet session.

- SSH

  Secure Shell (SSH) is a client/server protocol that can provide a secure remote login with encryption of data, user name, and password. For details on SSH connections, refer to *Nortel Ethernet Switch 460/470 Security — Configuration (NN47210-500)*.

- Nortel Enterprise Policy Manager

  The Nortel Enterprise Policy Manager (formerly Optivity Policy Services) allows you to configure the Ethernet Switches 460 and 470 with a single system.

Before you begin

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

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

Before using this guide, you must complete the installation procedures discussed in *Nortel Ethernet Switch 460-24T-PWR — Installation (NN47210-300)* or *Nortel Ethernet Switch 470 — Installation (NN47210-301)* .

Text conventions

angle brackets (< >)	Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: If the command syntax is **`ip default-gateway <XXX.XXX.XXX.XXX>`**, you enter **`ip default-gateway 192.32.10.12`**
braces ({})	Indicate required elements in syntax descriptions where there is more than one option. You must choose only one of the options. Do not type the braces when entering the command.

	Example: If the command syntax is **`http-server {enable | disable}`** the options are **`enable`** or **`disable`**.
brackets ([ ])	Indicate optional elements in syntax descriptions. Do not type the brackets when entering the command. Example: If the command syntax is **`show ip [bootp]`**, you can enter either **`show ip`** or **`show ip bootp.`**
`plain Courier text`	Indicates command syntax and system output. Example: `TFTP Server IP Address:  192.168.100.15`
vertical line |	Separates choices for command keywords and arguments. Enter only one of the choices. Do not type the vertical line when entering the command. Example: If the command syntax is **`cli password <serial | telnet>`**, you must enter either **`cli password serial`** or **`cli password telnet`**, but not both.
H.H.H.	Enter a MAC address in this format (XXXX.XXXX.XXXX).

Related publications

For more information about managing or using the switches, refer to the following publications:

- *Release Notes — Software Release 3.7 (NN47210-400)*
- *Nortel Ethernet Switch 460-24T-PWR — Installation (NN47210-300)*
- *Nortel Ethernet Switch 470 — Installation (NN47210-301)*
- *Nortel Ethernet Switch 460/470 Overview — System Configuration (NN47210-501)*
- *Nortel Ethernet Switch 460/470 Security — Configuration (NN47210-500)*

- *Nortel Ethernet Switch 460/470 Configuration — Quality of Service and IP Filtering (NN47210-502)*
- *Nortel Ethernet Switch 460/470 Configuration — IP Multicast Routing Protocols (NN47210-504)*
- *Nortel Ethernet Switch 460/470 Configuration — VLANs, Spanning Tree, and Multilink Trunking (NN47210-505)*
- *Installing Gigabit Interface Converters and Small Form Factor Pluggable Interface Converters* (312865-B)

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Chapter 1
Network monitoring

The Ethernet Switches 460 and 470 provide features that allow you to monitor your network, display switch statistics, and log system events.

This chapter discusses the following topics:

System Log

System Log messages operate as follows:

- Non-volatile memory messages are retrievable after a system reset.
- Messages can be viewed while the system is operational.
- All non-volatile and dynamic memory messages are time stamped.
- When you restart your system after a reset, the dynamic memory messages are deleted.
- After a reset, all messages stored in non-volatile memory are copied to dynamic memory. The messages copied to dynamic memory are time stamped to zero (0).
- Starting with Release 3.6 software, Ethernet Switches 460 and 470 save the last 100 commands entered to a command history log in NVRAM. This history is periodically copied from NVRAM to the remote syslog server. For details, refer to *Nortel Ethernet Switch 460/470 Security — Configuration (NN47210-500)*.

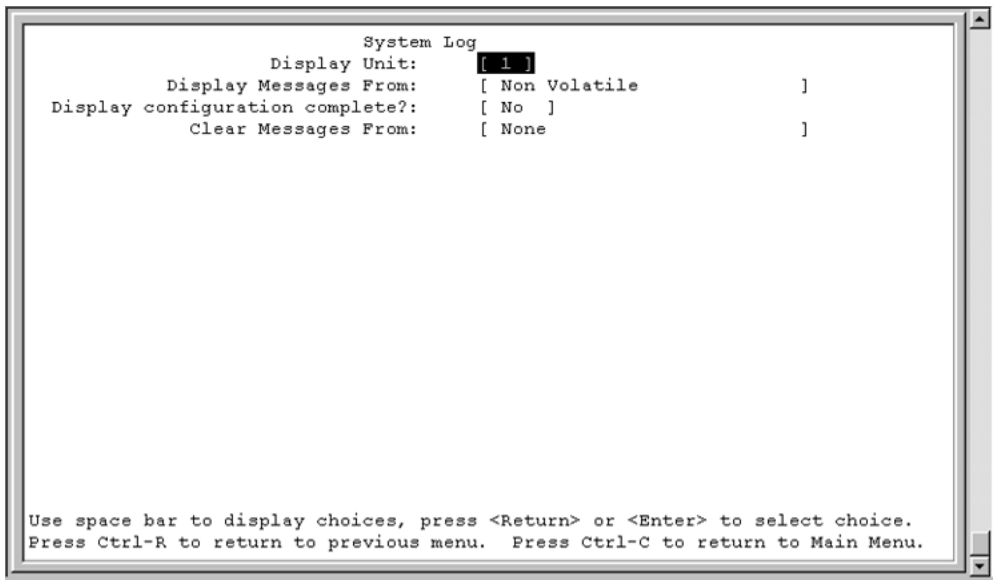
System Log screen

In the Console Interface, the System Log screen (Figure 1 "System Log screen" (page 16)) displays or clears messages obtained from system non-volatile memory or dynamic memory.

To open the System Log screen:

è Choose Display System Log (or type y) from the main menu.

Figure 1
System Log screen



Displaying most recent log entry first

This option allows you to view the system log with the most recent entry displayed first; the rest of the log entries are listed in reverse chronological order.

Table 1 "System Log screen fields" (page 16) describes the System Log screen fields.

Table 1
System Log screen fields

Field	Description
Display Messages From	This field allows you to select the memory source your messages are obtained from. Choose Non Volatile, Volatile, or Volatile + Non Volatile. Use the spacebar to toggle between the options. Default Non Volatile Range Non Volatile, Volatile + Non Volatile

Field	Description
Display configuration complete?	This field allows you to determine whether the configuration information received from non-volatile or dynamic memory (depending on what is selected in the Display Messages From field) is complete. Use the spacebar to toggle between the options. Default No Range No, Yes
Clear Messages From	This field allows you to clear the information messages from dynamic or non-volatile memory or both. If you clear dynamic messages, existing non-volatile messages are copied into dynamic memory. After a system reset, all existing non-volatile messages are copied to dynamic memory. Use the spacebar to toggle between the options. Default None Range None, Non Volatile, Volatile + Non Volatile

Port mirroring

You can designate one of your switch ports to monitor traffic on any two specified switch ports (port-based) or to monitor traffic to or from any two specified addresses that the switch has learned (address-based).

The following sections provide sample configurations using the Console Interface for both monitoring modes available with the port mirroring feature:

- Port-based mirroring
- Address-based mirroring

A sample Port Mirroring Configuration screen accompanies each network configuration example. Note that the examples do not show all of the screen prompts that precede some actions.

> ***Note:*** Use the CI menus, the CLI, or the Web-based management system to configure port mirroring.

For example, when you configure a switch for port mirroring or when you modify an existing port mirroring configuration, the new configuration does not take effect until you respond [Yes] to the following screen prompt:

```
Is your port mirroring configuration complete?     [ Yes ]
```

Port-based mirroring configuration

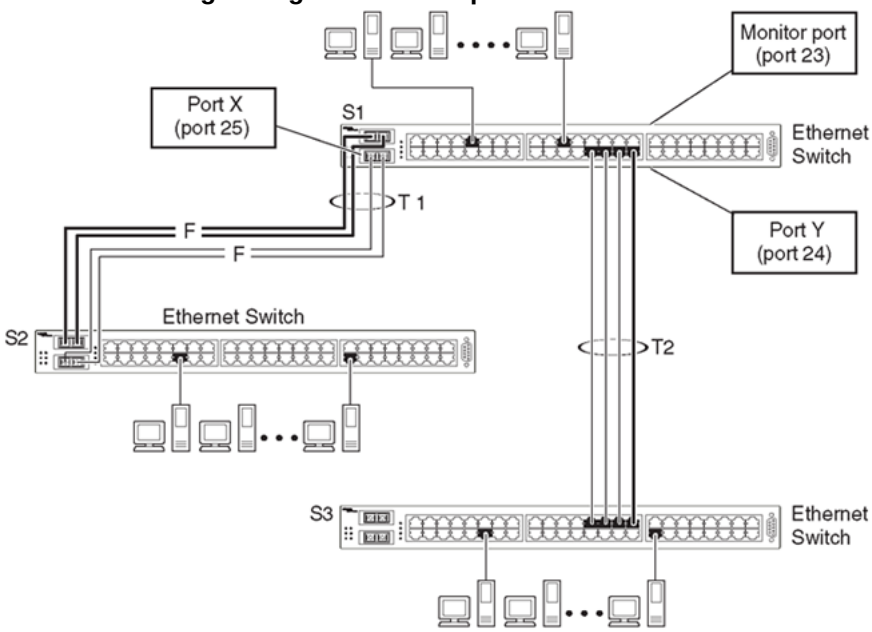
Figure 2 "Port-based mirroring configuration example" (page 18) shows an example of a port-based mirroring configuration where port 23 is designated as the monitor port for ports 24 and 25 of Switch S1. Although this example shows ports 24 and 25 monitored by the monitor port (port 23), any of the trunk members of T1 and T2 can also be monitored.

In this example, port X and port Y are members of Trunk T1 and Trunk T2. Port X and port Y are not required to always be members of Trunk T1 and Trunk T2.

Note: Trunks cannot be monitored and trunk members cannot be configured as monitor ports (see *Nortel Ethernet Switch 460/470 Configuration — VLANs, Spanning Tree, and Multilink Trunking (NN47210-505)* for details).

Figure 2 "Port-based mirroring configuration example" (page 18) shows the Port Mirroring Configuration screen setup for this example.

Figure 2
Port-based mirroring configuration example



In the configuration example shown in Figure 2 "Port-based mirroring configuration example" (page 18), the designated monitor port (port 23) can be set to monitor traffic in any of the following modes:

- Monitor all traffic received by port X.
- Monitor all traffic transmitted by port X.
- Monitor all traffic received and transmitted by port X.

- Monitor all traffic received by port X or transmitted by port Y.
- Monitor all traffic received by port X (destined to port Y) and then transmitted by port Y.
- Monitor all traffic received/transmitted by port X and transmitted/received by port Y (conversations between port X and port Y).

As shown in the Port Mirroring Configuration screen example (Figure 3 "Port Mirroring Configuration port-based screen example" (page 19)), port 23 is designated as the Monitor Port for ports 24 and 25 in Switch S1.

Note: The Unit value (in the Unit/Port field) is not configurable when the switch is operating.

The Monitoring Mode field [- > Port X or Port Y - >] indicates that all traffic received by port X *or* all traffic transmitted by port Y is currently being monitored by the StackProbe attached to Monitor Port 23.

The screen data displayed at the bottom of the screen shows the currently active port mirroring configuration.

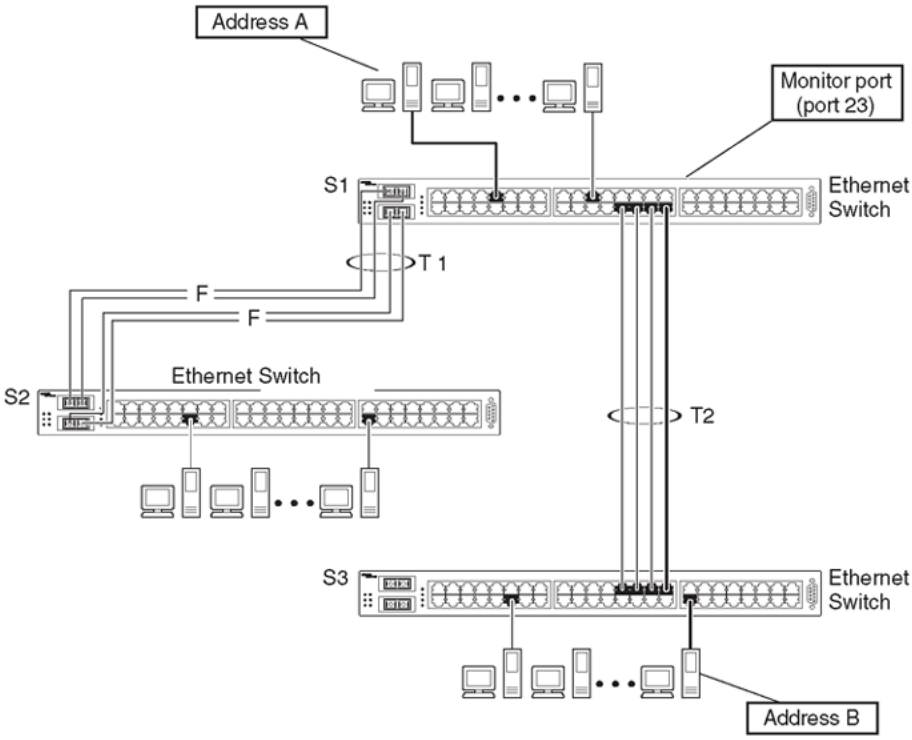
Figure 3
Port Mirroring Configuration port-based screen example

```
                    Port Mirroring Configuration


                  Monitoring Mode:  [  -> Port X   or    Port Y ->  ]
                Monitor Unit/Port:  [  /23 ]

                      Unit/Port X:  [  /25 ]
                      Unit/Port Y:  [  /24 ]

                        Address A:  [ 00-00-00-00-00-00 ]
                        Address B:  [ 00-00-00-00-00-00 ]



Port mirroring configuration has taken effect.

               Currently Active Port Mirroring Configuration
               ---------------------------------------------
Monitoring Mode:  -> Port X   or    Port Y ->    Monitor Port: 23
Port X: 25     Port Y: 24

Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Address-based mirroring configuration

Figure 4 "Address-based mirroring configuration example" (page 20) shows an example of an address-based mirroring configuration where port 23, the designated monitor port for Switch S1, is monitoring traffic occurring between address A and address B.

Figure 4
Address-based mirroring configuration example



In this configuration, the designated monitor port (port 23) can be set to monitor traffic in any of the following modes:

- Monitor all traffic transmitted from address A to any address.
- Monitor all traffic received by address A from any address.
- Monitor all traffic received by or transmitted by address A.
- Monitor all traffic transmitted by address A to address B.
- Monitor all traffic between address A and address B (conversation between the two stations).

Figure 5 "Port Mirroring Configuration address-based screen example" (page 21) shows the Port Mirroring Configuration screen setup for this example.

In this example, port 23 becomes the designated Monitor Port for Switch S1 when you press Enter in response to the [Yes] screen prompt.

Note: The screen data displayed at the bottom of the screen changes to show the *new* currently active port mirroring configuration *after* you press Enter.

The Monitoring Mode field [Address A - > Address B] indicates that all traffic transmitted by address A to address B is monitored by the StackProbe attached to Monitor Port 23.

Note: When you enter MAC addresses in this screen, they are also displayed in the MAC Address Table screen EAPOL.

Figure 5
Port Mirroring Configuration address-based screen example

```
                        Port Mirroring Configuration


                  Monitoring Mode:   [  Address A    ->   Address B  ]
                Monitor Unit/Port:   [  /23 ]

                      Unit/Port X:   [  /   ]
                      Unit/Port Y:   [  /   ]

                        Address A:   [ 00-44-55-44-55-22 ]
                        Address B:   [ 00-33-44-33-22-44 ]

Is your port mirroring configuration complete?    [ Yes ]



               Currently Active Port Mirroring Configuration
               ---------------------------------------------
Monitoring Mode:  -> Address A   or    Address B ->    Monitor Port: 23
Port X: 25     Port Y: 24

Use space bar to display choices, press <Return> or <Enter> to select choice.
Press Ctrl-R to return to previous menu.  Press Ctrl-C to return to Main Menu.
```

Port mirroring configuration rules

The following configuration rules apply to any port mirroring configuration:

- You cannot configure a monitor port as a trunk member or IGMP member.
- A monitor port cannot be used for normal switch functions.
- When you configure a port as a monitor port, the port is automatically disabled from participating in the spanning tree. When you reconfigure the port as a standard switch port (no longer a monitor port), the port is enabled for spanning tree participation.
- When you create a *port-based* port mirroring configuration, be sure that the monitor port and both of the mirrored ports, port X and port Y, have the same configuration. Use the VLAN Configuration screen to configure the VLAN EAPOL.

- VLAN configuration settings for any ports configured for port-based mirroring cannot be changed. Use the Port Mirroring Configuration screen to disable port mirroring (or reconfigure the port mirroring ports), then change the VLAN configuration settings.
- For port-based monitoring of traffic, use one of the following modes for monitoring broadcast, IP Multicast, or unknown DA frames:
  - Monitor all traffic received by port X.
  - Monitor all traffic transmitted by port X.
  - Monitor all traffic received and transmitted by port X.

Appendix "Quick steps for port mirroring" (page 123) also provides configuration flowcharts that can help you use this feature.

Port Mirroring Configuration screen

The Port Mirroring Configuration screen allows you to configure a specific switch port to monitor up to two specified ports or two MAC addresses. You can specify port-based monitoring or address-based monitoring.

Figure 6 "Port Mirror Configuration screen" (page 22) shows an example of a Port Mirroring Configuration screen.

To open the Port Mirroring Configuration screen:

è Choose Port Mirroring Configuration (or type i) from the Switch Configuration Menu screen.

Figure 6
Port Mirror Configuration screen

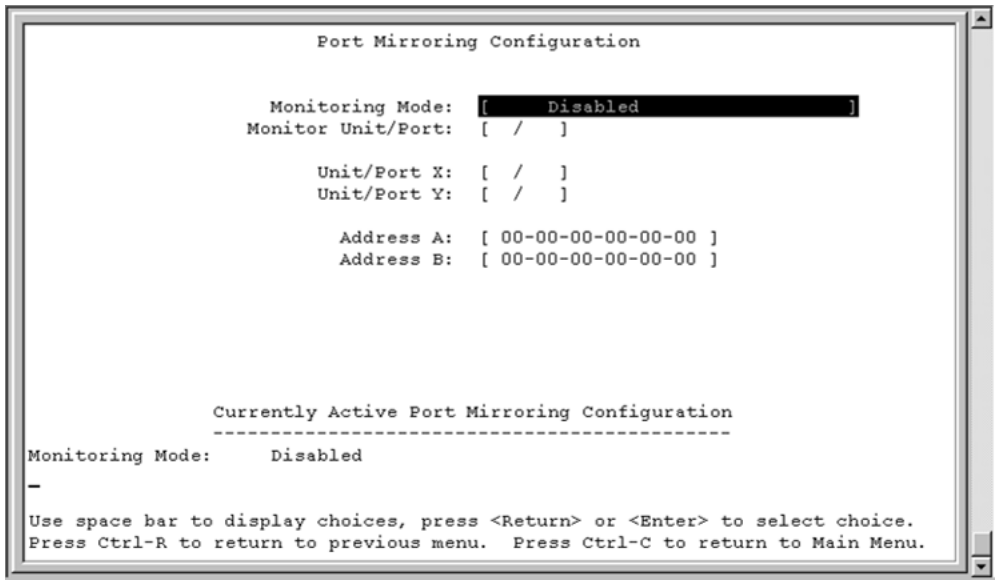


Table 2 "Port Mirroring Configuration screen fields" (page 23) describes the Port Mirroring Configuration screen fields.

Table 2
Port Mirroring Configuration screen fields

Field	Description
Monitoring Mode	Allows a user to select any one of six port-based monitoring modes or any one of five address-based monitoring modes (see Table 3 "Monitoring modes" (page 24)). Selecting any one of the six *port-based modes* activates the port X and port Y screen fields, where a user can choose up to two ports to monitor. Selecting any one of the five *address-based modes* activates the Address A and Address B screen fields, where a user can specify MAC addresses to monitor. Default Value: Disabled Range: See Table 3 "Monitoring modes" (page 24)
Monitor Unit/Port	Indicates the port number (of the specified unit) that is designated as the monitor port. Default Value: Zero-length string Range: 1 to 8 or 1 to 26 (depending on model type)
Unit/Port X	Indicates one of the ports (of the specified unit) that is monitored by the designated port monitor when one of the port-based monitoring modes is selected. This port is monitored according to the value of Port X in the Monitoring Mode field (see Table 3 "Monitoring modes" (page 24)). Default Value: Zero-length string Range: 1 to 8 or 1 to 26 (depending on model type)
Unit/Port Y	Indicates one of the ports (of the specified unit) that is monitored by the designated port monitor when one of the port-based monitoring modes is selected. When installed as a stand-alone switch, the screen does not display the (Unit/) field designation. This port is monitored according to the value of Port Y in the Monitoring Mode field (see Table 3 "Monitoring modes" (page 24)). Default Value: Zero-length string Range: 1 to 8 or 1 to 26 (depending on model type)

Field	Description
Address A	Indicates the MAC addresses that is monitored by the designated port monitor when one of the address-based monitoring modes is selected. This port is monitored according to the value of Address A in the selected Monitoring Mode field (see Table 3 "Monitoring modes" (page 24)). Default Value: 00-00-00-00-00-00 (no MAC address assigned) Range: 00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF
Address B	Indicates the MAC addresses that is monitored by the designated port monitor when one of the address-based monitoring modes is selected. This port is monitored according to the value of Address B in the selected Monitoring Mode field (see Table 3 "Monitoring modes" (page 24)). Default Value: 00-00-00-00-00-00 (no MAC address assigned) Range: 00-00-00-00-00-00 to FF-FF-FF-FF-FF-FF

Table 3 "Monitoring modes" (page 24) describes the various monitoring modes available from the Port Mirroring Configuration screen.

Table 3
Monitoring modes

Field	Description
Port-based:	
Disabled	Default value for this feature.
-> Port X	Monitor all traffic received by Port X.
Port X ->	Monitor all traffic transmitted by Port X.
<-> Port X	Monitor all traffic received and transmitted by Port X.
-> Port X or Port Y ->	Monitor all traffic received by Port X or transmitted by Port Y. ***Note:*** Do not use this mode for broadcast or multicast traffic.
-> Port X and Port Y ->	Monitor all traffic received by Port X (destined to Port Y) and then transmitted by Port Y. ***Note:*** Do not use this mode for broadcast or multicast traffic

Field	Description
<-> Port X and Port Y <->	Monitor all traffic received/transmitted by Port X and received/transmitted by Port Y. ***Note:*** Do not use this mode for broadcast or multicast traffic
Address-based:	
Disabled	Default value for this feature.
Address A -> any Address	Monitor all traffic transmitted from Address A to any address.
any Address -> Address A	Monitor all traffic received by Address A from any address.
<-> Address A	Monitor all traffic received by or transmitted by Address A.
Address A -> Address B	Monitor all traffic transmitted by Address A to Address B.
Address A <-> Address B	Monitor all traffic between Address A and Address B (conversation between the two stations).

Port Statistics screen

The Port Statistics screen, as displayed in Figure 7 "Port statistics screen" (page 26), allows you to view detailed information about any switch or port in a configuration. The screen is divided into two sections (Received and Transmitted) so that you can compare and evaluate throughput or other port parameters. All screen data is updated approximately every 2 seconds.

You can use the Port Statistics screen to clear (reset to zero) port counters for a specific switch or port. Alternatively, you can use the Clear All Port Statistics option to clear port counters for all switches or ports.

To open the Port Statistics screen:

Choose Display Port Statistics (or type d) from the Switch Configuration Menu screen.

Figure 7
Port statistics screen

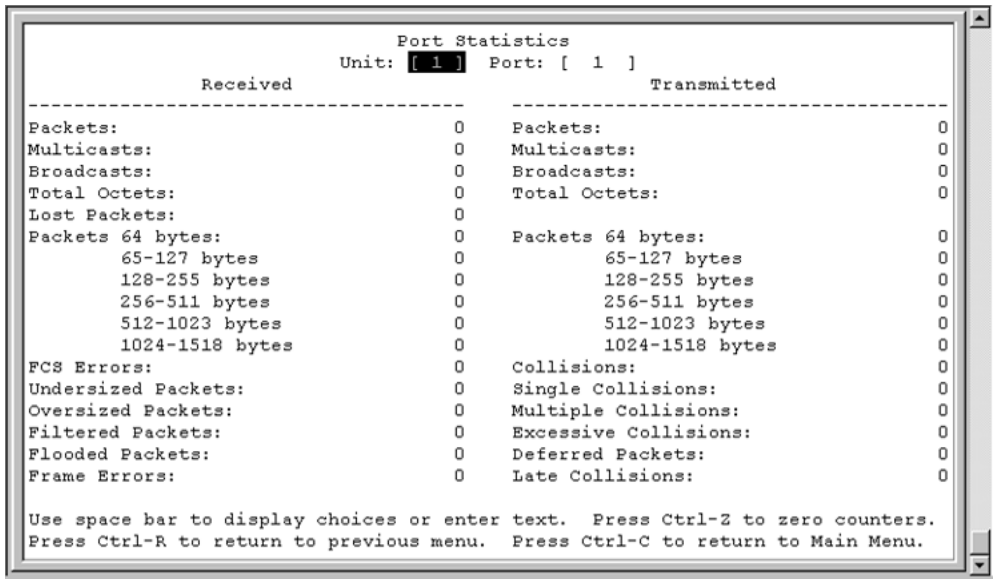


Table 4 "Port Statistics screen fields" (page 26) describes the Port Statistics screen fields.

Table 4
Port Statistics screen fields

Field	Description
Port	Allows you to select the number of the port you want to view or reset to zero. To view another port, enter its port number and press Enter, or press the spacebar on your keyboard to toggle the port numbers.
Packets	Received column: Indicates the total number of packets received on this port, including bad packets, broadcast packets, and multicast packets. Transmitted column: Indicates the total number of packets transmitted successfully on this port, including broadcast packets and multicast packets.
Multicasts	Received column: Indicates the total number of good multicast packets received on this port, excluding broadcast packets. Transmitted column: Indicates the total number of multicast packets transmitted successfully on this port, excluding broadcast packets.

Field	Description
Broadcasts	Received column: Indicates the total number of good broadcast packets received on this port. Transmitted column: Indicates the total number of broadcast packets transmitted successfully on this port.
Total Octets	Received column: Indicates the total number of octets of data (including data in bad packets) received on this port, excluding framing bits but including FCS octets. Transmitted column: Indicates the total number of octets of data transmitted successfully on this port, including FCS octets.
Lost Packets	Received column: Indicates the total number of packets lost (discarded) when the capacity of the port receive buffer was exceeded. Transmitted column: Indicates the total number of packets lost (discarded) when the capacity of the port transmit buffer was exceeded.
Packets 64 bytes	Received column: Indicates the total number of 64-byte packets received on this port. Transmitted column: Indicates the total number of 64-byte packets transmitted successfully on this port.
65-127 bytes	Received column: Indicates the total number of 65-byte to 127-byte packets received on this port. Transmitted column: Indicates the total number of 65-byte to 127-byte packets transmitted successfully on this port.
128-255 bytes	Received column: Indicates the total number of 128-byte to 255-byte packets received on this port. Transmitted column: Indicates the total number of 128-byte to 255-byte packets transmitted successfully on this port.
256-511 bytes	Received column: Indicates the total number of 256-byte to 511-byte packets received on this port. Transmitted column: Indicates the total number of 256-byte to 511-byte packets transmitted successfully on this port.

Field	Description
512-1023 bytes	Received column: Indicates the total number of 512-byte to 1023-byte packets received on this port. Transmitted column: Indicates the total number of 512-byte to 1023-byte packets transmitted successfully on this port.
1024-1518 bytes	Received column: Indicates the total number of 1024-byte to 1518-byte packets received on this port. Transmitted column: Indicates the total number of 1024-byte to 1518-byte packets transmitted successfully on this port.
Frame Errors	Indicates the total number of valid-size packets received but discarded because of CRC errors and improper framing.
Undersized Packets	Indicates the total number of packets received on this port with fewer than 64 bytes and with proper CRC and framing (also known as short frames or runts).
Oversized Packets	Indicates the total number of packets received on this port with more than 1518 bytes and with proper CRC and framing (also known as oversized frames).
Filtered Packets	Indicates the number of packets filtered (not forwarded) by this port.
Flooded Packets	Indicates the total number of packets flooded (forwarded) through this port because the destination address was not in the address database.
FCS Errors	Indicates the total number of valid-size packets received with proper framing but discarded because of cyclic redundancy check (CRC) errors.
Collisions	Indicates the total number of collisions detected on this port.
Single Collisions	Indicates the total number of packets transmitted successfully on this port after a single collision.
Multiple Collisions	Indicates the total number of packets transmitted successfully on this port after more than one collision.
Excessive Collisions	Indicates the total number of packets lost on this port due to excessive collisions.
Deferred Packets	Indicates the total number of frames delayed on the first transmission attempt, but that never incurred a collision.
Late Collisions	Indicates the total number of packet collisions that occurred after a total length of time that exceeded 512 bit-times of packet transmission.

Field	Description
The following field values appear only when the port selected in the Unit/Port field is configured with a GBIC.	
Pause Frames	Transmitted column: Indicates the total number of pause frames transmitted on this port. Pause frames cause the transmitting port to temporarily suspend the transmission of packets when the frame buffer of the receiving port is full (Gigabit ports only). Received column: Indicates the total number of pause frames received on this port. Pause frames cause the transmitting port to temporarily suspend the transmission of packets when the frame buffer of the receiving port is full (Gigabit ports only).

Chapter 2
Configuring network monitoring using CLI

You can configure network monitoring features and display switch statistics using the CLI. This chapter contains information on the following topics:

Setting the system event log

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

show logging

The **`show logging`** command displays the current contents of the system event log. The default value displays all levels in chronological order. The syntax for the **`show logging`** command is:

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

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

Table 5 "show logging command parameters and variables" (page 32) describes the parameters and variables for **show logging** command.

Table 5
show logging command parameters and variables

Parameters and variables	Description
config	Displays configuration log messages. (This command parameter is only available with the Ethernet Switch 470-24T.)
critical	Displays critical log messages.
serious	Displays serious log messages.
informational	Displays informational log messages.

Figure 8 "show logging sort-reverse command output" (page 32) shows the output of the show logging sort-reverse command.

Figure 8
show logging sort-reverse command output

```
470_48T#show logging sort-reverse
Type Time                    Idx  Src Message
---- --------------------- ---- --- -------
I    2003-10-27 20:52:00 GMT 59       Successful connection from IP address: 13
4.177.118.66, access mode: no security
I    2003-10-27 20:48:51 GMT 58       Inactivity logout, IP address: 134.177.11
8.66, access mode: no security
I    2003-10-27 20:26:03 GMT 57       Authentication Failure Trap
I    2003-10-27 20:25:03 GMT 56       Authentication Failure Trap
I    2003-10-27 20:24:03 GMT 55       Authentication Failure Trap
I    2003-10-27 20:23:03 GMT 54       Authentication Failure Trap
I    2003-10-27 20:16:00 GMT 53       Successful connection from IP address: 13
4.177.118.66, access mode: no security
I    2003-10-27 19:32:06 GMT 52       SNTP: First synchronization successful.
I    2003-10-27 19:29:29 GMT 51       Authentication Failure Trap
I    2003-10-27 19:29:25 GMT 50       Authentication Failure Trap
I    2003-10-27 19:29:22 GMT 49       Authentication Failure Trap
```

logging

The **logging** command configures the system settings for the system event log of the Ethernet Switch 470-24T. The syntax for the **logging** command is:

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

The **logging** command is in the config command mode.

Table 6 "logging command parameters and variables" (page 33) describes the parameters and variables for the **logging** command.

Table 6
logging command parameters and variables

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

no logging

The **no logging** command disables the system event log on the Ethernet Switch 470-24T. The syntax for the **no logging** command is:

```
no logging
```

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

The **no logging** command has no parameters or variables.

set logging

The **set logging** command configures the system settings of the system event log for the Ethernet Switch 470-48T or the Ethernet Switch 460-24T. The syntax for the **set logging** command is:

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

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

Table 7 "set logging command parameters and variables" (page 33) describes the parameters and variables for the **set logging** command.

Table 7
set logging command parameters and variables

Parameters and variables	Description
enable | disable	Enables or disables the event log (default is enabled).

Parameters and variables	Description
level critical | serious | informational	Specifies the level of logging stored in DRAM.
nv-level critical | serious | informational | none	Specifies the level of logging stored in NVRAM.

no set logging

The **no set logging** command disables the system event log for the Ethernet Switch 470-48T or the Ethernet Switch 460-24T. The syntax for the **no set logging** command is:

```
no set logging
```

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

The **no set logging** command has no parameters or variables.

default logging

The **default logging** command configures the system settings as the factory default settings for the system event log on the Ethernet Switch 470-24T. The syntax for the **default logging** command is:

```
default logging
```

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

The **default logging** command has no parameters or variables.

default set logging

The **default set logging** command configures the system settings as the factory default settings for the system event log on the Ethernet Switch 470-48T or the Ethernet Switch 460-24T. The syntax for the **default set logging** command is:

```
default set logging
```

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

The **default set logging** command has no parameters or variables.

clear logging command

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

```
clear logging [nv]
```

The **clear logging** command is in the privExec command mode.

Table 8 "clear logging command parameters and values" (page 35) shows the parameters and values for the **clear logging** command.

Table 8
clear logging command parameters and values

Parameters and values	Description
nv	Clears all log messages in both DRAM and non-volatile memory (NVRAM).

Enabling remote logging

This feature provides an enhanced level of logging by replicating system messages onto a syslog server. System log messages from several switches can be collected at a central location, which alleviates the network manager querying each switch individually to interrogate the log files. This section covers the following commands:

- "show logging" (page 35)
- "logging remote enable command" (page 36)
- "no logging remote enable command" (page 37)
- "logging remote address command" (page 37)
- "no logging remote address command" (page 37)
- "logging remote level command" (page 38)
- "no logging remote level command" (page 38)
- "default logging remote level command" (page 39)

show logging

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

```
show logging [config] [critical] [informational] [serious]
[sort-reverse]
```

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

Table 9 "show logging command parameters and variables" (page 36) describes the parameters and variables for the **show logging** command.

Table 9
show logging command parameters and variables

Parameters and variables	Description
config	Displays the configuration of event logging.
critical	Displays critical log messages.
informational	Displays informational log messages.
serious	Displays serious log messages.
sort-reverse	Displays log messages in reverse chronological order (beginning with most recent).

Figure 9 "show logging config command output" (page 36) shows the output of the show logging config command.

Figure 9
show logging config command output

```
470_48T>enable
470_48T#show logging config
Event Logging: Enabled
Volatile Logging Option: Latch
Event Types To Log: Critical, Serious, Informational
Event Types To Log To NV Storage: Critical, Serious
Remote Logging: Disabled
Remote Logging Address: 0.0.0.0
Event Types To Log Remotely: None
```

logging remote enable command

Note: The default value for remote logging is disabled.

The **logging remote enable** command enables logging syslog messages to a remote server. The syntax for the **remote logging enable** command is:

```
logging remote enable
```

The **logging remote enable** command is in the config command mode.

The **logging remote enable** command has no parameters or variables.

no logging remote enable command

The **no logging remote enable** command disables sending syslog messages to a remote server. The syntax for the **no logging remote enable** command is:

```
no logging remote enable
```

The **no remote logging enable** command is in the config command mode.

The **no remote logging enable** command has no parameters or variables.

logging remote address command

The **logging remote address** command sets the remote server for receiving the syslog messages; you enter the IP address of the server you want. The syntax for the **logging remote address** command is:

```
logging remote address <A.B.C.D>
```

The **logging remote address** command is in the config command mode.

Table 10 "logging remote address command parameters and variables" (page 37) describes the parameters and variables for the **logging remote address** command.

Table 10
logging remote address command parameters and variables

Parameters and variables	Description
<A.B.C.D>	Specifies the IP address of the remote server in dotted-decimal notation.

The default address is 0.0.0.0.

no logging remote address command

The **no logging remote address** command clears the IP address of the remote server. The syntax for the **no logging remote address** command is:

```
no logging remote address
```

The **no logging remote address** command is in the config command mode.

The **no logging remote address** command has no parameters or variables.

logging remote level command

The **logging remote level** command sets the severity level of the logs you send to the remote server. The syntax for the **logging remote level** command is:

```
logging remote level {critical | informational | serious}
```

The **logging remote level** command is in the config command mode.

Table 11 "logging remote level command parameters and variables" (page 38) describes the parameters and variables for the **logging remote level** command.

Table 11
logging remote level command parameters and variables

Parameters and variables	Description
{critical | serious | informational}	Specifies the severity level of the log messages sent to the remote server: • critical • informational • serious

There is no default value for this command.

no logging remote level command

The **no logging remote level** command removes any severity level of the log messages that you send to the remote server; it reverts to None. The syntax for the **no logging remote level** command is:

```
no logging remote level
```

The **no logging remote level** command is in the config command mode.

The **no logging remote level** command has no parameters or variables.

default logging remote level command

The **default logging remote level** command sets the severity level of the logs you send to the remote server to the default value, which is None. The syntax for the **default logging remote level** command is:

```
default logging remote level
```

The **default logging remote level** command is in the config command mode.

The **default logging remote level** command has no parameters or variables.

Using port mirroring

Note: For guidelines to port mirroring, refer to "Port mirroring" (page 17).

You use port mirroring to monitor traffic. This section covers the following commands:

- "show port-mirroring command" (page 39)
- "port-mirroring command" (page 40)
- "no port-mirroring command" (page 41)

show port-mirroring command

The **show port-mirroring** command displays the port mirroring configuration. The syntax for the **show port-mirroring** command is:

```
show port-mirroring
```

The **show port-mirroring** command is in the privExec command mode.

The **show port-mirroring** command has no parameters or variables.

Figure 10 "show port-mirroring command output" (page 39) displays sample output from the **show port-mirroring** command.

Figure 10
show port-mirroring command output

```
470-24T (config)#show port-mirroring
Monitoring Mode: Xrx ( -> Port X )
Monitor Port:    1/3
Port X:          1/1
```

port-mirroring command

The **port-mirroring** command sets the port mirroring configuration. The syntax of the **port-mirroring** command is:

```
port-mirroring mode
 {disable |
 Xrx monitor-port <portlist> mirror-port-X <portlist> |
 Xtx monitor-port <portlist> mirror-port-X <portlist> |
 XrxOrXtx monitor-port <portlist>
 mirror-port-X <portlist> mirror-port-Y <portlist> |
 XrxOrYtx monitor-port <portlist>
 mirror-port-X <portlist> mirror-port-Y <portlist> |
 XrxYtx monitor-port <portlist>
 mirror-port-X <portlist> mirror-port-Y <portlist> |
 XrxYtxOrYrxXtx monitor-port <portlist>
 mirror-port-X <portlist> mirror-port-Y <portlist> |
 Asrc monitor-port <portlist> mirror-MAC-A <macaddr> |
 Adst monitor-port <portlist> mirror-MAC-A <macaddr> |
 AsrcOrAdst monitor-port <portlist>
 mirror-MAC-A <macaddr> |
 AsrcBdst monitor-port <portlist>
 mirror-MAC-A <macaddr> mirror-MAC-B <macaddr> |
 AsrcBdstOrBsrcAdst monitor-port <portlist>
 mirror-MAC-A <macaddr> mirror-MAC-B <macaddr>}
```

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

The **port-mirroring** command is in the config command mode.

Table 12 "port-mirroring command parameters and variables" (page 40) describes the parameters and variables for the **port-mirroring** command.

Table 12
port-mirroring command parameters and variables

Parameters and variables	Description
disable	Disables port mirroring.
monitor-port	Specifies the monitor port.
mirror-port-X	Specifies the mirroring port X.
mirror-port-Y	Specifies the mirroring port Y.
mirror-MAC-A	Specifies the mirroring MAC address A.
mirror-MAC-B	Specifies the mirroring MAC address B.
portlist	Enter the port number.
Xrx	Mirror packets received on port X.

Parameters and variables	Description
Xtx	Mirror packets transmitted on port X.
XrxOrXtx	Mirror packets received or transmitted on port X.
XrxYtx	Mirror packets received on port X and transmitted on port Y. ***Note:*** Do not use this mode for mirroring broadcast and multicast traffic.
XrxYtxOrXtxYrx	Mirror packets received on port X and transmitted on port Y or packets received on port Y and transmitted on port X. ***Note:*** Do not use this mode for mirroring broadcast and multicast traffic.
macaddr	Enter the MAC address in format H.H.H.
Asrc	Mirror packets with source MAC address A.
Adst	Mirror packets with destination MAC address A.
AsrcOrAdst	Mirror packets with source or destination MAC address A.
AsrcBdst	Mirror packets with source MAC address A and destination MAC address B.
AsrcBdstOrBsrcAdst	Mirror packets with source MAC address A and destination MAC address B or packets with source MAC address B and destination MAC address A.

no port-mirroring command

The **no port-mirroring** command disables port mirroring. The syntax of the **no port-mirroring** command is:

```
no port-mirroring
```

The **no port-mirroring** command is in the config command mode.

The **no port-mirroring** command has no parameters or variables.

Displaying port statistics

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

- "show port-statistics command" (page 42)
- "clear-stats command" (page 43)

show port-statistics command

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

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

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

Table 13 "show port-statistics command parameters and variables" (page 42) describes the parameters and variables for the **show port-statistics** command.

Table 13
show port-statistics command parameters and variables

Parameters and variables	Description
port <portlist>	Specifies the port numbers for which to display statistics. ***Note:*** If you omit this parameter, the system uses the port number specified with the **interface** command.

Figure 11 "show port-statistics command output" (page 43) displays sample output from the **show port-statistics** command.

Figure 11
`show port-statistics` command output

```
470_24T(config-if)#show port-statistics
Received
    Packets:                0
    Multicasts:             0
    Broadcasts:             0
    TotalOctets:            0
    Lost Packets:           0
    Packets 64 bytes:       0
            65-127 bytes:   0
            128-255 bytes:  0
            256-511 bytes:  0
            512-1023 bytes: 0
            1024-1518 bytes: 0
    FCS Errors:             0
    Undersized Packets:     0
    Oversized Packets:      0
    Filtered Packets:       0
    Flooded PAckets:        0
    Frame Errors:           0
Transmitted
    Packets:                0
    Multicasts:             0
    Broadcasts:             0
    TotalOctets:            0
    Packets 64 bytes:       0
            65-127 bytes:   0
            128-255 bytes:  0
            256-511 bytes:  0
            512-1023 bytes: 0
            1024-1518 bytes: 0
    Collisions:             0
    Single Collisions:      0
    Multiple Collisions:    0
    Excessive Collisions:   0
    Deferred Packets:       0
    Late Collisions:        0
```

clear-stats command

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

`clear-stats [port <portlist>]`

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

Table 14 "clear-stats command parameters and variables" (page 44) describes the parameters and variables for the **clear-stats** command.

Table 14
clear-stats command parameters and variables

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

Chapter 3
Configuring network monitoring using Device Manager

You can use the Device Manager to configure system logging and to display chassis and port statistics for the Ethernet Switches 460 and 470.

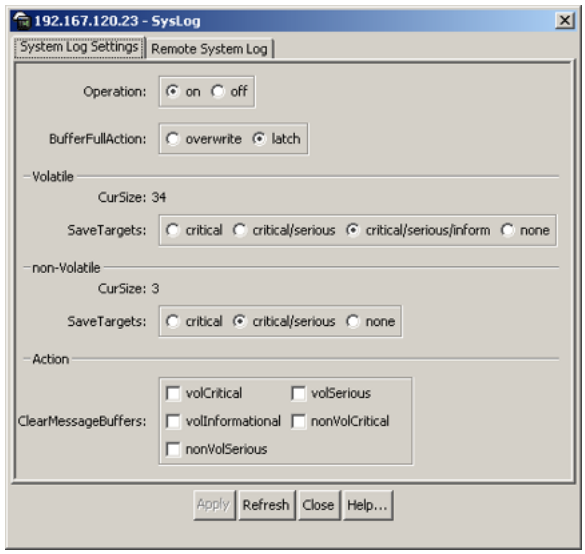
This section contains the following topics:

System Log Settings tab

To view System Log Settings information:

Step	Action
1	From the Device Manager menu bar, select Edit > Diagnostics > System Log. The SysLog dialog box opens with the System Log Settings tab displayed. (Figure 12 "System Log Settings tab" (page 46)).

Figure 12
System Log Settings tab



—End—

Table 15 "System Log Settings tab items" (page 46) describes the System Log Settings tab items.

Table 15
System Log Settings tab items

Items	Description
Operation	Specifies the storing or discarding of generated log messages. Specifying On causes log messages to be stored in the log message buffer facility. Specifying Off discontinues the storing of log messages. Previously collected log messages remain stored in the buffer facility until they are manually cleared or the system is reset. Resets do not clear log messages that have been saved in non-volatile storage.
BufferFullAction	Specifies overwriting of previous log messages, where messages are overwritten based on FIFO, or specifies that no more messages be saved until the setting is changed to overwrite. This applies only to messages that are maintained in volatile storage. Messages saved in non-volatile storage are never overwritten, and must be cleared manually.

Items	Description
Volatile CurrSize	The current number of log messages in the volatile portion of the system log message facility. Messages that are classified as volatile are lost upon system re-initialization.
Volatile Save Targets	Specifies the type of log messages to be saved in the log message buffer facilities. Messages are classified based on their type: • Critical - Specifies that only critical messages be saved to volatile storage. • Critical/Serious - Specifies that both critical and serious messages be saved to volatile storage. • Critical/Serious/Informational - Causes all log messages be saved when the log message is entered into the system. • None - Specifies that no log messages will be stored in volatile memory.
Non-Volatile CurrSize	The current number of log messages in the non-volatile portion of the system log message facility. Messages that are classified as non-volatile are not lost upon system re-initialization.
Non-Volatile Save Targets	Specifies the type of log messages to be saved in the log message buffer facilities. Messages are classified based on their type: • Critical - Specifies that only critical messages be saved to non-volatile storage. • Critical/Serious - Specifies that both critical and serious messages be saved to non-volatile storage. • None - Specifies that no log messages will be stored in non-volatile memory.
Action ClearMessageBuffers	Specifies the type of log messages to clear.

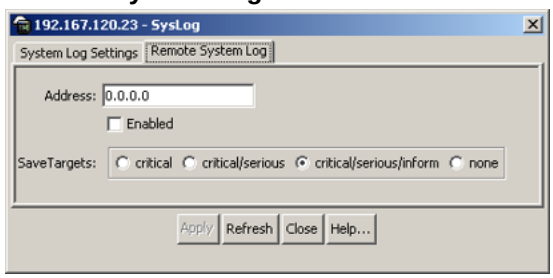
Remote System Log tab

To view Remote System Log information:

The Remote System Log tab opens.

Step	Action
1	From the Device Manager menu bar, select Edit > Diagnostics > System Log. The SysLog dialog box opens with the System Log Settings tab displayed.
2	Click the Remote System Log tab. The Remote System Log tab opens (Figure 13 "Remote System Log tab" (page 48)).

Figure 13
Remote System Log tab



—End—

Table 16 "Remote System Log tab items" (page 48) describes the Remote System Log tab items.

Table 16
Remote System Log tab items

Items	Description
Address	The IP address where log messages are sent using the remote syslog facility.
Enabled	Specifies that the remote logging feature is enabled.
SaveTargets	Specifies the type of log messages to be sent to a remote syslog server when they occur. Messages are classified based on their type: • Critical - Specifies that only critical messages are sent to the remote syslog server. • Critical/Serious - Specifies that both critical and serious messages are sent to the remote syslog server.

Items	Description
	• Critical/Serious/Informational - Causes all log messages are sent to the remote syslog server • None - Specifies that no log messages are sent to the remote syslog server.

Graphing chassis statistics

To graph chassis statistics:

Step	Action
1	Select the chassis.
2	Do *one* of the following: • From the shortcut menu, choose Graph. • From Device Manager main menu, choose Graph > Chassis. • On the toolbar, click Graph. 

—End—

The following describe the Graph Chassis dialog box tabs with descriptions of the statistics on each tab.

- "IP tab" (page 49)
- "ICMP In tab" (page 53)
- "ICMP Out tab" (page 54)

Six columns provide the statistics for the counters that are listed on the tab.

IP tab

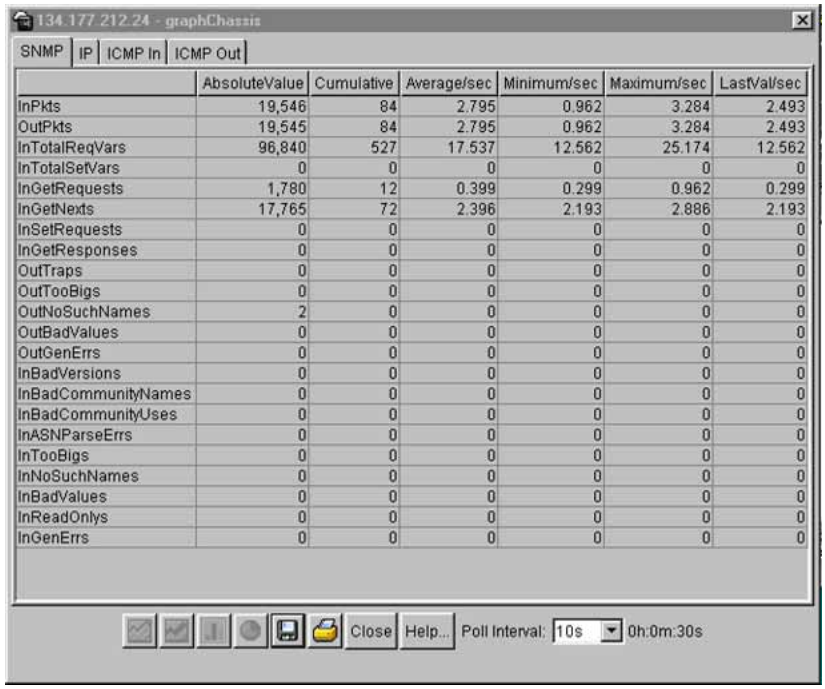
The IP tab shows IP information for the chassis.

To open the IP tab:

Step	Action
1	From the Main Menu, choose Graph > Chassis.

The Graph Chassis dialog box opens with the SNMP tab displayed (Figure 14 "Graph Chassis dialog box -- Chassis SNMP tab" (page 50)).

Figure 14
Graph Chassis dialog box -- Chassis SNMP tab

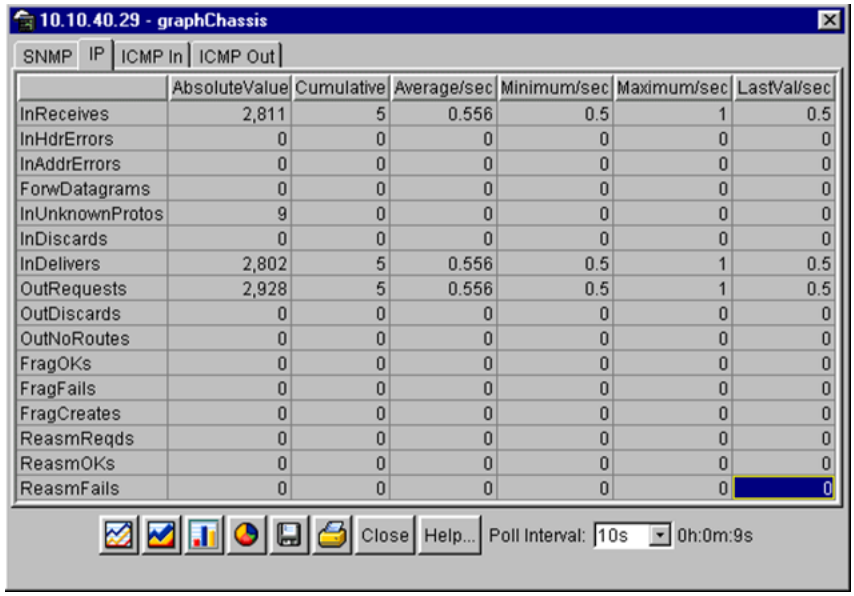


	AbsoluteValue	Cumulative	Average/sec	Minimum/sec	Maximum/sec	LastVal/sec
InPkts	19,546	84	2.795	0.962	3.284	2.493
OutPkts	19,545	84	2.795	0.962	3.284	2.493
InTotalReqVars	96,840	527	17.537	12.562	25.174	12.562
InTotalSetVars	0	0	0	0	0	0
InGetRequests	1,780	12	0.399	0.299	0.962	0.299
InGetNexts	17,765	72	2.396	2.193	2.886	2.193
InSetRequests	0	0	0	0	0	0
InGetResponses	0	0	0	0	0	0
OutTraps	0	0	0	0	0	0
OutTooBigs	0	0	0	0	0	0
OutNoSuchNames	2	0	0	0	0	0
OutBadValues	0	0	0	0	0	0
OutGenErrs	0	0	0	0	0	0
InBadVersions	0	0	0	0	0	0
InBadCommunityNames	0	0	0	0	0	0
InBadCommunityUses	0	0	0	0	0	0
InASNParseErrs	0	0	0	0	0	0
InTooBigs	0	0	0	0	0	0
InNoSuchNames	0	0	0	0	0	0
InBadValues	0	0	0	0	0	0
InReadOnlys	0	0	0	0	0	0
InGenErrs	0	0	0	0	0	0

2 Click the IP tab.

The IP tab opens (Figure 15 "Graph Chassis dialog box -- IP tab" (page 51)).

Figure 15
Graph Chassis dialog box -- IP tab



	AbsoluteValue	Cumulative	Average/sec	Minimum/sec	Maximum/sec	LastVal/sec
InReceives	2,811	5	0.556	0.5	1	0.5
InHdrErrors	0	0	0	0	0	0
InAddrErrors	0	0	0	0	0	0
ForwDatagrams	0	0	0	0	0	0
InUnknownProtos	9	0	0	0	0	0
InDiscards	0	0	0	0	0	0
InDelivers	2,802	5	0.556	0.5	1	0.5
OutRequests	2,928	5	0.556	0.5	1	0.5
OutDiscards	0	0	0	0	0	0
OutNoRoutes	0	0	0	0	0	0
FragOKs	0	0	0	0	0	0
FragFails	0	0	0	0	0	0
FragCreates	0	0	0	0	0	0
ReasmReqds	0	0	0	0	0	0
ReasmOKs	0	0	0	0	0	0
ReasmFails	0	0	0	0	0	0

—End—

Table 17 "Chassis IP tab fields" (page 51) describes the Chassis IP tab fields.

Table 17
Chassis IP tab fields

Field	Description
InReceives	The total number of input datagrams received from interfaces, including those received in error.
InHdrErrors	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.
InAddrErrors	The number of input datagrams discarded because the IP address in the IP header destination field was not a valid address. This count includes invalid addresses (for example, 0.0.0.0) and addresses of unsupported Classes (for example, Class E). For addresses that are not IP Gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.

Field	Description
ForwDatagrams	The number of input datagrams for which this entity 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. For addresses that do not act as IP Gateways, this counter includes only those packets that are Source-Routed by way of this address and have successful Source-Route option processing.
InUnknownProtos	The number of locally addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.
InDiscards	The number of input IP datagrams for which no problems were encountered to prevent their continued processing but that were discarded (for example, for lack of buffer space). Note that this counter does not include any datagrams discarded while awaiting reassembly.
InDelivers	The total number of input datagrams successfully delivered to IP user-protocols (including ICMP).
OutRequests	The total number of IP datagrams that 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.
OutDiscards	The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but that were discarded (for example, for lack of buffer space). Note that this counter includes datagrams counted in ipForwDatagrams if any such packets met this (discretionary) discard criterion.
OutNoRoutes	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 that meet this no-route criterion. Note that this includes any datagrams a host cannot route because all of its default gateways are down.
FragOKs	The number of IP datagrams successfully fragmented at this entity.
FragFails	The number of IP datagrams discarded because they needed to be fragmented at this entity but could not be; for example, because their Don't Fragment flag was set.

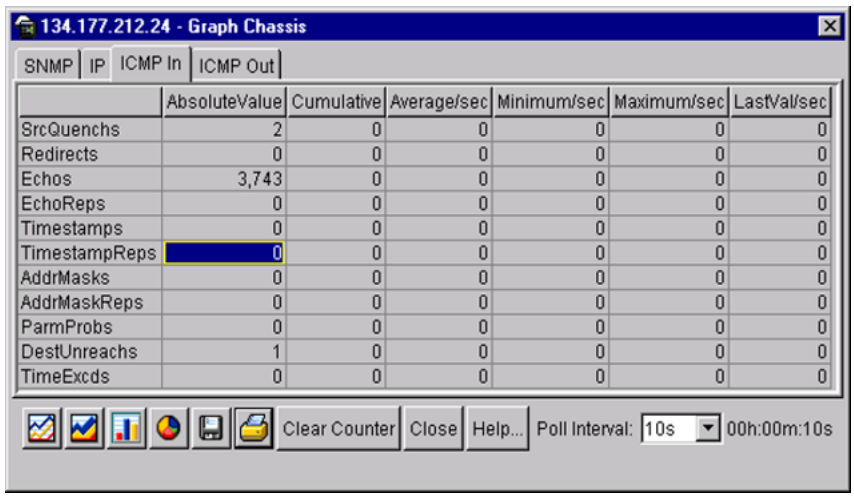
Field	Description
FragCreates	The number of IP datagram fragments generated as a result of fragmentation at this entity.
ReasmReqds	The number of IP fragments received that needed to be reassembled at this entity.
ReasmOKs	The number of IP datagrams successfully reassembled.
ReasmFails	The number of failures detected by the IP reassembly algorithm (for whatever reason, such as timed out, errors.). Note that this is not necessarily a count of discarded IP fragments because some algorithms (notably the algorithm in RFC 815) can lose track of the number of fragments by combining them as they are received.

ICMP In tab

To open the ICMP In tab:

Step	Action
1	From the Main Menu, choose Graph > Chassis. The Graph Chassis dialog box opens with the SNMP tab displayed (Figure 14 "Graph Chassis dialog box -- Chassis SNMP tab" (page 50)).
2	Click the ICMP In tab. The ICMP In tab opens (Figure 16 "Graph Chassis dialog box -- ICMP In tab" (page 53)).

Figure 16
Graph Chassis dialog box -- ICMP In tab



—End—

Table 18 "ICMP In tab fields" (page 54) describes the ICMP In tab fields.

Table 18
ICMP In tab fields

Field	Description
SrcQuenchs	The number of ICMP Source Quench messages received.
Redirects	The number of ICMP Redirect messages received.
Echos	The number of ICMP Echo (request) messages received.
EchoReps	The number of ICMP Echo Reply messages received.
Timestamps	The number of ICMP Timestamp (request) messages received.
TimestampReps	The number of ICMP Timestamp Reply messages received.
AddrMasks	The number of ICMP Address Mask Request messages received.
AddrMaskReps	The number of ICMP Address Mask Reply messages received.
ParmProbs	The number of ICMP Parameter Problem messages received.
DestUnreachs	The number of ICMP Destination Unreachable messages received.
TimeExcds	The number of ICMP Time Exceeded messages received.

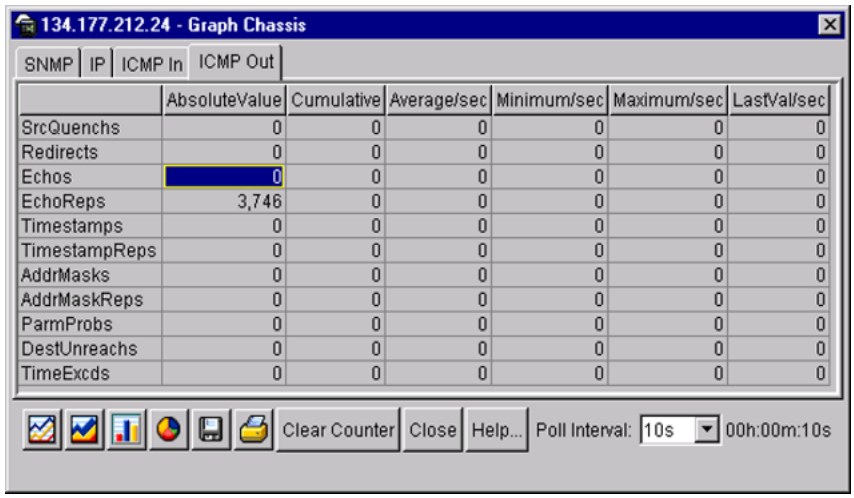
ICMP Out tab

To open the ICMP Out tab:

Step	Action
1	From the Main Menu, choose Graph > Chassis. The Graph Chassis dialog box opens with the SNMP tab displayed (Figure 14 "Graph Chassis dialog box -- Chassis SNMP tab" (page 50)).
2	Click the ICMP Out tab.

The ICMP Out tab opens (Figure 17 "Graph Chassis dialog box -- ICMP Out tab" (page 55)).

Figure 17
Graph Chassis dialog box -- ICMP Out tab



—End—

Table 19 "ICMP Out tab fields" (page 55) describes the ICMP Out tab fields.

Table 19
ICMP Out tab fields

Field	Description
SrcQuenchs	The number of ICMP Source Quench messages sent.
Redirects	The number of ICMP Redirect messages received. For a host, this object is always zero, because hosts do not send redirects.
Echos	The number of ICMP Echo (request) messages sent.
EchoReps	The number of ICMP Echo Reply messages sent.
Timestamps	The number of ICMP Timestamp (request) messages sent.
TimestampReps	The number of ICMP Timestamp Reply messages sent.
AddrMasks	The number of ICMP Address Mask Request messages sent.
AddrMaskReps	The number of ICMP Address Mask Reply messages sent.
ParmProbs	The number of ICMP Parameter Problem messages sent.

Field	Description
DestUnreachs	The number of ICMP Destination Unreachable messages sent.
TimeExcds	The number of ICMP Time Exceeded messages sent.

Graphing port statistics

You can graph statistics for either a single port or multiple ports from the graphPort dialog box. The displays for both single and multiple ports show the identical statistical items. The only difference is that the display for the single windows displays the following values simultaneously, while you select which of the following to display in the multiple port graph dialog box:

- AbsoluteValue
- Cumulative
- Average/sec
- Minimum/sec
- Maximum/sec
- LastVal/sec

The illustrations in this section show graphs for multiple ports.

To open the graphPort dialog box for graphing:

Step	Action
1	Select the port or ports you want to graph. To select multiple ports, [Ctrl] + left-click the ports that you want to configure. A yellow outline appears around the selected ports.
2	Do one of the following: • From the Device Manager main menu, choose Graph > Port. • From the shortcut menu, choose Graph. • On the toolbar, click Graph. 

—End—

The graphPort dialog box for a single port or for multiple ports opens with the Interface tab displayed.

Note: Some statistics are available only when you graph a single port.

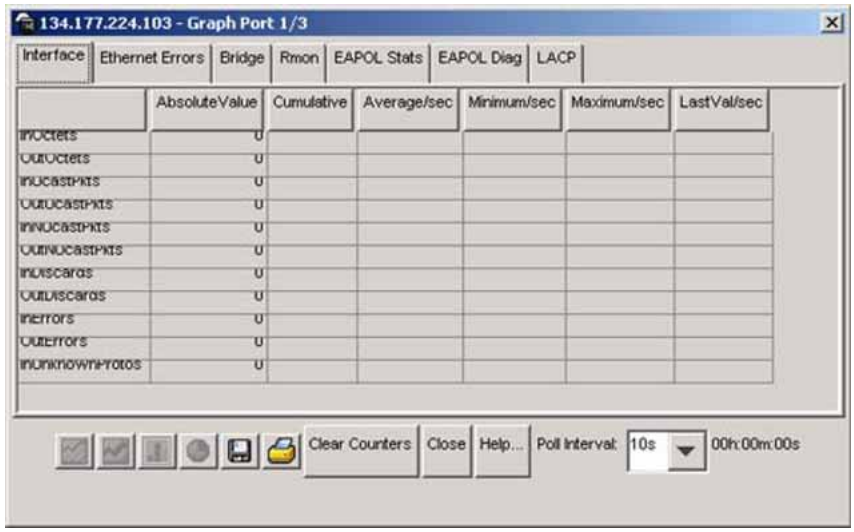
Interface tab for graphing ports

The Interface tab shows interface parameters for graphing a port or ports.

To open the Interface tab for graphing:

Step	Action
1	Select the port or ports you want to graph. To select multiple ports, [Ctrl] + left-click the ports that you want to configure. A yellow outline appears around the selected ports.
2	Do one of the following: • From the Device Manager main menu, choose Graph > Port. • From the shortcut menu, choose Graph. • On the toolbar, click Graph. The Port dialog box for a single port or for multiple ports (Figure 18 "Interface tab for graphing ports" (page 57)) opens with the Interface tab displayed.

Figure 18
Interface tab for graphing ports



—End—

Table 20 "Port Interface tab fields for multiple ports" (page 58) describes the Interface tab fields for graphing ports.

Table 20
Port Interface tab fields for multiple ports

Field	Description
InOctets	The total number of octets received on the interface, including framing characters.
OutOctets	The total number of octets transmitted out of the interface, including framing characters.
InUcastPkts	The number of packets delivered by this sublayer to a higher sublayer that were not addressed to a multicast or broadcast address at this sublayer.
OutUcastPkts	The number of packets that higher-level protocols requested be transmitted that were not addressed to a multicast address at this sublayer. This total number includes those packets discarded or unsent.
InNUcastPkts	The number of packets delivered by this sublayer to a higher (sub)layer that were addressed to a multicast or broadcast address at this sublayer.
OutNUcastPkts	The total number of packets that higher-level protocols requested be transmitted, and that were addressed to a multicast or broadcast address at this sublayer, including those that were discarded or not sent.
InDiscards	The number of inbound packets that were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet is to free up buffer space.
OutDiscards	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 is to free up buffer space.
InErrors	For packet-oriented interfaces, the number of inbound packets that contained errors preventing them from being deliverable 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.

Field	Description
OutErrors	For packet-oriented interfaces, the number of outbound packets that were not 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.
InUnknownProtos	For packet-oriented interfaces, the number of packets received through the interface that were discarded because of an unknown or unsupported protocol. For character-oriented or fixed-length interfaces that support protocol multiplexing, the number of transmission units received through the interface that were discarded because of an unknown or unsupported protocol. For any interface that does not support protocol multiplexing, this counter is always 0.

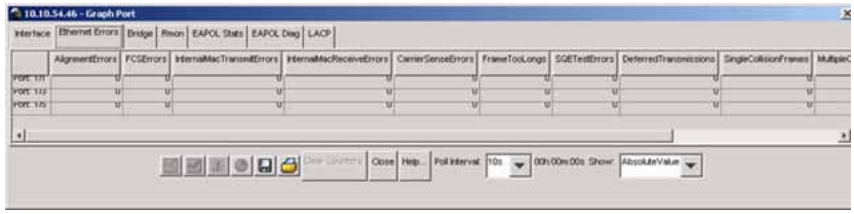
Ethernet Errors tab for graphing ports

The port Ethernet Errors tab shows port Ethernet Errors statistics.

To open the Ethernet Errors tab for graphing:

Step	Action
1	Select the port or ports you want to graph. To select multiple ports, [Ctrl] + left-click the ports that you want to configure. A yellow outline appears around the selected ports.
2	Do one of the following: • From the Device Manager main menu, choose Graph > Port. • From the shortcut menu, choose Graph. • On the toolbar, click Graph. The Port dialog box for a single port or for multiple ports opens with the Interface tab displayed.
3	Click the Ethernet Errors tab. The Port Ethernet Errors tab (Figure 19 "Graph Port dialog box -- Port Ethernet Errors tab" (page 60)) opens.

Figure 19
Graph Port dialog box -- Port Ethernet Errors tab



—End—

Table 21 "Ethernet Errors tab fields" (page 60) describes the Port Ethernet Errors tab fields.

Table 21
Ethernet Errors tab fields

Field	Description
AlignmentErrors	A count of frames received on a particular interface that are not an integral number of octets in length and do not pass the 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 LLC (or other MAC user). Received frames for which multiple error conditions occur are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
FCSErrors	A count of frames received on a particular interface that are an integral number of octets in length but do not pass the FCS check. The count represented by an instance of this object is incremented when the Frame Check Error status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions occur are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
InternalMacTransmitErrors	A count of frames for which transmission on a particular interface fails due to an internal MAC sublayer 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 LateCollisions object, the ExcessiveCollisions object, or the CarrierSenseErrors object.

Field	Description
InternalMacReceiveErrors	A count of frames for which reception on a particular interface fails due to an internal MAC sublayer 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 FrameTooLongs object, the AlignmentErrors object, or the FCSErrors object. The precise meaning of the count represented by an instance of this object is implementation specific. In particular, an instance of this object can represent a count of receive errors on a particular interface that are not otherwise counted.
CarrierSenseErrors	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.
FrameTooLongs	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 occur are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC.
SQETestErrors	A count of times that the SQE TEST ERROR message is generated by the PLS sublayer 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.
DeferredTransmissions	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.

Field	Description
SingleCollisionFrames	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 MultipleCollisionFrames object.
MultipleCollisionFrames	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 SingleCollisionFrames object.
LateCollisions	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 Mb/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.
ExcessiveCollisions	A count of frames for which transmission on a particular interface fails due to excessive collisions.
Poll Interval	Statistics are updated based on the poll interval. Default: 10s Range: None, 2s, 5s, 10s, 30s, 1m, 5m, 30m 1h

Bridge tab for graphing ports

The Bridge tab displays port frame statistics.

To open the Bridge tab for graphing:

Step	Action
1	Select the port or ports you want to graph. To select multiple ports, [Ctrl] + left-click the ports that you want to configure. A yellow outline appears around the selected ports.

2 Do one of the following:

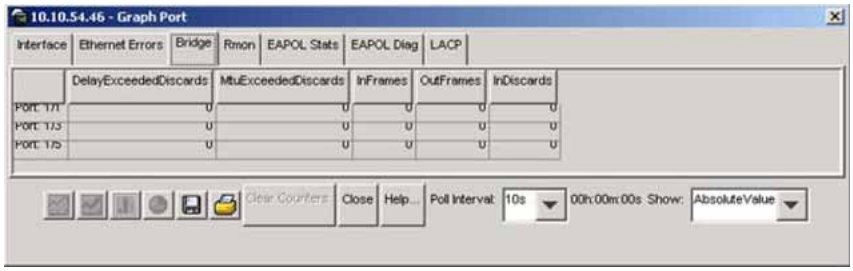
- From the Device Manager main menu, choose Graph > Port.
- From the shortcut menu, choose Graph.
- On the toolbar, click Graph.

The Port dialog box for a single port or for multiple ports opens with the Interface tab displayed.

3 Click the Bridge tab.

The Bridge tab for graphing ports opens (Figure 20 "Graph Port dialog box -- Bridge tab" (page 63)).

Figure 20
Graph Port dialog box -- Bridge tab



—End—

Table 22 "Bridge tab fields" (page 63) describes the Bridge tab fields.

Table 22
Bridge tab fields

Field	Description
DelayExceededDiscards	Number of frames discarded by the port due to excessive transit delays through the bridge. It is incremented by both transparent and source route bridges.
MtuExceededDiscards	Number of frames discarded by the port due to an excessive size. It is incremented by both transparent and source route bridges.
InFrames	The number of frames received by this port from its segment.

Field	Description
OutFrames	The number of frames received by this port from its segment.
InDiscards	Count of valid frames received that were discarded (filtered) by the Forwarding Process.

Chapter 4
Configuring network monitoring using Web-based management

You can configure network monitoring features using Web-based management.

This chapter contains information on the following topics:

Viewing the system log

You can view a display of messages contained in Non-Volatile Memory or Dynamic Random Access Memory (DRAM).

To open the System Log page:

Step	Action
1	From the main menu, choose Fault > System Log. The System Log page opens (Figure 21 "System Log page" (page 66)).

Figure 21
System Log page

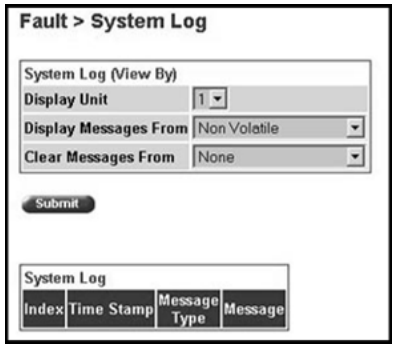


Table 23 "System Log page fields" (page 66) describes the fields on the System Log page.

Table 23
System Log page fields

Section	Item	Range	Description
System Log (View By)	Display Unit	1..8	Choose the unit on which to display messages or clear messages.
	Display Messages From	(1) Non Volatile (2) Volatile + Non Volatile	Choose to display messages from Non Volatile Memory or Volatile (DRAM) and Non Volatile memory. The default setting is Non Volatile.
	Clear Messages From	(1) Volatile (2) Volatile + Non Volatile (3) None	Choose to clear messages from Volatile memory or Volatile and Non Volatile memory. The default setting is None (do not clear messages).

Section	Item	Range	Description
System Log	Index		The number of the event.
	Time Stamp		The time, in hundreths of a second, between system initialization and the time the log messages entered the system.
	Message Type		The type of message. The options are (1) Critical, (2) Serious, and (3) Informational.
	Message		A character string that identifies the origin of the message and the reason why the message was generated.

2 In the System Log (View By) section do one or more of the following:

- Choose the number of the unit from which to display messages.
- Choose to display messages from both volatile and non-volatile memory or from non-volatile memory only.
- Choose to clear messages from both volatile and non-volatile memory, from non-volatile memory only, or from neither.

3 Click Submit.

The results of your request are displayed in the System Log section (Figure 21 "System Log page" (page 66)).

—End—

Configuring port mirroring

The Ethernet Switches support port mirroring to analyze traffic. You can view existing port mirroring activity, and you can configure a specific switch port to mirror up to two specified ports or two MAC addresses. When you configure port mirroring, you have the option to specify either port-based monitoring or address-based monitoring.

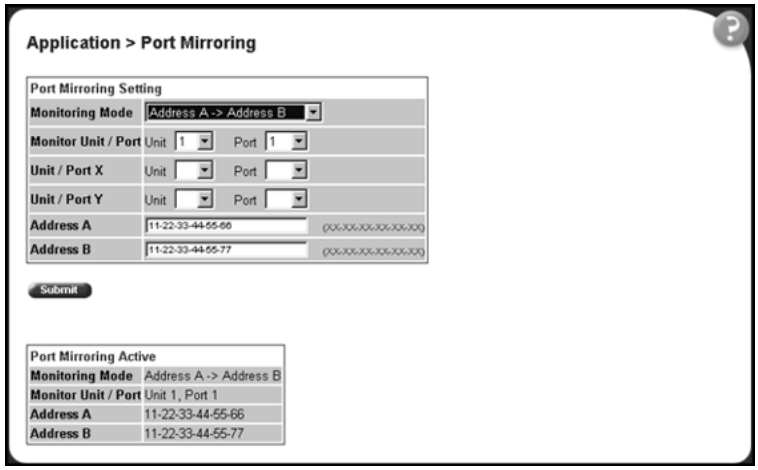
In a stack configuration, you can monitor ports that reside on different units within the stack.

To configure port mirroring:

Step	Action
1	From the main menu, choose Application > Port Mirroring.

The Port Mirroring page opens (Figure 22 "Port Mirroring page" (page 68)).

Figure 22
Port Mirroring page



Note: The Port Mirroring Active section of Figure 22 "Port Mirroring page" (page 68) displays only the port mirroring configurations you set. If you set no port mirroring configurations, the section does not display any rows.

Table 24 "Port Mirroring page items" (page 68) describes the items on the Port Mirroring page.

Table 24
Port Mirroring page items

Item	Range	Description
Monitoring Mode	(1) Disabled (2) --> Port X (3) Port X -->
(4)<-- --> Port X (5) -->Port X or Port Y -->
(6) -->Port X and Port Y -->
(7) <-- --> Port X and <-- --> Port Y (8) Address A --> any Address (9) any Address --> Address A (10) <-- --> Address A (11) Address A --> Address B (12) Address A <-- --> Address B	Choose any one of the six port-based monitoring modes or any one of the five address-based monitoring modes. For more information on selecting one of the six port-based modes that activates the port X and port Y screen fields, where you can choose up to two ports to monitor, see Table 25 "Port-based monitoring modes" (page 70). For more information on selecting one of the five address-based modes that activates the Address A and Address B screen fields, where you can specify

Item	Range	Description
		MAC addresses to monitor, see Table 26 "Address-based monitoring modes" (page 71). The default setting is Disabled.
Port-based monitoring		
Monitor Port	1..24	Choose the switch port to designate as the monitor port.
Port X	1..24	Choose the first switch port to be monitored by the designated monitor port. This port is monitored according to the value "X" in the Monitoring Mode field.
Port Y	1..24	Choose the second switch port to be monitored by the designated monitor port. This port is monitored according to the value "Y" in the Monitoring Mode field.
Address-based monitoring		
Address A	XX-XX-XX-XX-XX-XX	Type the MAC address to be monitored by the designated monitor port. This address is monitored according to the value "Address A" in the Monitoring Mode field.
Address B	XX-XX-XX-XX-XX-XX	Type the MAC address to be monitored by the designated monitor port. This address is monitored according to the value "Address B" in the Monitoring Mode field.

2 Type information in the text boxes, or select from a list.

3 Click Submit.

Selecting one of the port-based monitoring modes activates the port X or the port Y screen fields or both, where you can choose up to two ports to monitor.

Table 25 "Port-based monitoring modes" (page 70) describes the port-based monitoring modes.

Table 25
Port-based monitoring modes

Item	Description
Disabled	Choose this option to disable port-based monitoring. The default setting is Disabled.
--> Port X	Choose this option to monitor all traffic received by port X.
Port X -->	Choose this option to monitor all traffic transmitted by port X.
<-- --> Port X	Choose this option to monitor all traffic received and transmitted by port X.
--> Port X or Port Y -->	Choose this option to monitor all traffic received by port X or transmitted by port Y. ***Note:*** Do not use this mode for multicast and broadcast traffic.
--> Port X and Port Y -->	Choose this option to monitor all traffic received by port X (destined to port Y) and then transmitted by port Y (one way conversation steering). ***Note:*** Do not use this mode for multicast and broadcast traffic
<-- --> Port X and Port Y <-- -->	Choose this option to monitor all traffic received by port X and then transmitted by port Y or transmitted by port X and received by port Y (two way conversation steering). ***Note:*** Do not use this mode for multicast and broadcast traffic

Selecting any one of the address-based monitoring modes activates the Address A and Address B screen fields, where you can specify MAC addresses to monitor.

Table 26 "Address-based monitoring modes" (page 71) describes the address-based monitoring modes.

Table 26
Address-based monitoring modes

Item	Description
Disabled	Choose this option to disable port-based monitoring. The default setting is Disabled.
Address A --> any Address	Choose this option to monitor all traffic transmitted from Address A to any address.
any Address --> Address A	Choose this option to monitor all traffic received by Address A from any address.
<-- --> Address A	Choose this option to monitor all traffic received by or transmitted by Address A.
Address A --> Address B	Choose this option to monitor all traffic transmitted by Address A that goes to Address (one way conversation steering).
Address A <-- --> Address B	Choose this option to monitor all traffic received by Address A and then transmitted by Address B or transmitted by Address A and received by Address B (two way conversation steering).

—End—

Viewing system statistics

The options available to monitor system statistical data are:

- "Viewing port statistics" (page 71)
- "Viewing all port errors" (page 74)
- "Viewing interface statistics" (page 76)
- "Viewing Ethernet error statistics" (page 77)
- "Viewing transparent bridging statistics" (page 79)

Viewing port statistics

You can view detailed statistics about a selected switch port in a stacked or stand-alone configuration. Both received and transmitted statistics are displayed so that you can compare throughput or other port parameters.

To view statistical data about a selected switch port:

Step	Action

1 From the main menu, choose Statistics > Port.

The Port page opens (Figure 23 "Port page" (page 72)).

Figure 23
Port page

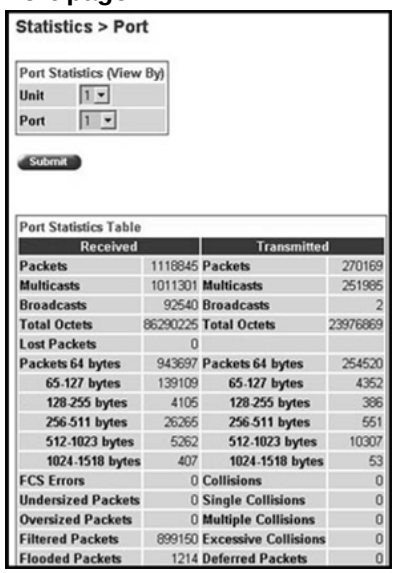


Table 27 "Port page items" (page 72) describes the items on the Port page.

Table 27
Port page items

Section	Item	Description
Port Statistics (View By)	Unit	The number of the switch to monitor.
	Port	The switch port number to monitor.
Port Statistics Table	Packets	The number of packets received/transmitted on this port, including bad packets, broadcast packets, and multicast packets.
	Multicast	The number of good multicast packets received/transmitted on this port, excluding broadcast packets.
	Broadcasts	The number of good broadcast packets received/transmitted on this port.
	Total Octets	The number of octets of data received/transmitted on this port, including data in bad packets and Frame Check Sequence (FCS) octets, and framing bits.

Section	Item	Description
	Lost Packets	The number of packets discarded on this port when the capacity of the port transmit buffer was exceeded.
	Packets = 64 bytes	The number of packets this size received/transmitted successfully on this port.
	Packets 65-127 bytes	The number of packets this size received/transmitted successfully on this port.
	Packets 128-255 bytes	The number of packets this size received/transmitted successfully on this port.
	Packets 256-511 bytes	The number of packets this size received/transmitted successfully on this port.
	Packets 512-1023 bytes	The number of packets this size received/transmitted successfully on this port.
	Packets 1024-1518 bytes	The number of packets this size received/transmitted successfully on this port.
	FCS Errors	The number of valid-size packets received on this port with proper framing but discarded because of cyclic redundancy check (CRC) errors.
	Undersized Packets	The number of packets received on this port with fewer than 64 bytes and with proper CRC and framing (also known as short frames or runts).
	Oversized Packets	The number of packets received on this port with proper CRC and framing that meet the following requirements: • 1518 bytes if no VLAN tag exists • 1522 bytes if a VLAN tag exists
	Filtered Packets	The number of packets filtered, but not forwarded on this port.
	Flooded Packets	The number of packets flooded (forwarded) through this port because the destination address was not recognized in the address database.
	Frame Errors	The number of valid-size packets received on this port but discarded because of CRC errors and improper framing.
	Collisions	The number of collisions detected on this port.
	Single Collisions	The number of packets transmitted successfully on this port after a single collision.

Section	Item	Description
	Multiple Collisions	The number of packets transmitted successfully on this port after more than one collision.
	Excessive Collisions	The number of packets lost on this port due to excessive collisions.
	Deferred Packets	The number of frames delayed on the first transmission attempt, but that never incurred a collision.
	Late Collisions	The number of packet collisions that occurred after a total length of time exceeding 512 bit-times of packet transmission.

2 In the Port Statistics section, choose the unit number and its port number.

3 Click Submit.

The Port Statistics Table is updated with information about the selected device and port (Figure 23 "Port page" (page 72)).

4 To update the statistical information, click Update.

—End—

Zeroing ports

To clear the statistical information for the currently displayed port:

è Click Zero Port.

To clear the statistical information for all ports in a switch or stack configuration:

è Click Zero All Ports.

Viewing all port errors

You can view all ports in the entire stack that have an error. If a particular port has no errors, it is not displayed.

To view a summary of the port errors for the Ethernet Switch:

Step	Action
1	From the main menu, choose Statistics > Port Error Summary. The Port Error Summary page opens (Figure 24 "Port Error Summary page" (page 75)).

Figure 24
Port Error Summary page

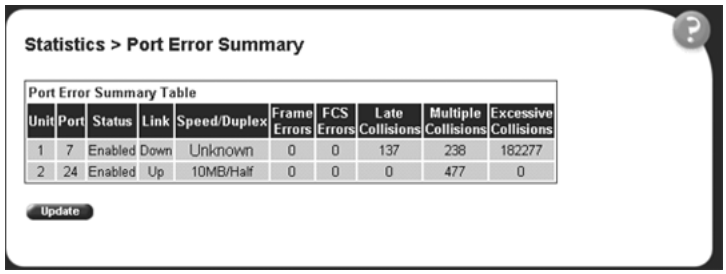


Table 28 "Port Error Summary Table fields" (page 75) describes the read-only information displayed in the Port Error Summary Table.

Table 28
Port Error Summary Table fields

Item	Description
Unit	Displays the unit number in the stack.
Port	Displays the port number of the unit.
Status	Displays the status of the port (Enabled/Disabled).
Link	Displays the link status of the port (Up/Down).
Speed/Duplex	Displays the speed at which the port is operating, as well as whether it is in half- or full-duplex mode.
Frame Errors	Displays the number of frame errors received on this port.
FCS Errors	Displays the number of frame check sequence (FCS) errors received on this port.
Late Collisions	Displays the number of late collisions errors received on this port.
Multiple Collisions	Displays the number of multiple collisions errors received on this port.
Excessive Collisions	Displays the number of excessive collisions errors received on this port.

2 To view the latest port statistics, click the Update button at the bottom of the page.

—End—

Viewing interface statistics

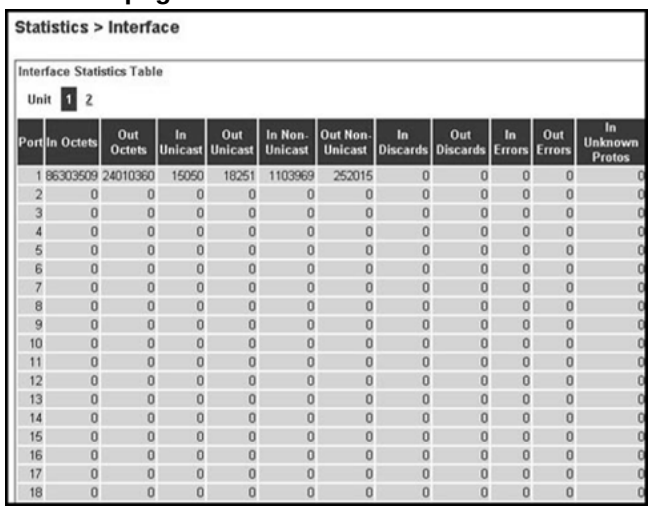
You can view selected switch interface statistics.

To view statistical information for an interface:

Step	Action
1	From the main menu, choose Statistics > Interface.

The Interface page opens (Figure 25 "Interface page" (page 76)).

Figure 25
Interface page



Port	In Octets	Out Octets	In Unicast	Out Unicast	In Non-Unicast	Out Non-Unicast	In Discards	Out Discards	In Errors	Out Errors	In Unknown Protos
1	86303509	24010360	15050	18251	1103969	252015	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0

Table 29 "Interface page items" (page 76) describes the items on the Interface page.

Table 29
Interface page items

Item	Description
Port	The port number corresponding to the selected switch.
In Octets	The number of octets received on the interface, including framing characters.
Out Octets	The number of octets transmitted out of the interface, including framing characters.
In Unicast	The number of subnetwork-unicast packets delivered to a higher-layer protocol.
Out Unicast	The number of packets that higher-layer protocols requested be transmitted to a subnetwork-unicast address, including those discarded or not sent.
In Non-Unicast	The number of non-unicast packets, for example, subnetwork-broadcast or subnetwork-multicast packets, delivered to a higher protocol.

Item	Description
Out Non-Unicast	The number of packets that higher-level protocols requested be transmitted to a non-unicast address. For example, a subnetwork-broadcast or a subnetwork multicast address, including those discarded or not sent.
In Discards	The number of inbound packets selected to be discarded even though no errors were detected to prevent their delivery to a higher-layer protocol. Packet discarding is not arbitrary. One reason for discarding packets is to free buffer space.
Out Discards	The number of outbound packets selected to be discarded even though no errors were detected to prevent their being transmitted. Packet discarding is not arbitrary. One reason for discarding packets is to free buffer space.
In Errors	The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
Out Errors	The number of outbound packets not transmitted because of errors.
In Unknown Protos	The number of packets received through the interface that were discarded because of an unknown or unsupported protocol.

2 In the upper-left hand corner, click on the unit number of the device to monitor.

The page is updated with the information for the selected device (Figure 25 "Interface page" (page 76)).

3 To update the statistical information, click Update.

4 To update the statistical information, click Update, or click Back to return to the Interface page.

—End—

Viewing Ethernet error statistics

You can view Ethernet error statistics for each monitored interface linked to the Ethernet Switches 460 and 470.

To view Ethernet error statistics:

Step	Action

1 From the main menu, choose Statistics > Ethernet Errors.

The Ethernet Errors page opens (Figure 26 "Ethernet Errors page" (page 78)).

Figure 26
Ethernet Errors page

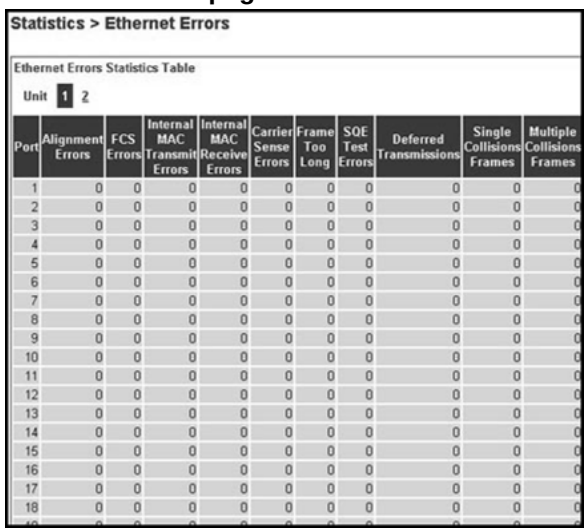


Table 30 "Ethernet Errors page items" (page 78) describes the items on the Ethernet Errors page.

Table 30
Ethernet Errors page items

Item	Description
Port	The port number corresponding to the selected switch.
Alignment Errors	The number of frames received on a particular interface that are not an integral number of octets in length and do not pass the FCS check.
FCS Errors	The number of frames received on a particular interface that are an integral number of octets in length, but do not pass the FCS check.
Internal MAC Transmit Errors	The number of frames for which transmission on a particular interface fails due to an internal MAC sublayer transmit error. A frame is added to this counter only if it is not counted as a late collision error, excessive collisions error, or as a carrier sense error.
Internal MAC Receive Errors	The number of frames for which reception on a particular interface fails due to an internal MAC sublayer transmit error. A frame is added to this counter only if it is not counted as a late collision error, excessive collisions error, or as a carrier sense error.
Carrier Sense Errors	The number of times that the carrier sense conditions were lost or never asserted when attempting to transmit a frame on a particular interface.
Frame Too Long	The number of frames received on a particular interface that exceed the maximum permitted frame size.

Item	Description
SQE Test Errors	The number of times that the SQE TEST ERROR message is generated by the PLS sublayer for a particular interface. The SQE TEST ERROR 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.
Deferred Transmissio ns	The number of frames for which the first transmission attempt on a particular interface is delayed because the medium is busy.
Single Collision Frames	The number of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision.
Multiple Collision Frames	The number of successfully transmitted frames on a particular interface for which transmission is inhibited by a single collision.
Late Collisions	The number of times a collision is detected on a particular interface later than 512 bit-times into the transmission of a packet.
Excessive Collisions	The number of frames for which transmission on a particular interface fails due to excessive collisions.

2 In the upper-left hand corner, click on the unit number of the device to monitor.

The table is updated with the information for the selected device.

3 To refresh the statistical information, click Update.

4 To update the statistical information, click Update, or click Back to return to the Ethernet Errors page

—End—

Viewing transparent bridging statistics

You can view the transparent bridging statistics measured for each monitored interface on the device.

To view transparent bridging statistics:

Step	Action
1	From the main menu, choose Statistics > Transparent Bridging. The Transparent Bridging page opens (Figure 27 "Transparent Bridging page" (page 80)).

Figure 27
Transparent Bridging page

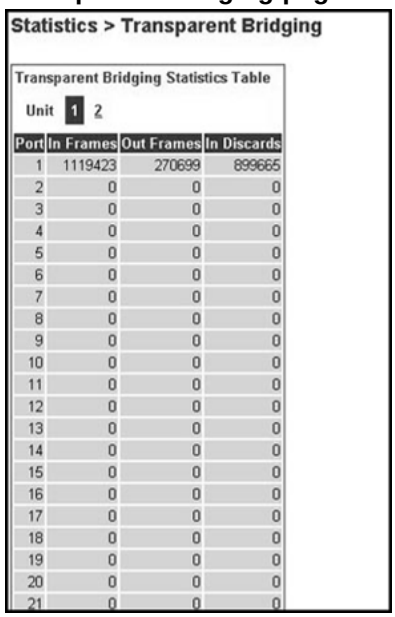


Table 31 "Transparent Bridging page items" (page 80) describes the items on the Transparent Bridging page.

Table 31
Transparent Bridging page items

Item	Description
Port	The port number that corresponds to the selected switch.
In Frames	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 counted only if it is for a protocol being processed by the local bridging function, including bridge management errors.
Out Frames	The number of frames that have been transmitted by this port from its segment. A frame received on the interface corresponding to this port is counted only if it is for a protocol being processed by the local bridging function, including bridge management errors.
In Discards	The number of valid frames received which were discarded by the forwarding process.

2 In the upper-left hand corner, click the unit number of the device to monitor.

The page is updated with statistics about the selected device and its corresponding port number.

3 To refresh the statistical information, click Update.

—End—

Monitoring MLT traffic

You can monitor the bandwidth usage for the MultiLink Trunk member ports within each trunk in your configuration by selecting the traffic type to monitor.

To monitor MultiLink Trunk traffic:

Step	Action
1	From the main menu, choose Application > MultiLink Trunk > Utilization. The Utilization page opens (Figure 28 "Utilization page" (page 81)).

Figure 28
Utilization page

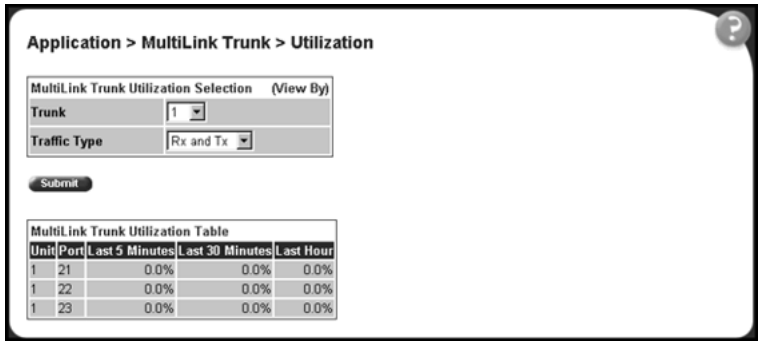


Table 32 "Utilization page items" (page 81) describes the items on the Utilization page.

Table 32
Utilization page items

Section	Item	Range	Description
MultiLink Trunk Utilization Selection (View By)	Trunk	1..6	Choose the trunk to be monitored.
	Traffic Type	(1) RX and TX (2) RX (3) TX	Choose the traffic type to be monitored for percentage of bandwidth utilization.

Section	Item	Range	Description
MultiLink Trunk Utilization Table	Unit/Port		A list of the trunk member switch ports that correspond to the trunk specified in the Trunk column.
	Last 5 Minutes%		The percentage of packets (of the type specified in the Traffic Type field) used by the port in the last five minutes. This field provides a running average of network activity, and is updated every 15 seconds.
	Last 30 Minutes%		The percentage of packets (of the type specified in the Traffic Type field) used by the port in the last 30 minutes. This field provides a running average of network activity, and is updated every 15 seconds.
	Last Hour%		The percentage of packets (of the type specified in the Traffic Type field) used by the port in the last 60 minutes. This field provides a running average of network activity, and is updated every 15 seconds.

2 In the MultiLink Trunk Utilization Selection section, type the Trunk number and traffic type to be monitored.

3 Click Submit.

The results of your request are displayed in the MultiLink Trunk Utilization Table (Figure 28 "Utilization page" (page 81)).

—End—

Chapter 5
Configuring RMON using the CLI

The remote network monitoring (RMON) management information base (MIB) is an interface between the RMON agent on an Ethernet Switch and the RMON management applications. It defines objects that are suitable for the management of any type of network. Some groups are specifically targeted for Ethernet networks.

The RMON agent continuously collects statistics and proactively monitors the switch.

This chapter covers the RMON commands available in the CLI and includes the following topics:

show rmon alarm

The **`show rmon alarm`** command displays information for RMON alarms. The syntax for the **`show rmon alarm`** command is:

```
show rmon alarm
```

The **show rmon alarm** command is in the privExec mode.

The **show rmon alarm** command has no parameters or variables.

Figure 29 "show rmon alarm command output" (page 84) displays a sample output of the **show rmon alarm** command.

Figure 29
show rmon alarm command output

```
470_24T#show rmon alarm
                                          Sample      Rising         Falling
Index Interval Variable                    Type  Threshold Event Threshold Event
----- -------- ------------------------- ------ --------- ----- --------- -----
1     30       ifInOctets.1              delta  500       1     10        1
```

show rmon event

The **show rmon event** command displays information regarding RMON events. The syntax for the **show rmon event** command is:

show rmon event

The **show rmon event** command is in the privExec mode.

The **show rmon event** command has no parameters or variables.

Figure 30 "show rmon event command output" (page 84) displays a sample output of the **show rmon event** command.

Figure 30
show rmon event command output

```
470_24T#show rmon event
Index Log Trap Description
----- --- ---- -----------------------------------------------------
1     Yes Yes  'Rising or Falling alarm on received octets'
```

show rmon history

The **show rmon history** command displays information regarding RMON history. The syntax for the **show rmon history** command is:

show rmon history

The **show rmon history** command is in the privExec mode.

The **show rmon history** command has no parameters or variables.

Figure 31 "show rmon history command output" (page 85) displays a sample output of the **show rmon history** command.

Figure 31
show rmon history command output

```
470_24T#show rmon history
Index Unit/Port Buckets Requested Buckets Granted Interval
----- --------- ----------------- --------------- --------
1     1/1       15                15              30
2     1/2       15                15              30
3     1/3       15                15              30
4     1/4       15                15              30
5     1/5       15                15              30
6     1/6       15                15              30
7     1/7       15                15              30
8     1/8       15                15              30
9     1/9       15                15              30
10    1/10      15                15              30
11    1/11      15                15              30
12    1/12      15                15              30
13    1/13      15                15              30
14    1/14      15                15              30
15    1/15      15                15              30
16    1/16      15                15              30
17    1/17      15                15              30
18    1/18      15                15              30
19    1/19      15                15              30
20    1/20      15                15              30
--More--
```

show rmon stats

The **show rmon stats** command displays information regarding RMON statistics. The syntax for the **show rmon stats** command is:

show rmon stats

The **show rmon stats** command is in the privExec mode.

The **show rmon stats** command has no parameters or variables.

Figure 32 "show rmon stats command output" (page 86) displays a sample output of the **show rmon stats** command.

Figure 32
`show rmon stats` command output

```
470_24T#show rmon stats
Index Unit/Port
----- ---------
1     1/1
2     1/2
3     1/3
4     1/4
5     1/5
6     1/6
7     1/7
8     1/8
9     1/9
10    1/10
11    1/11
12    1/12
13    1/13
14    1/14
15    1/15
16    1/16
17    1/17
18    1/18
19    1/19
20    1/20
--More--
```

rmon alarm

The **`rmon alarm`** command allows you to set RMON alarms and thresholds. The syntax for the **`rmon alarm`** command is:

```
rmon alarm <1-65535> <WORD> <1-2147483647> {absolute | delta}
rising threshold <-2147483648-2147483647> [<1-65535>]
falling-threshold <-2147483648-2147483647> [<1-65535>]
[owner <LINE>]
```

The **`rmon alarm`** command is in the config command mode.

Table 33 "rmon alarm command parameters and variables" (page 86) describes the parameters and variables for the **`rmon alarm`** command.

Table 33
rmon alarm command parameters and variables

Parameters and variables	Description
`<1-65535>`	Unique index for the alarm entry.
`<WORD>`	The MIB object to be monitored. This is an object identifier (OID) and, for most available objects, an English name can be used.

Parameters and variables	Description
`<1-2147483647>`	The sampling interval in seconds.
`absolute`	Use absolute values (value of the MIB object is compared directly with thresholds).
`delta`	Use delta values (change in value of the MIB object between samples is compared with thresholds).
`rising-threshold <-2147483648-2147483647> [<1-65535>]`	The first integer value is the rising threshold value. The optional second integer specifies the event entry triggered when the rising threshold is crossed. If omitted, or if an invalid event entry is referenced, no event is triggered.
`falling-threshold <-2147483648-2147483647> [<1-65535>]`	The first integer value is the falling threshold value. The optional second integer specifies the event entry triggered when the falling threshold is crossed. If omitted, or if an invalid event entry is referenced, no event is triggered.
`[owner <LINE>]`	Specifies an owner string to identify alarm entry.

no rmon alarm

The **`no rmon alarm`** command deletes RMON alarm table entries. When the variable is omitted, all entries in the table are cleared. The syntax for the **`no rmon alarm`** command is:

```
no rmon alarm [<1-65535>]
```

The **`no rmon alarm`** command is in the config command mode.

Table 34 "no rmon alarm command parameters and variables" (page 87) describes the parameters and variables for the **`no rmon alarm`** command.

Table 34
no rmon alarm command parameters and variables

Parameters and variables	Description
`<1-65535>`	Unique index for the alarm entry.

rmon event

The **rmon event** command allows you to configure RMON event log and trap settings. The syntax for the **rmon event** command is:

```
rmon event <1-65535> [log] [trap] [description <LINE>] [owner
<LINE>]
```

The **rmon event** command is in the config command mode.

Table 35 "rmon event command parameters and variables" (page 88) describes the parameters and variables for the **rmon event** command.

Table 35
rmon event command parameters and variables

Parameters and variables	Description
<1-65535>	Unique index for the event entry.
[log]	Record events in the log table.
[trap]	Generate SNMP trap messages for events.
[description <LINE>]	Specify a textual description for the event.
[owner <LINE>]	Specify an owner string to identify the event entry

no rmon event

The **no rmon event** command deletes RMON event table entries. When the variable is omitted, all entries in the table are cleared. The syntax for the **no rmon event** command is:

```
no rmon event [<1-65535>]
```

The **no rmon event** command is in the config command mode.

Table 36 "no rmon event command parameters and variables" (page 88) describes the parameters and variables for the **no rmon event** command.

Table 36
no rmon event command parameters and variables

Parameters and variables	Description
<1-65535>	Unique index for the event entry.

rmon history

The **rmon history** command allows you to configure RMON history settings. The syntax for the **rmon history** command is:

```
rmon history <1-65535> <LINE> <1-65535> <1-3600> [owner
<LINE>]
```

The **rmon history** command is in the config command mode.

Table 37 "rmon history command parameters and variables" (page 89) describes the parameters and variables for the **rmon history** command.

Table 37
rmon history command parameters and variables

Parameters and variables	Description
<1-65535>	Unique index for the history entry.
<LINE>	Specify the port number to be monitored.
<1-65535>	Number of history buckets (records) to keep.
<1-3600>	Sampling rate (how often a history sample is collected).
[owner <LINE>]	Specify an owner string to identify the history entry.

no rmon history

The **no rmon history** command deletes RMON history table entries. When the variable is omitted, all entries in the table are cleared. The syntax for the **no rmon history** command is:

```
no rmon history [<1-65535>]
```

The **no rmon history** command is in the config command mode.

Table 38 "no rmon history command parameters and variables" (page 89) describes the parameters and variables for the **no rmon history** command.

Table 38
no rmon history command parameters and variables

Parameters and variables	Description
<1-65535>	Unique index for the history entry.

rmon stats

The **rmon stats** command allows you to configure RMON statistic settings. The syntax for the **rmon stats** command is:

```
rmon stats <1-65535> <port> [owner <LINE>]
```

The **rmon stats** command is in the config command mode.

Table 39 "rmon stats command parameters and variables" (page 90) describes the parameters and variables for the **rmon stats** command.

Table 39
rmon stats command parameters and variables

Parameters and variables	Description
<1-65535>	Unique index for the stats entry.
<port>	Specifies a port for the stats.
[owner <LINE>]	Specifies an owner string to identify the stats entry.

no rmon stats

The **no rmon stats** turns off RMON statistics. When the variable is omitted, all table entries are cleared. The syntax for the **no rmon stats** command is:

```
no rmon stats [<1-65535>]
```

The **no rmon stats** command is in the config command mode.

Table 40 "no rmon stats command parameters and variables" (page 90) describes the parameters and variables for the **no rmon stats** command.

Table 40
no rmon stats command parameters and variables

Parameters and variables	Description
<1-65535>	Unique index for the stats entry.

Chapter 6
Configuring RMON using Device Manager

The Remote Network Monitoring (RMON) MIB is an interface between the RMON agent on an Ethernet Switch and an RMON management application, such as the Device Manager.

The RMON MIB defines objects that are suitable for the management of any type of network, but some groups are targeted for Ethernet networks in particular.

The RMON agent continuously collects statistics and proactively monitors switch performance. You can view this data through the Device Manager.

RMON has three major functions:

- Creating and displaying alarms for user-defined events
- Gathering cumulative statistics for Ethernet interfaces
- Tracking a history of statistics for Ethernet interfaces

This chapter contains the following topics:

Working with RMON information

You can view RMON information by looking at the Graph information associated with the port or chassis.

RMON history

Ethernet history records periodic statistical samples from a network. A sample is called a history and is gathered in time intervals referred to as buckets. Histories establish a time-dependent method for gathering RMON statistics on a port. The default values for history are:

- Buckets are gathered at 30-minute intervals.
- Number of buckets gathered is 50.

Both the time interval and the number of buckets is configurable. However, when the last bucket is reached, bucket 1 is dumped and "recycled" to hold a new bucket of statistics. Then bucket 2 is dumped, and so forth.

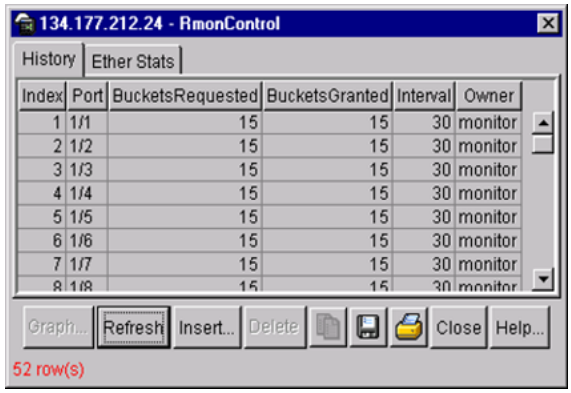
Creating a history

You can use RMON to collect statistics at intervals. For example, if you want RMON statistics to be gathered over the weekend, you require enough buckets to cover two days. To do this, set the history to gather one bucket each hour, thus covering a 48-hour period. After you set history characteristics, you cannot modify them; you must delete the history and create another one.

To establish a history for a port and set the bucket interval:

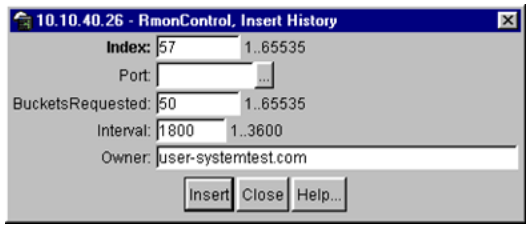
Step	Action
1	From the Device Manager main menu, choose Rmon > Control. The RmonControl dialog box opens with the History tab displayed Figure 33 "History tab" (page 92).

Figure 33
History tab



2	Click Insert. The RmonControl, Insert History dialog box opens (Figure 34 "RmonControl, Insert History dialog box" (page 93)).

Figure 34
RmonControl, Insert History dialog box



3 Select the port from the port list or type the port number.

4 Set the number of buckets.

The default is 50.

5 Set the interval.

The default is 1800 seconds.

6 Type the owner (the network management system that created this entry).

Click Insert.

—End—

Table 41 "History tab fields" (page 93) describes the History tab of the RmonControl dialog box.

Table 41
History tab fields

Field	Description
Index	A unique value assigned to each interface. An index identifies an entry in a table.
Port	Any Ethernet interface on the device.
BucketsRequested	The requested number of discrete time intervals over which data is to be saved in the part of the media-specific table associated with this entry.
BucketsGranted	The number of discrete sampling intervals over which data is saved in the part of the media-specific table associated with this entry. There are instances when the actual number of buckets associated with this entry is less than the value of this object. In this case, at the end of each sampling interval, a new bucket is added to the media-specific table.

Field	Description
Interval	The interval in seconds over which the data is sampled for each bucket in the part of the media-specific table associated with this entry. You can set this interval to any number of seconds between 1 and 3600 (1 hour). Because the counters in a bucket can overflow at their maximum value with no indication, note the possibility of overflow in any of the associated counters. It is important to consider the minimum time in which any counter can overflow on a particular media type; set the historyControlInterval object to a value less than this interval. This is typically most important for the octets counter in any media-specific table. For example, on an Ethernet network, the etherHistoryOctets counter can overflow in about one hour at the Ethernet maximum utilization.
Owner	The network management system that created this entry.

Disabling history

To disable RMON history on a port:

Step	Action
1	From the Device Manager main menu, choose Rmon > Control. The RmonControl dialog box opens with the History tab displayed (Figure 33 "History tab" (page 92)).
2	Highlight the row that contains the port ID you want to delete.
3	Click Delete. The entry is removed from the table.

—End—

Viewing RMON history statistics

To display RMON history statistics:

è In the Rmon History tab, highlight an entry and click on the Graph button.

The Rmon History statistics dialog box opens (Figure 35 "Rmon History statistics" (page 95)).

Figure 35
Rmon History statistics

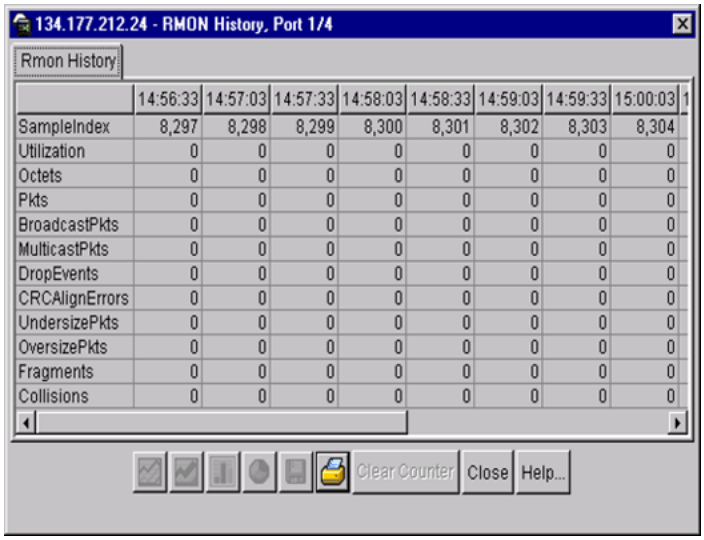


Table 42 "Rmon History statistics tab fields" (page 95) describes the Rmon History statistics tab fields.

Table 42
Rmon History statistics tab fields

Field	Description
SampleIndex	Indicates the sample number. As history samples are taken, they are assigned greater sample numbers.
Utilization	Estimates the percentage of link capacity used during the sampling interval.
Octets	The number of octets received on the link during the sampling period.
Pkts	The number of packets received on the link during the sampling period.
BroadcastPkts	The number of packets received on the link during the sampling interval that are destined for the packet address.
MulticastPkts	The number of packets received on the link during the sampling interval that are destined for the multicast address. This doe not include the broadcast packets.
DropEvents	The number of received packets dropped due to system resource constraints.
CRCAlignErrors	The number of packets received during a sampling interval that were between 64 and 1518 octets long that had a bad FCS with either an integral number of octets (FCS Error) or a non-integral number of octets (Alignment Error). The packet length includes Frame Check Sequence (FCS) octets but not framing bits.

Field	Description
UndersizePkts	The number of packets received during the sampling interval that were less than 64 octets long (including FCS octets, but not framing bits).
OversizePkts	The number of packets received during the sampling interval that were longer than 1518 octets (including FCS octets, but not framing bits) and were otherwise well-formed.
Fragments	The number of packets received during the sampling interval that were less than 64 octets long (including FCS octets, but not framing bits) that had a bad FCS with either an integral number of octets (FCS Error) or a non-integral number of octets (Alignment Error).
Collisions	The best estimate of the number of collisions on an Ethernet segment during a sampling interval.

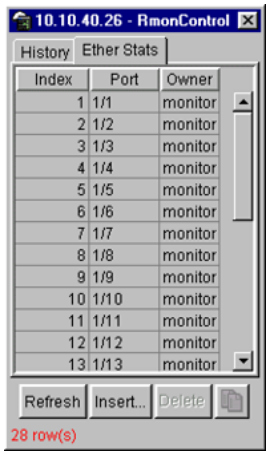
Enabling Ethernet statistics gathering

You can use RMON to gather Ethernet statistics.

To gather Ethernet statistics:

Step	Action
1	From the Device Manager main menu, choose RMon > Control. The RmonControl dialog box opens with the History tab displayed.
2	Click the Ether Stats tab. The Ether Stats tab opens (Figure 36 "RmonControl dialog box -- Ether Stats tab" (page 96)).
3	Click Insert.

Figure 36
RmonControl dialog box -- Ether Stats tab



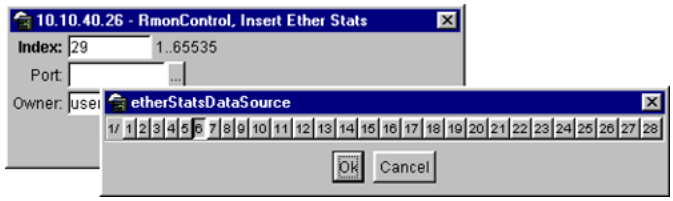
The RmonControl, Insert Ether Stats dialog box opens (Figure 37 "RmonControl, Insert Ether Stats dialog box" (page 97)).

Figure 37
RmonControl, Insert Ether Stats dialog box

4 Select the ports.

Enter the port number you want or select the port from the list menu (Figure 38 "RmonControl, Insert Ether Stats dialog box port list" (page 97)).

Figure 38
RmonControl, Insert Ether Stats dialog box port list



Device Manager assigns the index.

5 Click Insert.

The new Ethernet Statistics entry is shown in the Ether Stats tab.

—End—

Table 43 "Ether Stats tab fields" (page 97) describes the Ether Stats tab fields.

Table 43
Ether Stats tab fields

Field	Description
Index	A unique value assigned to each interface. An index identifies an entry in a table.
Port	Any Ethernet interface on the device.
Owner	The network management system that created this entry.

Disabling Ethernet statistics gathering

To disable Ethernet statistics that you have set:

Step	Action
1	From the Device Manager main menu, choose Rmon > Control. The RmonControl dialog box opens with the History tab displayed.
2	Click the Ether Stats tab. The Ether Stats tab opens (Figure 36 "RmonControl dialog box -- Ether Stats tab" (page 96)).
3	Highlight the row that contains the port ID you want to delete.
4	Click Delete. The Ether Stats entry is removed from the table.

—End—

RMON Alarms

Alarms are useful when you need to know when the values of a variable go outside a specified range. You can define an RMON alarm for any MIB variable that resolves to an integer value. You cannot use string variables (such as system description) as alarm variables.

All alarms share the following characteristics:

- An upper and lower threshold value is defined.
- A corresponding rising and falling event occurs.
- An alarm interval or polling period is reached.

When alarms are activated, you can view the activity in a log or a trap log, or you can create a script to notify you by beeping a console, sending e-mail, or calling a pager.

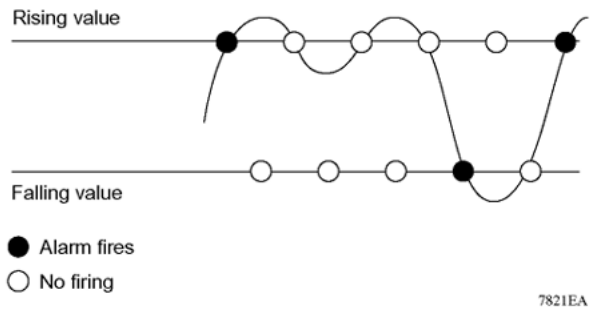
How RMON alarms work

The alarm variable is polled and the result is compared against upper and lower limit values you select when you create the alarm. If either limit is reached or crossed during the polling period, then the alarm fires and generates an event that you can view in the event log or the trap log.

The upper limit of the alarm is called the *rising value*, and its lower limit is called the *falling value*. RMON periodically samples the data based upon the alarm interval. During the *first* interval that the data passes above the

rising value, the alarm fires as a rising event. During the first interval that the data drops below the falling value, the alarm fires as a falling event (Figure 39 "How alarms fire" (page 99)).

Figure 39
How alarms fire



It is important to note that the alarm fires during the first interval in which the sample goes out of range. No additional events are generated for that threshold until the opposite threshold is crossed. Therefore, you must carefully define the rising and falling threshold values for alarms to work as expected. Otherwise, incorrect thresholds cause an alarm to fire at every alarm interval.

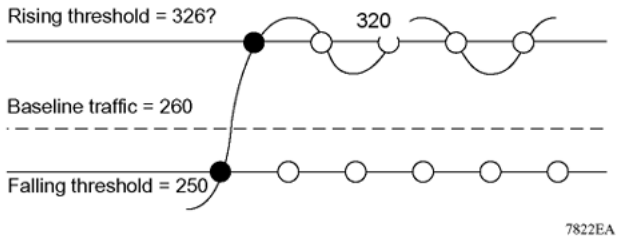
A general guideline is to define one of the threshold values to an expected, baseline value, and then define the opposite threshold as the out-of-bounds limit. Because of sample averaging, the value can be equal to ±1 of the baseline units. For example, assume an alarm is defined on octets going out of a port as the variable. The intent of the alarm is to provide notification to the system administrator when excessive traffic occurs on that port. If spanning tree is enabled, then 52 octets are transmitted out of the port every 2 seconds, which is equivalent to baseline traffic of 260 octets every 10 seconds. This alarm provides the notification the system administrator needs if the lower limit of octets going out is defined at 260 and the upper limit is defined at 320 (or at any value greater than 260 + 52 = 312).

The first time outbound traffic other than spanning tree Bridge Protocol Data Units (BPDUs) occurs, the rising alarm fires. When outbound traffic other than spanning tree ceases, the falling alarm fires. This process provides the system administrator with time intervals of any non-baseline outbound traffic.

If the alarm is defined with a falling threshold less than 260 (assuming the alarm polling interval is 10 seconds), say 250, then the rising alarm can fire only once (Figure 40 "Alarm example -- threshold less than 260" (page 100)). The reason is that for the rising alarm to fire a second time, the falling alarm (the opposite threshold) must fire. Unless the port becomes inactive or spanning tree is disabled (which causes the value for outbound octets

to drop to zero), the falling alarm cannot fire, because the baseline traffic is always greater than the value of the falling threshold. By definition, the failure of the falling alarm to fire prevents the rising alarm from firing a second time.

Figure 40
Alarm example -- threshold less than 260



Creating alarms

When you create an alarm, you select a variable from the variable list and a port, or other switch component, to which it is connected. Some variables require port IDs, card IDs, or other indices (for example, spanning tree group IDs). You then select a rising and a falling threshold value. The rising and falling values are compared against the actual value of the variable that you choose. If the variable falls outside of the rising or falling value range, an alarm is triggered, and an event is logged or trapped.

When you create an alarm, you also select a sample type, which can be either absolute or delta. *Absolute* alarms are defined on the cumulative value of the alarm variable. An example of an alarm defined with absolute value is card operating status. Because this value is not cumulative, but instead represents states, such as card up (value 1) and card down (value 2), you set it for absolute value. Therefore, you can create an alarm with a rising value of 2 and a falling value of 1 to alert a user to whether the card is up or down.

Most alarm variables related to Ethernet traffic are set to *delta* value. Delta alarms are defined based on the difference in the value of the alarm variable between the start of the polling period and the end of the polling period. Delta alarms are sampled twice per polling period. For each sample, the last two values are added together and compared to the threshold values. This process increases precision and allows for the detection of threshold crossings that span the sampling boundary. Therefore, if you track the current values of a given delta-valued alarm and add them together, the result is twice the actual value. (This result is not an error in the software.)

Alarm Manager example

Note: The example alarm described in the following procedure generates at least one alarm every five minutes. The example is

intended only to demonstrate how alarms fire; it is not a useful alarm. Because of the high frequency, delete this alarm and replace it with a practical setting.

To create an alarm to receive statistics and history using default values:

Step	Action

1 Do one of the following:

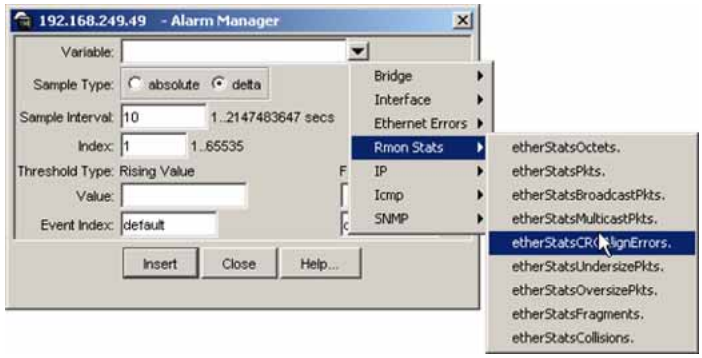
- From the Device Manager main menu, choose Rmon >Alarm Manager.
- On the toolbar, click the Alarm Manager button.

The Alarm Manager dialog box opens (Figure 41 "Alarm Manager dialog box" (page 101)).

Figure 41
Alarm Manager dialog box

2 In the variable field, select a variable for the alarm from the list and a port (or other ID) on which you want to set an alarm (Figure 42 "Alarm variable list" (page 102)).

Figure 42
Alarm variable list



Alarm variables are in three formats, depending on the type:

- A chassis alarm ends in x where the x index is hard-coded. No further information is required.
- A card, spanning tree group (STG) or EtherStat alarm ends with a dot (.). You must enter a card number, STG ID, IP address, or EtherStat information.
- A port alarm ends with no dot or index and requires using the port shortcut menu. An example of a port alarm is ifInOctets (interface incoming octet count).
- For this example, select Bridge > dot1dStpTopChanges.0 from the variable list. This example is a chassis alarm, indicated by the ".0" in the variable.

3 For this example, select a rising value of 4 and a falling value of 0.

4 Leave the remaining fields at their default values, including a sample type of Delta.

5 Click Insert.

If you want to make field changes, see the field descriptions shown in Table 44 "Rmon Insert Alarm dialog box fields" (page 103).

—End—

Alarm Manager dialog box fields

Table 44
Rmon Insert Alarm dialog box fields

Field	Description	
Variable	Name and type of alarm--indicated by the format: *alarmname.x* where x=0 indicates a chassis alarm. *alarmname*. where the user must specify the index. This is a card number for module-related alarms, an STG ID for spanning tree group alarms (the default STG is 1, other STG IDs are user-configured), or the Ether Statistics Control Index for RMON Stats alarms. *alarmname* with no dot or index is a port-related alarm and results in display of the port selection tool.	
Sample Type	Can be either absolute or delta. For more information about sample types, refer to "Creating alarms" (page 100).	
Sample Interval	Time period (in seconds) over which the data is sampled and compared with the rising and falling thresholds.	
Index	Uniquely identifies an entry in the alarm table. Each such entry defines a diagnostic sample at a particular interval for an object on the device.	
Threshold Type	Rising Value	Falling Value
Value	When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval is less than this threshold, a single event is generated.	When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval is greater than this threshold, a single event is generated.
Event Index	Index of the event entry used when a rising threshold is crossed. The event entry identified by a particular value of this index is the same as identified by the same value of the event index object. (Generally, accept the default that is already filled in.)	Index of the event entry used when a falling threshold is crossed. The event entry identified by a particular value of this index is the same as identified by the same value of the event index object. (Generally, accept the default that is already filled in.)

Viewing RMON statistics

To view the RMON statistics and history for the port for which you have created an alarm:

Step	Action
1	Select the port on which you have created an alarm.
2	From the Device Manager main menu, choose Rmon > Control. The RmonControl dialog box opens displaying the History tab (Figure 33 "History tab" (page 92)).
3	Click the Ether Stats tab to view statistics (Figure 36 "RmonControl dialog box -- Ether Stats tab" (page 96)).

—End—

To delete an alarm:

Step	Action
1	From the Device Manager main menu, choose Rmon >Alarms. The RmonAlarms dialog box opens with the Alarms tab (Figure 43 "RmonAlarms dialog box -- Alarms tab" (page 104)) displayed.
2	Click any field for the alarm that you want to delete.
3	Click Delete.

Figure 43
RmonAlarms dialog box -- Alarms tab

—End—

Table 45 "Alarms tab fields" (page 104) describes the fields on the Alarms tab.

Table 45
Alarms tab fields

Field	Description
Index	Uniquely identifies an entry in the alarm table. Each such entry defines a diagnostic sample at a particular interval for an object on the device

Field	Description
Interval	The interval in seconds over which data is sampled and compared with the rising and falling thresholds. When setting this variable, in the case of deltaValue sampling, set the interval short enough so that the sampled variable is unlikely to increase or decrease by more than 2^31 - 1 during a single sampling interval.
Variable	The object identifier of the particular variable to be sampled. Only variables that resolve to an ASN.1 primitive type of INTEGER (INTEGER, Counter, Gauge, or TimeTicks) can be sampled.
Sample Type	The method of sampling the selected variable and calculating the value to be compared against the thresholds. If the value of this object is absoluteValue(1), the value of the selected variable is compared directly with the thresholds at the end of the sampling interval. If the value of this object is deltaValue(2), the value of the selected variable at the last sample is subtracted from the current value, and the difference compared with the thresholds.
Value	The value of the statistic during the last sampling period. For example, if the sample type is deltaValue, this value is the difference between the samples at the beginning and end of the period. If the sample type is absoluteValue, this value is the sampled value at the end of the period. This value is compared with the rising and falling thresholds. The value during the current sampling period is not made available until the period is completed and remains available until the next period completes.
StartupAlarm	The alarm that can be sent when this entry is first set to valid. If the first sample after this entry becomes valid is greater than or equal to the risingThreshold and alarmStartupAlarm is equal to risingAlarm(1) or risingOrFallingAlarm(3), then a single rising alarm is generated. If the first sample after this entry becomes valid is less than or equal to the fallingThreshold and alarmStartupAlarm is equal to fallingAlarm(2) or risingOrFallingAlarm(3), then a single falling alarm is generated.
RisingThreshold	A threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single event is generated. A single event is also generated after this entry becomes valid if the first sample is greater than or equal to this threshold and the associated alarmStartupAlarm is equal to risingAlarm(1) or risingOrFallingAlarm(3). After a rising event is generated, another such event is not generated until the sampled value falls below this threshold and reaches the alarmFallingThreshold.
RisingEventIndex	The index of the eventEntry that is used when a rising threshold is crossed. The eventEntry identified by a particular value of this index is the same as identified by the same value of the eventIndex object. If there is no corresponding entry in the eventTable, then no association exists. In particular, if this value is zero, no associated event is generated, because zero is not a valid event index.

Field	Description
FallingThreshold	A threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single event is generated. A single event is also generated after this entry becomes valid if the first sample is less than or equal to this threshold and the associated alarmStartupAlarm is equal to fallingAlarm(2) or risingOrFallingAlarm(3). After a falling event is generated, another such event is not generated until the sampled value rises above this threshold and reaches the alarmRisingThreshold.
FallingEventIndex	The index of the eventEntry used when a falling threshold is crossed. The eventEntry identified by a particular value of this index is the same as identified by the same value of the eventIndex object. If there is no corresponding entry in the eventTable, then no association exists. In particular, if this value is zero, no associated event is generated, because zero is not a valid event index.
Owner	The network management system that created this entry.
Status	The status of this alarm entry.

RMON events

RMON events and alarms work together to notify you when values in your network are outside of a specified range. When values pass the specified ranges, the alarm is triggered and fires. The event specifies how the activity is recorded.

How events work

An event specifies whether a trap, a log, or a trap and a log is generated to view alarm activity. When RMON is globally enabled, two default events are generated:

- RisingEvent
- FallingEvent

The default events specify that when an alarm goes out of range, the firing of the alarm is tracked in both a trap and a log. For example, when an alarm fires at the rising threshold, the rising event specifies that this information be sent to both a trap and a log. Likewise, when an alarm passes the falling threshold, the falling event specifies that this information be sent to a trap and a log.

Viewing an event

To view a table of events:

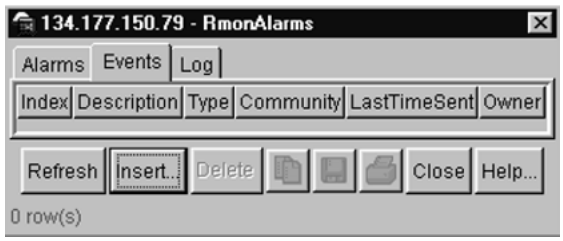
Step	Action
1	From the Device Manager main menu, choose Rmon > Alarms.

The RmonAlarms dialog box opens displaying the Alarms tab (Figure 43 "RmonAlarms dialog box -- Alarms tab" (page 104)).

2 Click the Events tab.

The Events tab opens (Figure 44 "RmonAlarms dialog box -- Events tab" (page 107)).

Figure 44
RmonAlarms dialog box -- Events tab



—End—

Table 46 "Events tab fields" (page 107) describes the RmonAlarms Events tab fields.

Table 46
Events tab fields

Field	Description
Index	This index uniquely identifies an entry in the event table. Each entry defines one event that is generated when the appropriate conditions occur.
Description	Specifies whether the event is a rising or falling event.
Type	The type of notification that the Device Manager provides about this event. In the case of log, an entry is made in the log table for each event. In the case of trap, an SNMP trap is sent to one or more management stations. Possible notifications follow: • none • log • trap • log-and-trap
Community	The SNMP community string acts as a password. Only those management applications with this community string can view the alarms.

Field	Description
LastTimeSent	The value of sysUpTime at the time this event entry last generated an event. If this entry does generate any events, this value is zero.
Owner	If traps are specified to be sent to the owner, then this is the name of the machine that receives alarm traps.

Creating an event

To create an event:

Step	Action
1	In the RmonAlarms dialog box Events tab, click Insert. The RmonAlarms, Insert Events dialog box opens (Figure 45 "Insert Events dialog box" (page 108)).
2	In the Description field, type a name for the event.
3	Select the type of event you want. The default setting is log-and-trap. You can set the event type to log to save memory or to snmp-trap to reduce traffic from the switch or for better CPU utilization. If you select snmp-trap or log-and-trap, you must set trap receivers.
4	Click Insert. The new event is shown in the Events tab (Figure 46 "New event in the Events tab" (page 108)).

Figure 45
Insert Events dialog box

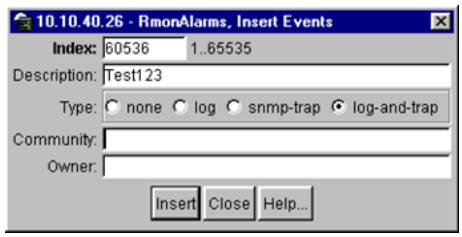
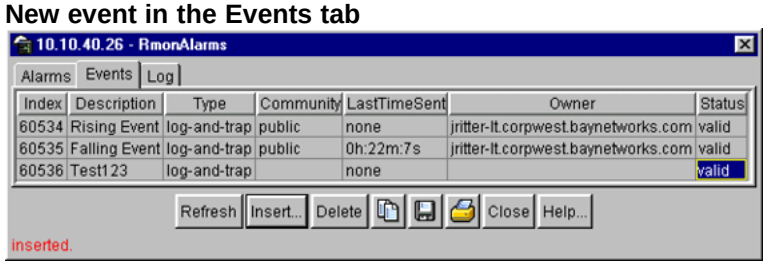


Figure 46
New event in the Events tab



—End—

Deleting an event

To delete an event:

Step	Action
1	In the Events tab, highlight an event Description.
2	Click Delete. The event is removed from the table.

—End—

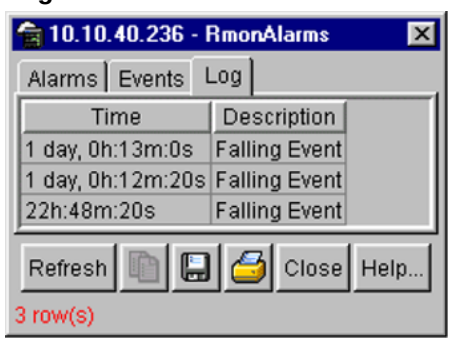
RMON Log information

The Log tab chronicles and describes the alarm activity, which is then generated to be viewed.

To view the Log tab:

Step	Action
1	From the Device Manager main menu, choose Rmon > Alarms. The RmonAlarm dialog box opens with the Alarms tab displayed (Figure 43 "RmonAlarms dialog box -- Alarms tab" (page 104)).
2	Click the Log tab. The Log tab opens (Figure 47 "Log tab" (page 109)).

Figure 47
Log tab



—End—

Table 47 "Log tab fields" (page 110) describes the Log tab fields.

Table 47
Log tab fields

Item	Description
Time	An implementation-dependent description of the event that activated the log entry.
Description	Specifies whether the event is a rising or falling event.

RMON tab for graphing ports

The RMON tab displays Ethernet statistics for graphing a port or ports.

To open the RMON tab for graphing:

Step	Action
1	Select the port or ports you want to graph. To select multiple ports, [Ctrl] + left-click the ports that you want to configure. A yellow outline appears around the selected ports.
2	Do one of the following: • From the Device Manager main menu, choose Graph > Port. • From the shortcut menu, choose Graph. • On the toolbar, click Graph. The Port dialog box for a single port or for multiple ports opens with the Interface tab displayed.
3	Click the RMON tab. The RMON tab for graphing multiple ports opens (Figure 48 "Graph Port dialog box -- RMON tab" (page 111)).

—End—

Figure 48
Graph Port dialog box -- RMON tab

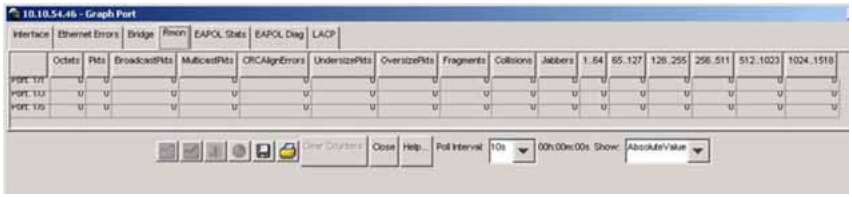


Table 48 "RMON tab fields" (page 111) describes the RMON tab fields.

Table 48
RMON tab fields

Field	Description
Octets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). You can use this object as a reasonable estimate of Ethernet utilization. For greater precision, sample the etherStatsPkts and etherStatsOctets objects before and after a common interval.
Pkts	The total number of packets (including bad packets, broadcast packets, and multicast packets) received.
BroadcastPkts	The total number of good packets received that were directed to the broadcast address. Note that this does not include multicast packets.
MulticastPkts	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.
CRCAlignErrors	The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).
UndersizePkts	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.
OversizePkts	The total number of packets received that were longer than 1518 octets (excluding framing bits but including FCS octets), and were otherwise well-formed.

Field	Description
Fragments	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 nonintegral number of octets (Alignment Error). It is normal for etherStatsFragments to increment because it counts both runts (which are normal occurrences due to collisions) and noise hits.
Collisions	The best estimate of the total number of collisions on this Ethernet segment.
Jabbers	The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Jabber is defined as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.
1..64	The total number of packets (including bad packets) received that were between 1 and 64 octets in length (excluding framing bits but including FCS octets).
65..127	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).
128..255	The total number of packets (including bad packets) received that were between 128 and 255 octets in length (excluding framing bits but including FCS octets).
256..511	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).
511..1023	The total number of packets (including bad packets) received that were between 511 and 1023 octets in length (excluding framing bits but including FCS octets).
1024..1518	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).

Chapter 7
Configuring RMON using Web-based management

The RMON management information base (MIB) is an interface between the RMON agent on an Ethernet Switch and the RMON management applications such as the Web-based management user interface. It defines objects that are suitable for the management of any type of network. Some groups are specifically targeted for Ethernet networks.

The RMON agent continuously collects statistics and proactively monitors the switch.

This RMON options available to you are:

Configuring RMON fault threshold parameters

Alarms are useful when you need to know when the value of some variable goes out of range. RMON alarms can be defined on any MIB variable that resolves to an integer value. String variables (such as system description) cannot be used as alarm variables.

Creating an RMON fault threshold

You can create the RMON threshold parameters for fault notification (alarms).

To create an RMON threshold:

Step	Action
1	From the main menu, choose Fault > RMON Threshold.

The RMON Threshold page opens (Figure 49 "RMON Threshold page" (page 114)).

Figure 49
RMON Threshold page

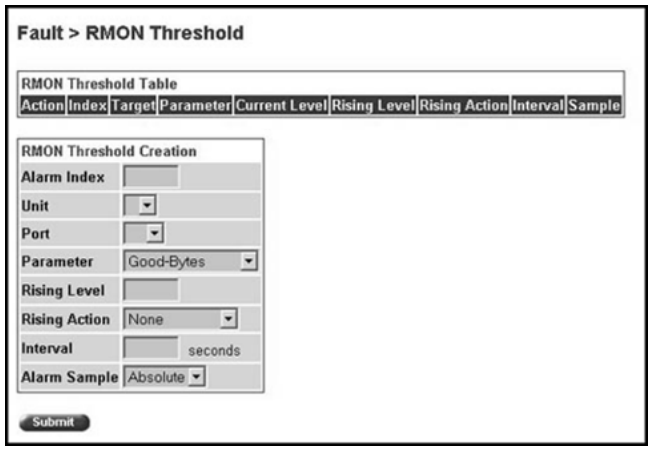


Table 49 "RMON Threshold page items" (page 114) describes the items on the RMON Threshold page.

Table 49
RMON Threshold page items

Item	Range	Description
		Deletes the row.
Index/ Alarm Index	1..10	Type the unique number to identify the alarm entry.
Target	Integer	The unit number and port number.
Unit	1..8	Choose the switch on which to configure port alarms.
Port	1..26	Choose the port on which to set an alarm.
Parameter	(1) Good-Bytes (2) Good-Packets (3) Multicast (4) Broadcast (5) CRC-Errors (6) Runts (7) Fragments (8) Frame-Too-Long (9) Collisions	Choose the sampled statistic.

Item	Range	Description
Current Level	Integer	The value of the statistic during the last sampling period. ***Note:*** If the sample type is Delta, the value is the difference between the samples at the *beginning and end* of the period. If the sample type is Absolute, the value is the sampled value at the *end* of the period.
Rising Level	Integer	Type the event entry used when a rising threshold is crossed. ***Note:*** When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single event is generated. After a rising event is generated, another such event is not generated until the sampled value falls below this threshold and reaches the Falling Threshold.
Rising Action	(1) None (2) Log (3) SNMP-Trap (4) Log-and-Trap	Choose the type of notification for the event. Selecting Log generates an entry in the RMON Event Log table for each event. Selecting SNMP Trap sends an SNMP trap to one or more management stations.
Interval		Type the time period (in seconds) to sample data and compare the data to the rising and falling thresholds.
Sample/Alarm Sample	(1) Absolute (2) Delta	Choose the sampling method: Absolute: *Absolute* alarms are defined on the current value of the alarm variable. An example of an alarm defined with absolute value is card operating status. Because this value is not cumulative, but instead represents states, such as card up (value 1) and card down (value 2), you set it for absolute value. Therefore, an alarm can be created with a rising value of 2 and a falling value of 1 to alert a user to whether the card is up or down. Delta: Most alarm variables related to Ethernet traffic are set to delta value. Delta alarms are defined based on the difference in the value of the alarm variable between the start of the polling period and the end of the polling period. Delta alarms are sampled twice per polling period. For each sample, the last two values are added together and compared to the threshold values. This process increases precision and allows for the detection of threshold crossings that span the sampling boundary. Therefore, if you keep track of the current values of a

Item	Range	Description
		given delta-valued alarm and add them together, the result is twice the actual value. (This result is not an error in the software.)

2 In the RMON Threshold Creation section, type information in the text boxes, or select from a list.

3 Click Submit.

The new configuration is displayed in the RMON Threshold Table (Figure 49 "RMON Threshold page" (page 114)).

Note: RMON threshold configurations are not modifiable. They must be deleted and the information recreated.

—End—

Deleting an RMON threshold configuration

To delete an existing RMON threshold configuration:

Step	Action
1	From the main menu, choose Fault > RMON Threshold. The RMON Threshold page opens (Figure 49 "RMON Threshold page" (page 114)).
2	In the RMON Threshold Table, click the Delete icon for the entry you want to delete. A message opens prompting you to confirm your request.
3	Do one of the following: • Click Yes to delete the RMON threshold configuration. • Click Cancel to return to the RMON Threshold page without making changes.

—End—

Viewing the RMON fault event log

RMON events and alarms work together to notify you when values in your network go outside a specified range. When values pass the specified ranges, the alarm is triggered and fires. The event specifies how the activity is recorded.

An event specifies whether a trap, a log, or a trap and a log are generated to view alarm activity. When RMON is globally enabled, two default events are generated:

- Rising Event
- Falling Event

Default events specify that when an alarm goes out of range, the firing of the alarm is tracked in both a trap and a log. For example, when an alarm fires at the rising threshold, the rising event specifies that this information be sent to both a trap and a log. The RMON Event Log page works in conjunction with the RMON Threshold page to enable you to view a history of RMON fault events.

To view a history of RMON fault events:

è From the main menu, choose Fault > RMON Event Log.

The RMON Event Log page opens (Figure 50 "RMON Event Log page" (page 117)).

Figure 50
RMON Event Log page

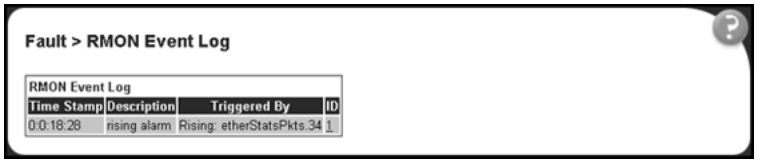


Table 50 "RMON Event Log page fields" (page 117) describes the fields on the RMON Event Log page.

Table 50
RMON Event Log page fields

Item	Description
Time Stamp	Specifies the time that the event occurred.
Description	An implementation dependent description of the event that activated this log entry.

Item	Description
Triggered By	Indicates a comment that describes the source of the event.
ID	Signifies the event that generated this log entry.

Viewing RMON Ethernet statistics

You can gather and graph RMON Ethernet statistics in a variety of formats.

To gather and graph RMON Ethernet statistics:

Step	Action
1	From the main menu, choose Statistics > RMON Ethernet.

The RMON Ethernet page opens (Figure 51 "RMON Ethernet page" (page 118)).

Figure 51
RMON Ethernet page

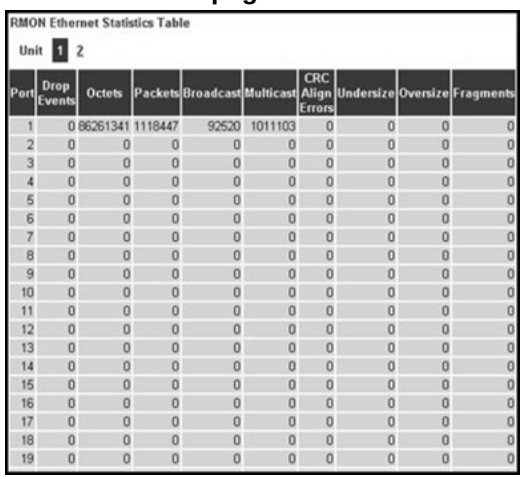


Table 51 "RMON Ethernet page items" (page 118) describes the items on the RMON Ethernet page.

Table 51
RMON Ethernet page items

Item	Description
Port	The port number that corresponds to the selected switch.
Drop Events	The number of events in which the interface dropped packets due to a lack of resources.
Octets	The number of octets of data (including those in bad packets) received on the network (excluding framing bits, but including Frame Check Sequence (FCS) octets).

Item	Description
Packets	The number of good packets received that were directed to the broadcast address. This *does not* include multicast packets.
Broadcast	The number of good packets received that were directed to the broadcast address. This *does not* include multicast packets.
Multicast	The number of good packets received that were directed to the multicast address. This *does not* include packets sent to the broadcast address.
CRC Align Errors	The number of packets received during a sampling interval that were between 64 and 1518 octets long that had a bad FCS with either an integral number of octets (FCS Error), or a non-integral number of octets (Alignment Error). The packet length includes Frame Check Sequence (FCS) octets but not framing bits.
Undersize	The number of packets received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well-formed.
Oversize	The number of packets received that were longer than 1518 octets long (excluding framing bits, but including FCS octets) and were otherwise well-formed.
Fragments	The number of packets received that were less than 64 octets in length (excluding framing bits, but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
Collisions	The "best estimate" number of collisions on this Ethernet segment.
Jabbers	The number of packets received that were longer than 1518 octets in length (excluding framing bits, but including FCS octets), and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
Packets < = 64 bytes 65-127 bytes 128-255 bytes 256-511 bytes 512-1023 bytes 1024-1518 bytes	The number of octets received (including bad packets) within the specified length (excluding framing bits, but including FCS octets).

2 In the upper-left hand corner, click the unit number of the device to monitor.

3 Click Submit.

The RMON Ethernet Statistics Table is updated with information about the selected device.

4 To refresh statistical information, go to the bottom of the page and click Update, or click Back to return to the Ethernet Statistics page.

5 To refresh statistical information, click Update, or click Back to return to the Ethernet Statistics page.

—End—

Viewing RMON history

You can view a periodic statistical sampling of data from various types of networks.

To view periodic statistical data:

Step	Action
1	From the main menu, choose Statistics > RMON History. The RMON History page opens (Figure 52 "RMON History page" (page 120)).

Figure 52
RMON History page

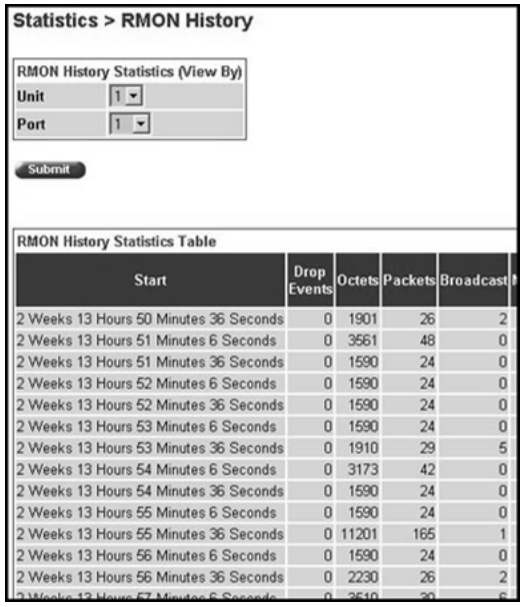


Table 52 "RMON History page items" (page 121) describes the items on the RMON History page.

Table 52
RMON History page items

Section	Item	Description
RMON History Statistics (View By)	Unit	Choose the unit number to be monitored.
	Port	Choose the port number to be monitored.
RMON History Statistics Table	Start	The value of the sysUPTime at the start of the interval over which this sample was measured.
	Drop Events	The number of events in which the interface dropped packets due to a lack of resources.
	Octets	The number of octets of data (including those in bad packets) received on the network (excluding framing bits, but including Frame Check Sequence (FCS) octets).
	Packets	The number of good packets received that were directed to the broadcast address. This does not include multicast packets.
	Broadcast	The number of good packets received that were directed to the broadcast address. This does not include multicast packets.
	Multicast	The number of good packets received that were directed to the multicast address. This does not include packets sent to the broadcast address.
	CRC Align Errors	The number of packets received during a sampling interval that were between 64 and 1518 octets long that had a bad FCS with either an integral number of octets (FCS Error), or a non-integral number of octets (Alignment Error). The packet length includes Frame Check Sequence (FCS) octets but not framing bits.
	Undersize	The number of packets received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well-formed.
	Oversize	The number of packets received that were longer than 1518 octets long (excluding framing bits, but including FCS octets) and were otherwise well-formed.

2 In the RMON History Statistics section, choose the unit and port number to be monitored.

3 Click Submit.

The RMON History Statistics Table is updated with information about the selected device and port (Figure 52 "RMON History page" (page 120)).

—End—

Appendix A
Quick steps for port mirroring

If you are a system administrator with experience configuring Ethernet Switch port mirroring, use the flowcharts on the following pages as quick configuration guides. The flowcharts refer you to the configuration rules appropriate for the port mirroring feature.

Configuring port mirroring

To create or modify port mirroring ports, follow the flowcharts in Figure 53 "Configuring port mirroring (1 of 2)" (page 124) and Figure 54 "Configuring port mirroring (2 of 2)" (page 125)).

To open the Port Mirroring Configuration screen:

è Choose Port Mirroring Configuration (or type i) from the Switch Configuration Menu screen

Figure 53
Configuring port mirroring (1 of 2)

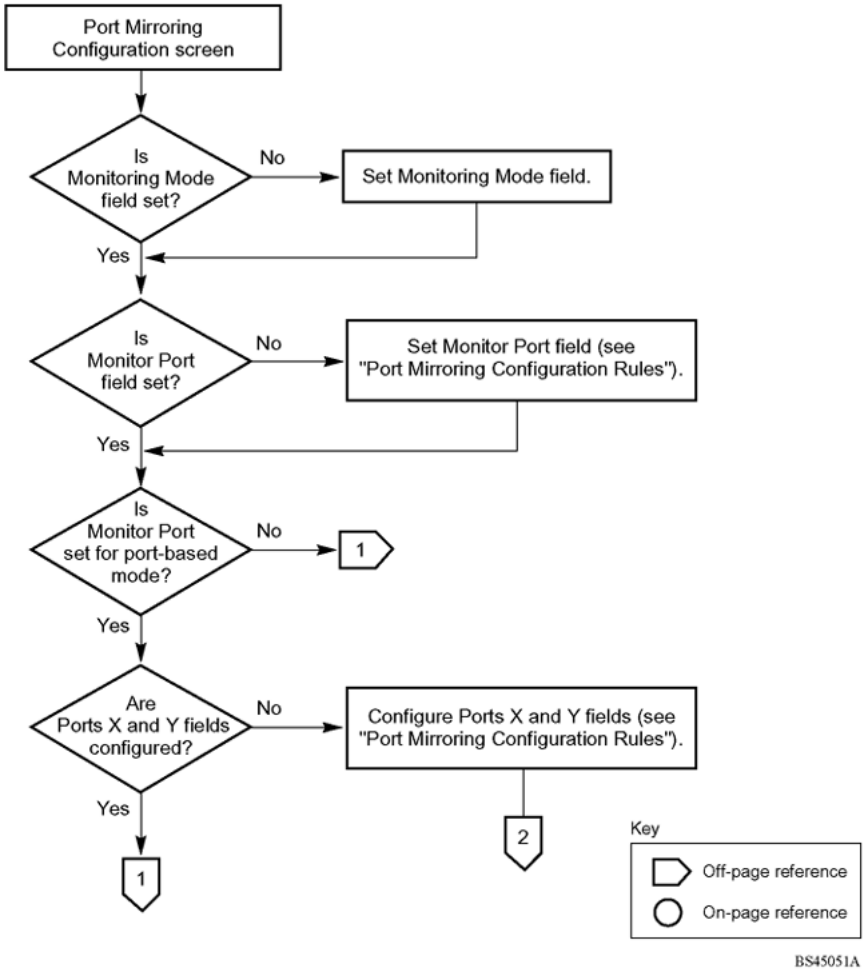
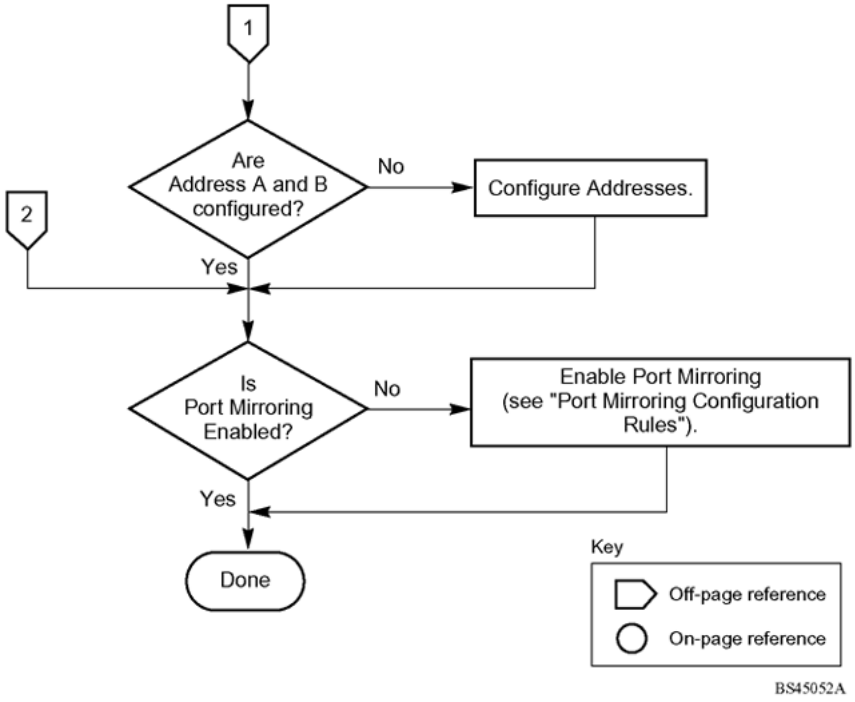


Figure 54
Configuring port mirroring (2 of 2)



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