Table of Contents

List of Figures

List of Tables

1
Network Management Overview

Part 2 discusses how to manage the FE-DS12 and FE-DS12TF Switches using NPI' management module that accompanies the switches.

Managing the switches with NPI' NuSight Network Management System for Windows is covered in the *NuSight Network Management System for NuSwitch FE-Series Products User's Guide*. Managing the switches with HP OpenView Network Node Manager or another network management system is covered in the respective vendor's documents.

For information about installing the FE-DS12 and FE-DS12TF Switches or about building networks using the switches, see Part 1 of this user's guide. Part 1 also explains how to use the switches' built-in console program to configure the switches and monitor their statistics.

How a Network Management System Works

In the context of a network management system—the NuSight platform or a 32-bit version of the HP OpenView platform, for example—the switch is one of a number of managed devices (network elements) in the network. And the management console is a network management station. The management console can be any PC or workstation on the network that is currently running a network management system. Being SNMP-based, the switch contains an SNMP agent that responds to requests from the management console. These requests, which you can control, can vary from getting data and event information to setting the device attribute

values. With the agent and corresponding MIBs, the switches are manageable through an SNMP-based management console.

Network management functions that can be applied to the switches include the following:

- **Modify configuration**. You can modify the configuration of the hub and individual ports. You can also modify configuration settings such as names and port states as required.
- **Monitor statistics**. You can monitor hub statistics and port statistics to determine the network's traffic load and its real-time performance. Information provided includes the total number of packets passing through the ports and the errors occurring on them. You can also view a graphical representation of these statistics to facilitate diagnosis.
- **Reset the hub**. When problems occur on the hub, you can reset the hub from the management console. This reset is the same as a warm boot: The power-on self-test (POST) is performed and all configurations are restored to those saved in the EEPROM. You can also perform a factory reset on the hub to bring all settings back to the factory defaults.
- **Set the trap level**. Traps are messages sent by network devices to the management device. These traps are sent to inform you of significant events that have occurred on the network devices. You can set the trap level of the hub to determine which traps will be sent to the management console.
- **Configure virtual LANs** to segment users into the most appropriate workgroups.
- **Configure the Spanning Tree Protocol** parameters to avoid loops and bottlenecks in bridged networks.
- **Monitor ports**. You can use network analyzers to analyze traffic through the FE-DS12 and FE-DS12TF Switches ports.
- **Monitor performance**

- **Use power links**. This function increases bandwidth and speed of traffic though the FE-DS12 and FE-DS12TF Switches' ports.
- **Configure a routing table**. With this management function, you can view routing table and set static addresses.
- **Remote network monitoring**. With the RMON Manager function, you can view statistics, check on switch performance, and have network events logged, all from a remote management console.

A graphical representation of the entire network gives you the ability to quickly identify and troubleshoot problems on the network.

Using the Management Module

The management module is SNMP-based software designed to manage the FE-DS12 and FE-DS12TF Switches the same as a network management system does. It can be used in any of these ways:

- As a stand-alone switch management system
- With the NuSight Network Management System for NuSwitch FE-Series Products
- With 32-bit versions of HP OpenView Network Node Manager

Regardless of how the management module is used, it must be installed in your network management station (management console). Use the CD that is included with the switches. Chapter 2 describes the system requirements for installation and installation steps.

2
Installing the Management Module

This chapter describes the system requirements for installing the management module that accompanies the FE-DS12 and FE-DS12TF Switches, and describes the installation procedure.

System Requirements

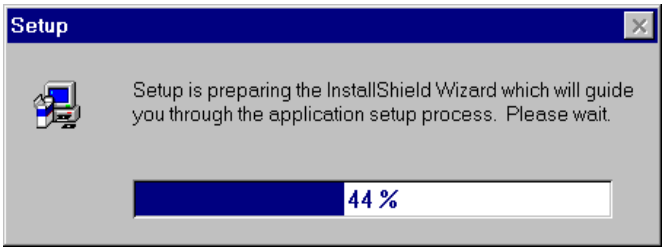
- IBM PC or compatible
- Windows 95, Windows NT Workstation 4.0, or Windows NT Server 4.0
- At least four megabytes of hard disk space

Installation

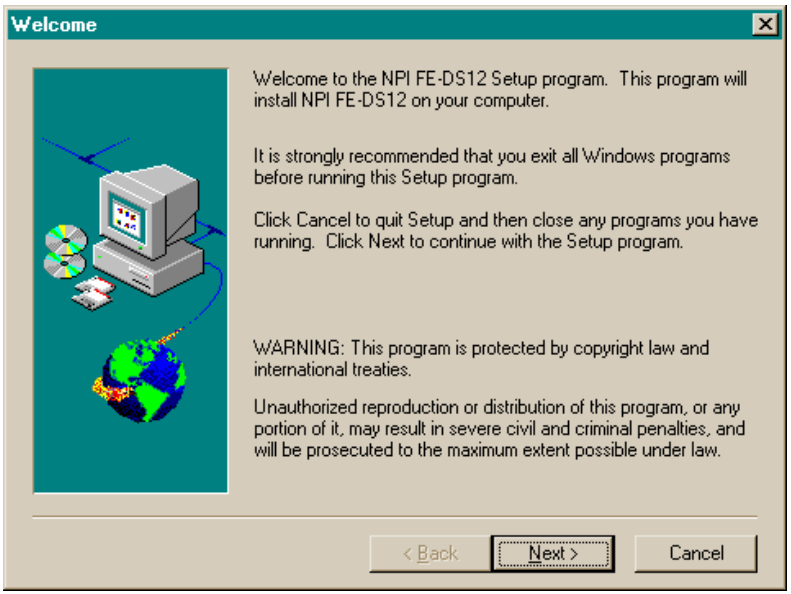
You should be in the Windows environment before starting installation.

1. Insert the management module CD in your CD drive.
2. Click **Start**, then select **Run**...
3. In the Open field, enter the complete **path name** of the management module on the CD. The directory for an FE-DS12 Switch is DS12MM; for an FE-DS12TF Switch, the directory is DS12TFMM. The path name must specify **setup.exe**; for example, E:/DS12MM/setup.exe.

4. Click **OK**. A Setup screen displays to show installation progress.



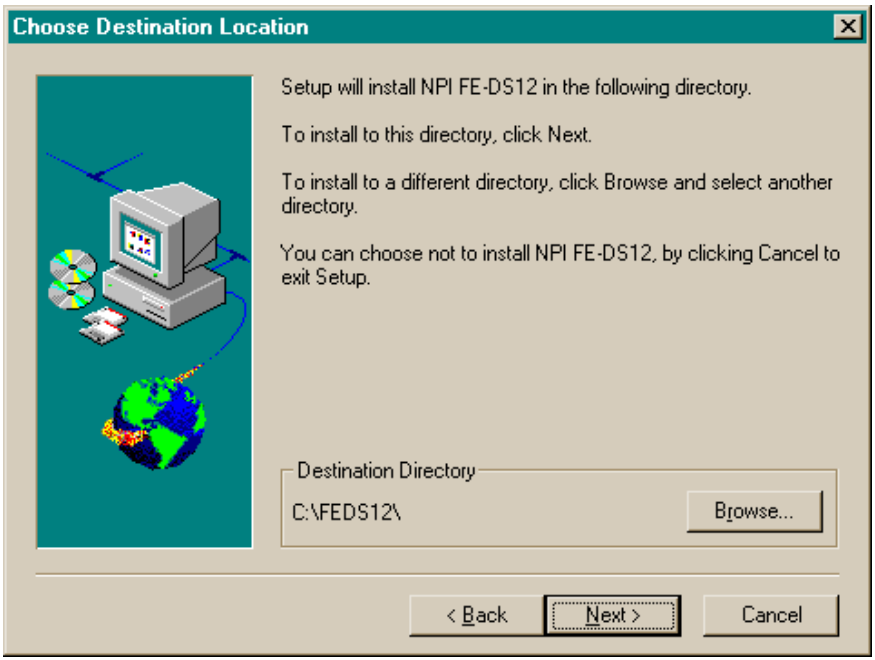
5. When the InstallShield Wizard takes over, the following screen displays.



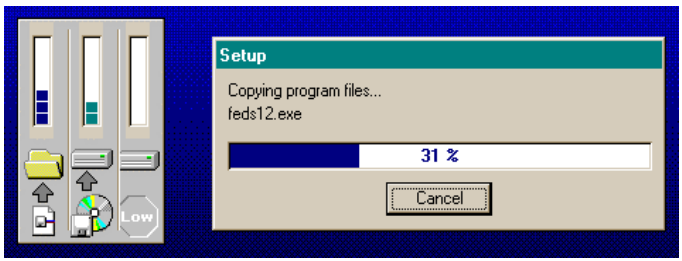
6. Click **Next** to continue. The remaining installation steps differ slightly, depending on whether you are installing the management module as a stand-alone entity, on the NuSight platform, or on the HP OpenView platform.

As a Stand-Alone Entity

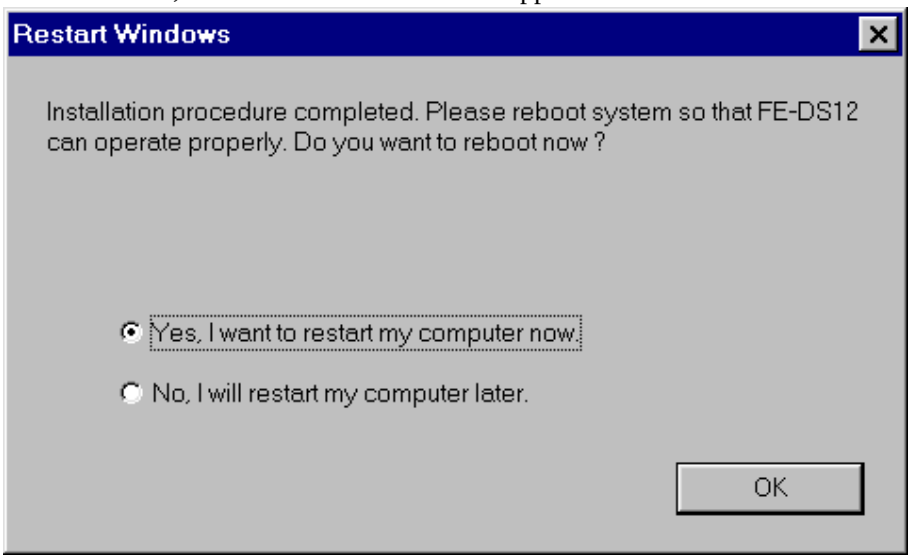
7. The installation program presents a directory to install to.



8. To accept the default directory, click **Next**. To select a different destination directory, click **Browse** and choose the desired directory, then click **Next** to continue.



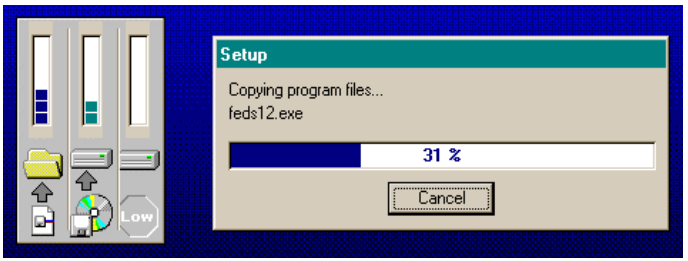
The installation program starts copying the management module program files to your selected directory. When the status bar reaches 100%, the Restart Windows screen appears.



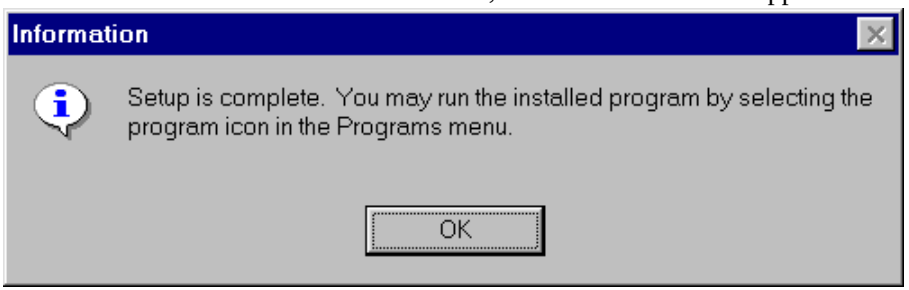
9. The installation is completed, and you should restart your computer now.

On the NuSight Platform

7. Click **Next** to continue.



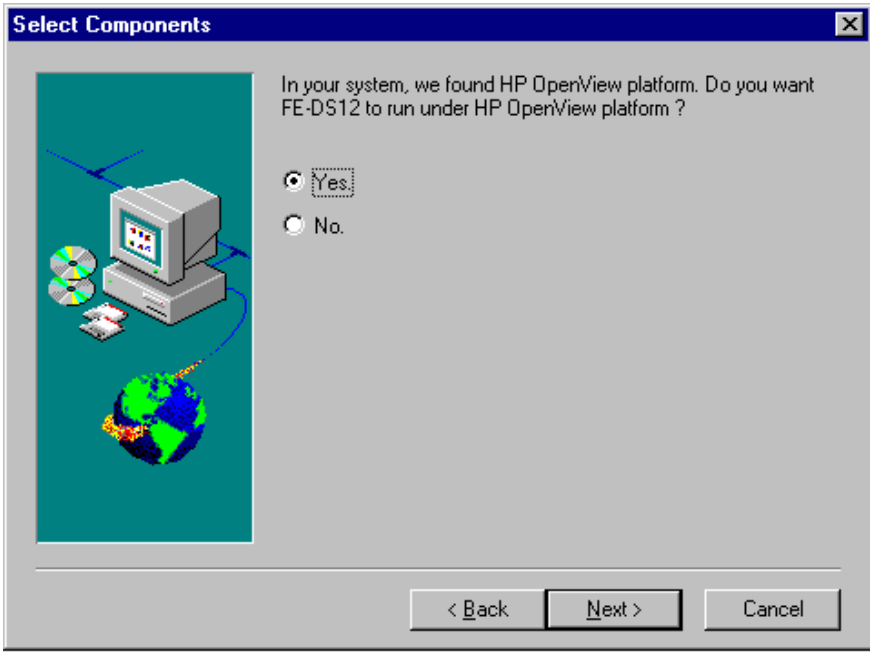
The installation program starts copying the management module program files to the default directory for the management module. When the status bar reaches 100%, an Information screen appears.



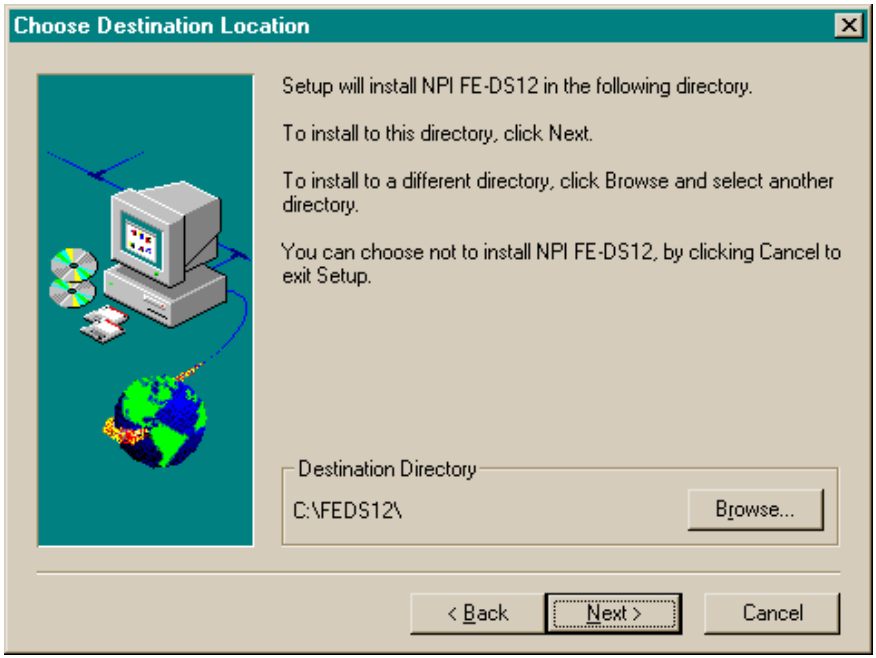
8. Click **OK**. You can now access the management module

On the HP OpenView Platform

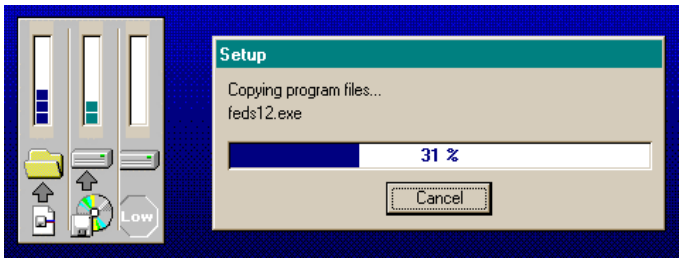
7. Click **Next** to continue. The Select Components screen appears.



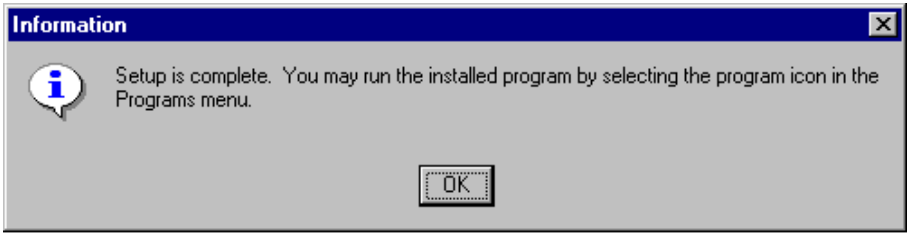
8. Make sure the **Yes** option is selected, then click **Next** to continue. The installation program presents a directory to install to.



9. To accept the default directory, click **Next**. To select a different destination directory, click **Browse** and choose the desired directory, then click **Next** to continue.



10. The installation program starts copying the management module program files to your selected directory. When the status bar reaches 100%, an Information screen appears.



11. Click **OK**. You can now access the management module.

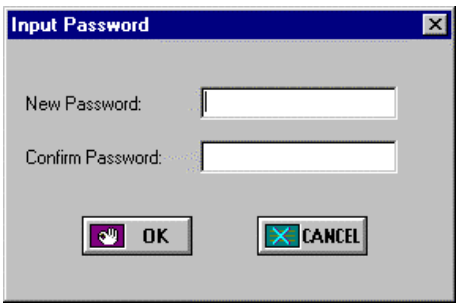
3
Using a Device Window

Once you have installed the management module at the management console, management of the FE-DS12 and FE-DS12TF Switches through the network is possible.

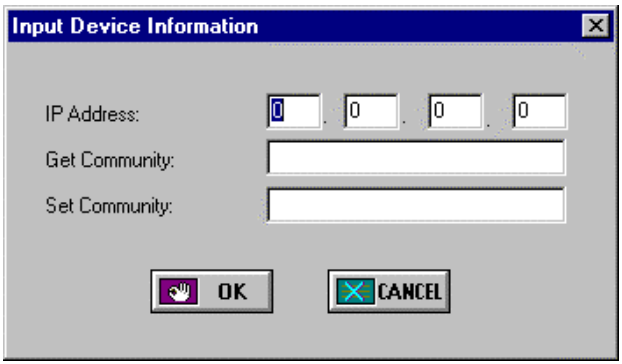
Displaying the Device Window

To perform management tasks through a FE-DS12 Switch or FE-DS12TF Switch, you must first display its device window on the management console.

1. Double click on the switch's icon on the topology map generated with your network management system.
2. If this is the first time you are accessing the device window, you must enter a **password**. Otherwise, you start by entering input device information as described in step 3.



3. Type your **password** then confirm it. The following screen appears to prompt you for the device IP address and the community name.



4. Enter the **switch's IP address** and the applicable **community names**, then click **OK**.
5. Click **OK**. A bit-mapped device window appears with a graphical view of the front panel of the switch.

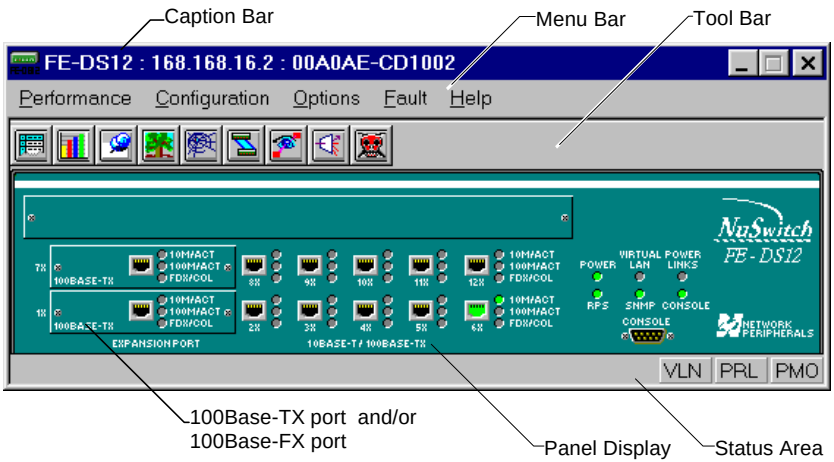


Figure 1. Device Window Showing FE-DS12 Front Panel

The depiction of ports in the EXPANSION PORT area reflects the port type installed in the switch, or it depicts a blank cover plate if no port is installed.

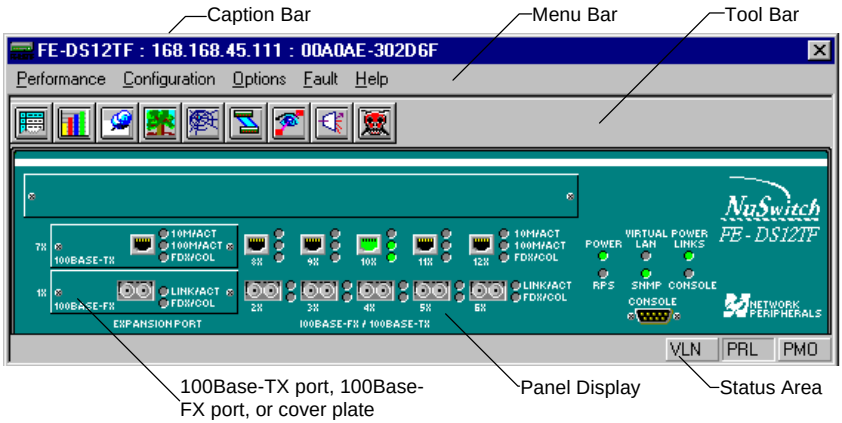


Figure 2. Device Window Showing FE-DS12TF Front Panel

Use the various menus, tools, and status information in the device window for management. As the figure shows, the device window has five main areas, summarized in the following section.

Device Window Description

The **Caption Bar** shows the switch name, which contains a hub label (as defined in your topology map), its IP address (168.168.004.002), and the MAC address (00A0AE-010402).

The **Menu Bar** shows the names of menus for monitoring and managing the FE-DS12 and FE-DS12TF Switches. Chapter 4 gives more information about using the menus.

The **Performance menu** lets you monitor the performance of the FE-DS12 and FE-DS12TF Switches. You can view statistics on the entire switch (unit) or on specific ports of the switch. A graphical view of the unit or port statistics is also available.

The **Configuration menu** lets you configure the entire switch (system), view current port configuration, and configure Spanning Tree Protocol parameters.

The **Options menu** lets you access and modify additional functions of the FE-DS12 and FE-DS12TF Switches such as virtual LANs, routing addresses and trap management.

The **Fault menu** lets you reset the FE-DS12 and FE-DS12TF Switches after changing settings or go back to the factory default settings.

The **Help menu** gives you information about the management module version (About ...). It also lets you view this guide on-line.

Tool Bar icons give you access to the most commonly used management functions. Clicking on an icon in the tool bar is the fastest way to access a management function.


Unit Statistics


Power Link


Unit Analysis


Port Monitor


System Configuration


Routing Address

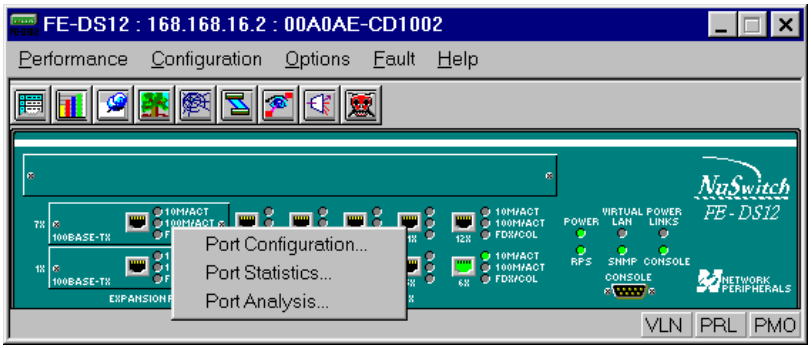

Spanning Tree Configuration


Trap Management


Virtual LAN

The **Panel Display** shows a graphical representation of the FE-DS12 and FE-DS12TF Switches' front panel. The status of the LEDs and the physical ports of the switch can be seen in this area. A port can also be selected from this area to monitor its performance and configure it. (If an FE-831 or FE-833 Media Adapter is installed in the expansion slot, a representation of the 100Base-TX port it contains replaces the cover plate over the expansion slot shown on the front panel.) When you click on the

desired port, a pop-up menu displays. You can select the desired option from this menu, applicable to the chosen port. In the figure below, port 2 is selected.



The **Status Bar** shows the current status of the FE-DS12 and FE-DS12TF Switches. The port number on the left side of the status bar shows the currently selected port. VLN, PRL, and PMO on the right side of the status bar are turned on if the Virtual LAN, Power Link, and Port Monitor functions, respectively, are enabled.

4
Managing the Switches

When you display a device window for the FE-DS12 and FE-DS12TF Switches as discussed in Chapter 3, you can use the device window to manage the switches. This chapter describes preparations for managing the switches from the device window and explains the management options.

Preliminary Steps

Before managing the switches, you need to ensure that:

- The FE-DS12 or FE-DS12TF Switch is connected to the management console. The switch can be connected (and managed) either in-band or out-of-band. An in-band connection is the same as a network connection: the management console is a workstation on the network. An out-of-band connection is a connection made through the console port of the switch.
- All switches to be managed are turned on.
- Each switch is represented by an icon that is incorporated into the topology map on your management console.

If you want to have full control over the switch (set its configuration, reset it, and reset statistic counters), enable the manager privilege option through the Security Menu in the network management system window menu bar.

To manage FE-DS12 and FE-DS12TF Switches, display the topology map on your management console then double-click the FE-DS12 or FE-DS12TF Switch's icon. The NuSwitch device window appears and shows the front panel of the switch. The menu bar described in Chapter 3 is near

the top of this window. The front panel displays the actual components—the ports and LEDs—of the selected switch.

Monitoring switch performance, configuring the system and all switch options, and resetting the switch are all done through the menu bar.

Monitoring and configuring individual ports are done through a pop-up menu that appears when you click on the port.

Monitoring the FE-DS12 and FE-DS12TF Switches

The FE-DS12 and FE-DS12TF Switches have statistics counters that let you monitor the real-time operating condition of the switch. The switch also has an event log that you can view. These statistics counters and log gather information about the entire switch and individual switching ports. You can view switch statistics and the log from the Performance menu on the menu bar.

You can view port statistics from a pop-up menu that appears when you click on an individual port in the device window.

Each statistics and analysis screen is explained in greater detail in the remainder of this chapter. All the screens have common buttons or fields that let you start or stop the statistics counters or change the poll timer. These common buttons and fields are defined in the following table. You use them the same way in all screens.

The analysis screens described in the following pages also include buttons to select bar, line, or metered graphical views of the statistics.

The statistics screens described in the following pages show various statistics counters. These statistics counters described in the following table, are commonly displayed in four “count” columns.

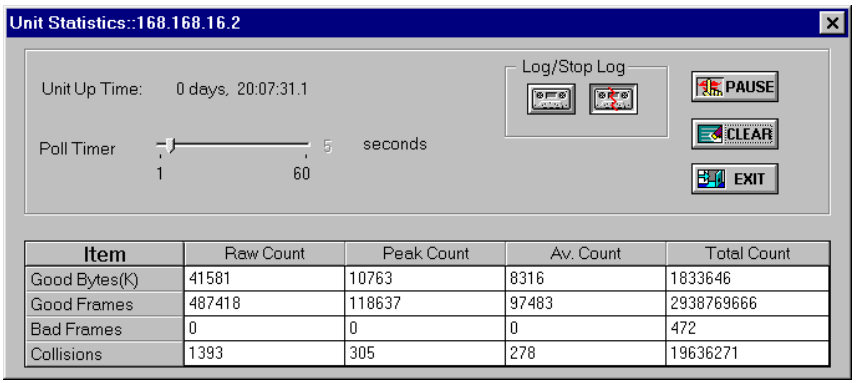
Table 1. Counters Common to Statistics Screens

Field	Description
Raw Count	The total count between the last polling and the current polling.
Peak Count	The highest average count since the time the statistics counters were last reset. These counters are reset whenever you re-start the hub or click **Clear** in the dialog box.
Average Count	The raw count per second.
Total Count	The accumulated count since the time the statistics counters were last reset. These counters are reset whenever you re-start the switch or click **Clear** in the dialog box.

Unit Performance

The Performance menu has three options, Unit Statistics, Unit Analysis, and View Log that give you information about traffic through the switch. The Unit Statistics screen shows information in table form about the total number of good kilobytes passing through the ports, the total number of good and bad frames, and collisions on the connected segments. The Unit Analysis screen shows a graphical view of the total number of good packets and good kilobytes passing through the ports per second, and the percentage of error packets. The View Log screen displays a log of any events that occurred on a specified port and device during a specified period.

When you select **Unit Statistics** from the Performance menu, the following screen appears:



Item	Raw Count	Peak Count	Av. Count	Total Count
Good Bytes(K)	41581	10763	8316	1833646
Good Frames	487418	118637	97483	2938769666
Bad Frames	0	0	0	472
Collisions	1393	305	278	19636271

Items in this screen are described in the following paragraphs.

Unit Up Time: A view-only field that shows how long the switch has been operational since it was turned on or reset.

Poll Timer: This determines how often statistical values are retrieved from the switch. To change the polling time, click on the slider and drag it to a position on the gauge that approximates the desired polling time, from 1-60 seconds. The polling time you set is only valid for the current session. Once you close the dialog box, the default polling time (5 seconds) goes into effect in the next session.

Log/Stop Log: To have the polling statistics logged in the database, click the **left button**. These statistics can then be viewed with the View Log option in the Performance menu. To stop logging, click the **right button**.

Good Bytes (k): The size (in kilobytes) of good frames that have been received on all ports of the switch.

Good Frames: The number of good frames that passed through all ports of the switch. Good frames are from 64-1518 bytes with no cyclic redundancy check (CRC) or alignment errors.

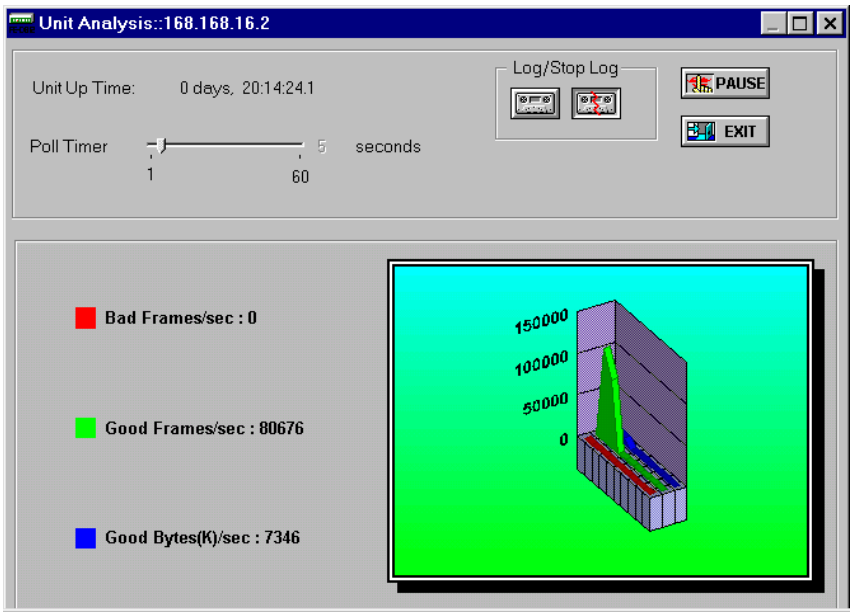
Bad Frames: The number of bad frames that have been received on all ports of the switch. Bad frames are those that did not meet the requirements of good frames, but are without collision.

Collisions: The number of collisions that occurred on all segments connected to all ports of the switch. Collisions are normal on half duplex links in an Ethernet network. They occur when two or more network devices attempt packet transmission at the same time. When a collision occurs, these devices back off automatically and retry transmission later.

To stop the polling, click **PAUSE**. To resume polling, click **PAUSE** again. For example, you can stop polling, adjust the Poll Timer, then resume polling with the new time.

If you want to reset the statistics counters of the displayed dialog box, click **CLEAR**. This button is available only if the manager privilege option of the console is enabled.

When you select **Unit Analysis** from the Performance menu, the following screen appears:



This screen shows the number of good packets per second and good kilobytes per second that pass through the switch. The error rate is also graphed as a percentage over time.

Items in this screen are described in the following paragraphs.

Unit Up Time: A view-only field that shows how long the switch has been operational since it was turned on or reset.

Poll Timer: Use this parameter as described earlier under *Unit Performance*.

Log/Stop Log: Use this parameter as described earlier under *Unit Performance*.

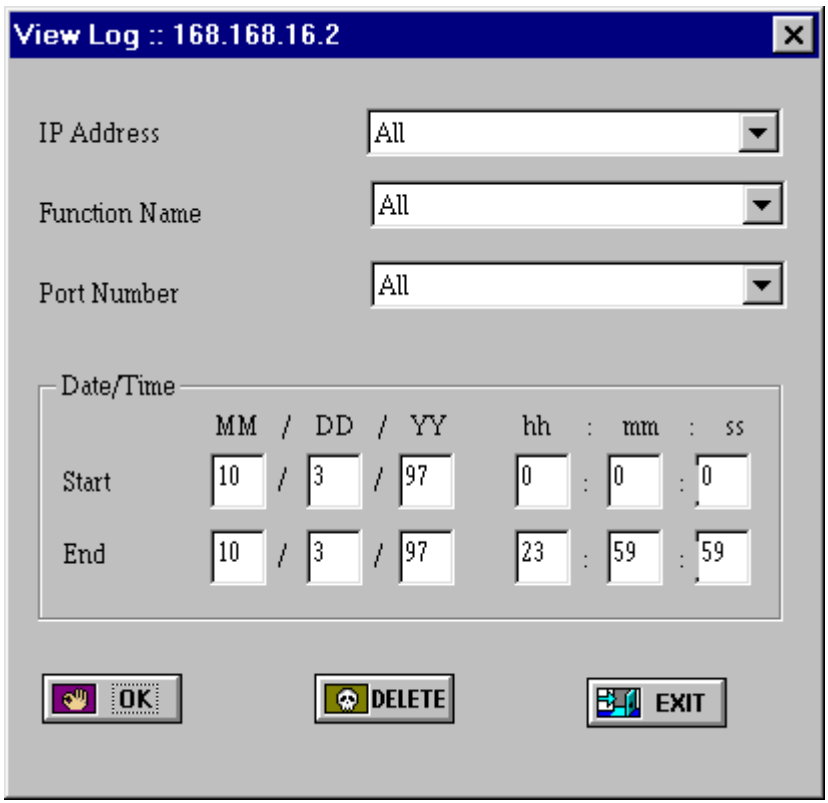
Use the PAUSE button as described earlier under *Unit Performance.*

Bad Frames/ sec: The number of bad frames that have been received on all ports of the switch. Bad frames are those that did not meet the requirements of good frames, but are without collision

Good Frames/sec: The number of good packets per second passing through all ports of the switch

Good Bytes (k)/sec: The total size (in kilobytes) of good frames per second passing through all ports of the switch.

When you select **View Log** from the Performance menu, the following screen appears:



Items in this screen are described in the following paragraphs.

IP Address: Select the desired address from the list. The IP addresses in this list exist in the database and represent units that were designated for logging in the Unit Statistics option as described earlier in this section. If you select **All**, the system ignores the IP address as a condition for viewing.

Function Name: Select one of the functions in this list to be a condition for viewing, or select **All** if you want the system to ignore all the functions as conditions of viewing.

Port Number: Select a port from the list that represents the port on the device specified by the IP address. If you select **All**, the system ignores the port number as a condition for viewing.

Date/Time: Use this section to specify the period of logged events you want to view.

To view the events meeting the conditions just specified, click **OK**.

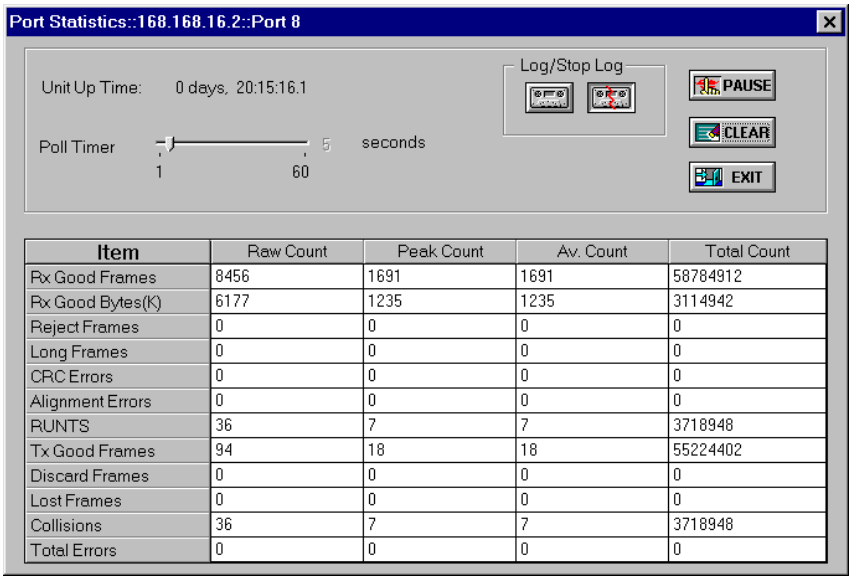
To delete the events meeting the conditions just specified from the log, click **DELETE**.

To cancel any entries and leave this window, click **EXIT**.

Port Statistics

Each of the 12 ports on the switch can be monitored. Statistics on the ports are gathered by the switch and offer you information about traffic through that port. The Port Statistics and Port Analysis options on an individual port's pop-up menu give access to this information.

When you select **Port Statistics** from an individual port's pop-up menu, the following screen appears:



Item	Raw Count	Peak Count	Av. Count	Total Count
Rx Good Frames	8456	1691	1691	58784912
Rx Good Bytes(K)	6177	1235	1235	3114942
Reject Frames	0	0	0	0
Long Frames	0	0	0	0
CRC Errors	0	0	0	0
Alignment Errors	0	0	0	0
RUNTS	36	7	7	3718948
Tx Good Frames	94	18	18	55224402
Discard Frames	0	0	0	0
Lost Frames	0	0	0	0
Collisions	36	7	7	3718948
Total Errors	0	0	0	0

Items in this screen are described in the following paragraphs. The counters displayed in this screen show statistics for the selected port.

Unit Up Time: A view-only field that shows how long the switch has been operational since it was turned on or reset.

Poll Timer: Use this parameter as described earlier under Unit *Performance*.

Log/Stop Log: Use this parameter as described earlier under *Unit Performance*.

Rx Good Frames: The number of good frames that have been received on the selected port. Good frames are from 64-1518 bytes with no cyclic redundancy check (CRC) or alignment errors.

Rx Good Bytes (k): The size in kilobytes of good frames received by the port.

Reject Frames: The number of valid frames received that were discarded (filtered) by the forwarding process.

Long Frames: The number of long frames that are received in the selected port. Long frames are frames longer than 1518 bytes (including FCS), and with a duration less than 5 ms.

CRC Errors: A counter that is incremented by one for each frame received on this port with the FCSError signal asserted and the FraminError and CollisionEvent signals unasserted, and w hose octet count is greater than or equal to minFrameSize and less than or equal to maxFrameSize. This counter rolls over approximately every 80 hours.

Alignment Errors: The number of alignment errors received on the selected port. An alignment error occurs when a received frame is not an integral number of bytes.

RUNTS: The number of interrupted frames received on the selected port. Runts are frames with incorrect sizes or formats that are typically the result of collisions.

Tx Good Frames: The number of good frames that have been transmitted in the selected port. Good frames are from 64-1518 bytes, including the CRC.

Discard Frames: The number of discarded frames that are received on the selected port. These frames are discarded at the receiving port because of frame filtering.

Lost Frames: The number of lost frames received on the selected port. Lost frames result from the lack of internal receive buffer space.

Collisions: The number of collisions that occurred on the segment connected to the selected port.

Total Errors: The number of errors that have occurred on this port. It gives an overall indication of the health of this port because it is the summation of the individual error counters for this port.

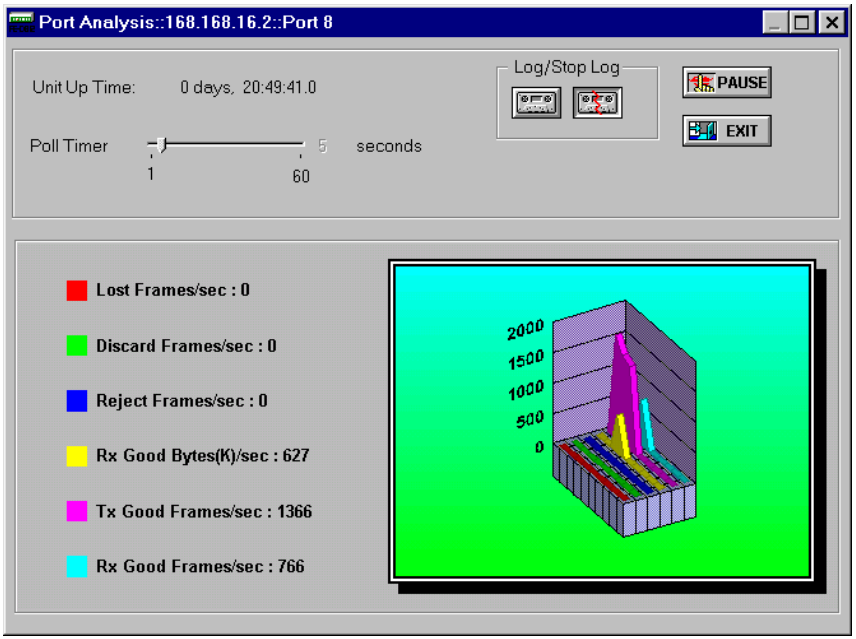
Use the **PAUSE** button as described earlier under *Unit Performance*.

Use the **CLEAR** button as described earlier under *Unit Performance*. This button is available only if the manager privilege option of the console is enabled.

To cancel any entries and leave this window, click **EXIT**.

Port Analysis

When you select **Port Analysis** from an individual port's pop-up menu, the following screen appears:



The counters and graph displayed in the Port analysis screen show statistics for the selected port. Items in this screen are described in the following paragraphs.

Unit Up Time: A view-only field that shows how long the switch has been operational since it was turned on or reset.

Poll Timer: Use this parameter as described earlier under *Unit Performance*.

Log/Stop Log: Use this parameter as described earlier under *Unit Performance*.

Lost Frames/sec: The number of packets lost after the input buffer is full.

Keep in mind that the flow control feature of the FE-DS12 and FE-DS12TF Switches minimizes packet loss by sending out collision signals when the port's internal storage buffer is full. The transmitting stations will then try to resend the packet later. When flow control is enabled and has jammed the attached segment to minimize packet loss, this percentage lost rate will be lowered. When this happens, the Collision and Lost Frames statistics counters will increment together.

Discard Frames/sec: The number of discarded frames that are received per second on the selected port. These frames are discarded at the receiving port because of frame filtering.

Reject Frames: The number of valid frames received that were discarded (filtered) by the forwarding process.

Rx Good Bytes (K)/sec: The size in kilobytes of good frames received per second at the selected port.

Tx Good Frames/sec: The number of packets transmitted by the selected port per second.

Rx Good Frames/sec: The number of packets per second received and forwarded by the selected port.

Use the PAUSE button as described earlier under *Unit Performance.*

To cancel any entries and leave this window, click **EXIT**.

Configuring the FE-DS12 and FE-DS12TF Switches

The Configuration menu contains options, which allow viewing configuration, configuring the system, and configuring Spanning Tree Protocol parameters.

The bitmapped port representations in the device window allow the configuring of individual ports.

When installing the switch for the first time, you must configure the system and the ports as appropriate for your environment.

You can change settings for the switch and individual ports. These settings are stored in the EEPROM of the switch and are recalled every time the switch is reset. Configuration settings that you can change include:

- Switch name, location, and contact
- Port name
- Port state (enabled or disabled, flow control enabled or disabled, auto-negotiation, and speed)
- Spanning tree-related parameters include bridge priority, maximum age, hello time, forward delay, port priority, port block on link, and port path cost.

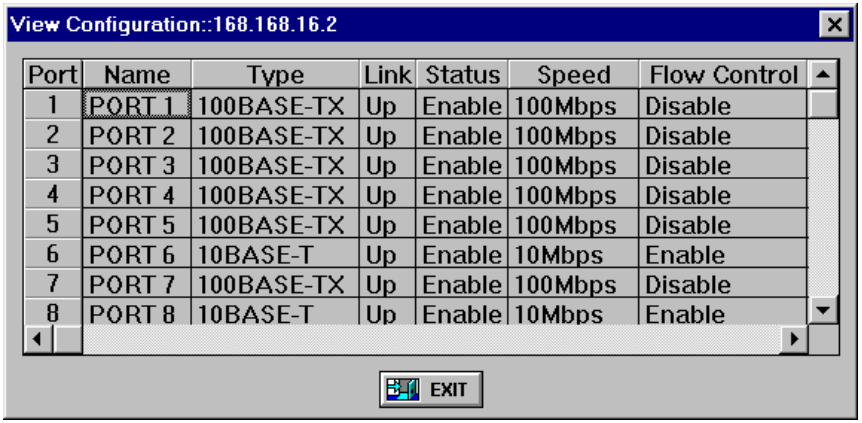
The contents of the switch's EEPROM can also be set back to their factory defaults by performing a factory reset on the switch. For more information, see *Resetting the FE-DS12 and FE-DS12TF Switches* later in this chapter.

Before you can change settings, you must enable the manager privilege option of the management console. This lets you use the SET command button, common to all screens that have changeable parameters. To enable the manager privilege, you need to access the Security menu from within your network management system.

Viewing Configuration

The View Configuration option in the Configuration menu shows you the MAC address of the last node that transmitted a frame, current port-related settings, and statistical data.

When you select **View Configuration** from the Configuration menu, the following view-only screen appears:



Items in this screen are described in the following paragraphs. To change any of the settings in the table, use the Port Configuration option in the pop-up menu for that port in the device window.

Port: The port number in the switch.

Name: The name, up to 12 alphanumeric characters of your choice, that identifies the port.

Type: The port type (10Base-T, 100Base-TX, or 100Base-FX).

Link: The current link status (Up or Down) of the port.

Status: The operating status (Disable or Enable) of the port.

Speed: Current connection speed (10Mbps or 100Mbps) specified for the port.

Flow Control: The flow control status (Disable or Enable) for the port. Flow control minimizes dropped packets by sending out collision signals when the port's receiving buffer is full. Flow control is only available in half duplex mode.

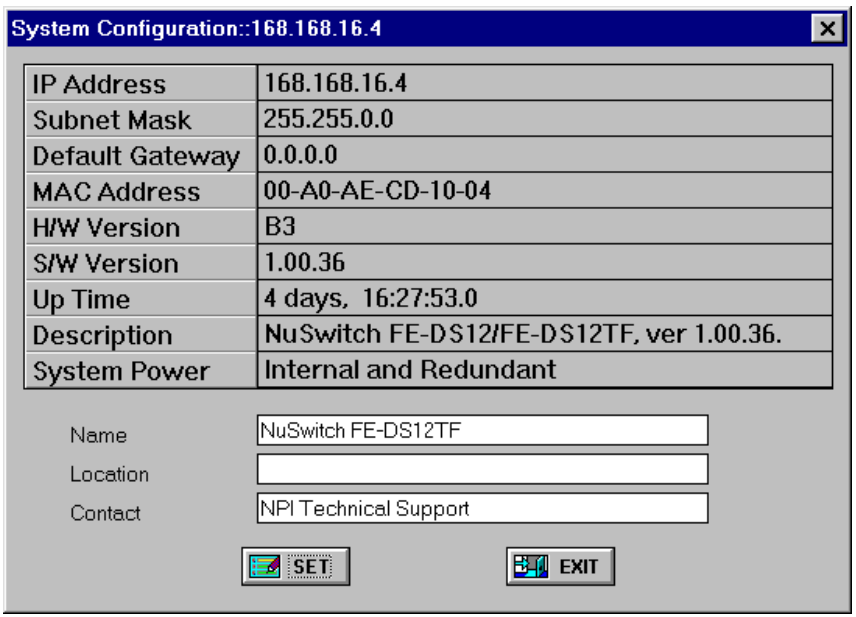
Full Duplex: The duplex mode set for the port. To make full duplex mode work properly both ends of the link must be enabled for full duplex mode.

Last Source Address: The MAC address of the last node that transmitted a frame to the port.

System Configuration

System configuration lets you enter a name, location, and contact information. These three parameters are only used for reference purposes.

When you select **System Configuration** from the Configuration menu, the following screen appears:



Items in this screen are described in the following paragraphs.

IP Address: IP addresses are very important in managing TCP/IP networks because they are used for communication between network devices. Each network device must have a unique IP address.

The switch comes with a default IP address of 168.168.xxx.xxx. The last two bytes are the decimal equivalent to the last two hexadecimal bytes of the switch's MAC address. You can use this value as the switch IP address or specify a new one if there is address duplication or the address does not match your network ID. When assigning a new value, you can use the BootP function to automatically assign an IP address to the switch. You can change the IP address through the console port on the switch.

Subnet Mask: The default subnet mask is 255.255.0.0. You can change the subnet mask through the console port on the switch.

Default Gateway: The IP address for a gateway or router. This address tells the switch which device is responsible for the delivery of IP packets sent by the switch to remote networks. This feature is required if the switch and the management console are not on the same network or subnet. The default value of this parameter is 0.0.0.0, which means no gateway exists or the switch and the management console are on the same network. You can change the gateway address through the console port on the switch.

MAC Address: The MAC address assigned to the switch (hardware address). You cannot access this field to change the MAC address of the switch.

H/W Version: The hardware version of the switch.

S/W Version: The version of the software currently loaded in flash memory.

Up Time: The time that has elapsed since the switch was turned on or reset.

Description: A general description of the device.

System Power: Indicates whether the switch's power source is internal, internal and from the optional RPS-600 redundant power supply, or from only the optional redundant power supply.

Name: A name of your choice that uniquely identifies this switch. The switch name is for reference purposes only. The default name is NuSwitch FE-DS12 or NuSwitch FE-DS12TF.

Location: The physical location of the switch (Second Flr SW closet for example). This information is for reference purposes only. The default is no location specified.

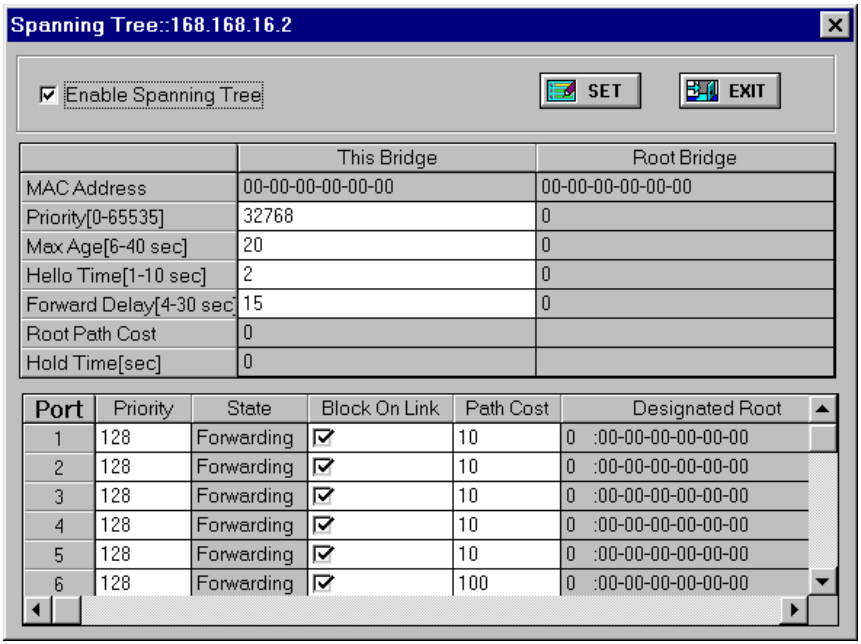
Contact: The person to contact in case problems occur on the switch. This information is for reference purposes only. The default contact is NPI Technical Support.

After entering this information, click **SET** to save the new settings into the switch's EEPROM.

Spanning Tree Protocol Parameters Configuration

Support for the Spanning Tree Protocol lets you create protocol-independent bridges that connect networks in diverse communications environments. These bridged networks are treated as segments in an extended network. With the Spanning Tree Protocol, you can tailor your network topology: you can adjust parameters such as Hello Time and Root Path Cost to shape the spanning tree as desired.

When you select **Spanning Tree Configuration** from the Configuration menu, the following screen appears:



There are two main areas in the Spanning Tree screen. The first area shows bridge-level details about the switch. There are two columns of information in this area: This Bridge and Root Bridge. This Bridge refers to the currently selected switch. Root Bridge refers to the switch that currently acts as the root bridge of the spanning tree. Parameters displayed for the root bridge were obtained through the configuration BPDUs (Bridge Protocol Data Units) received on the root port. They are the settings currently being used in the spanning tree topology of the active bridged local area network. They are displayed here for reference purposes only.

The fields in this area are described in the following paragraphs.

MAC Address: This is a view-only field that shows the MAC address of the respective bridge.

Priority: Enter a value from 0-65535. This value lets you influence the choice of root bridge and the designated bridge. A lower numerical value gives the bridge a higher priority and a greater chance of becoming the root bridge.

Max. Age: Enter the time after which received protocol information is discarded. The stored information for each port is aged and discarded if no update activity has occurred when this limit is reached. Maximum age can range from 6-40 seconds.

Hello Time: Enter the time interval between issuing configuration BPDUs that are used by the bridges to calculate a spanning tree. Hello time can range from 1-10 seconds.

Forward Delay: Enter the amount of time the spanning tree algorithm spends in each intermediate port state during a transition from blocking to forwarding. This value is also used as a short aging time value for all dynamic MAC entries in the address tables, during a topology change of the active bridged local area network, as specified by the root bridge. Forward delay can range from 400-3000, in 10ms units (4-30 seconds in 1/100-second increments). The default is 15 seconds.

Root Path Cost: This field shows the cost of the path to the root from this bridge. It is equal to the sum of the designated cost and path cost parameters held for the root port. When the bridge is the root this parameter is 0.

Hold Time: This is a fixed value that specifies the minimum period during which no more than two Configuration BPDUs are transmitted through a given bridge port.

The second area in the Spanning Tree screen shows information about ports on the switch. Most of the fields in this area are view-only fields.

Priority: Enter a value from 0-255. This value lets you influence the choice of port when a bridge has two ports connected in a loop. A lower numerical value gives that port a higher priority.

State: This is a view-only field that shows the operating state of the port. The five possible states are Blocking, Listening, Learning, Forwarding, and Disabled.

Block on Link: This field allows you to block or unblock the link of the port.

Path Cost: Enter a value, from 1-65535, that represents the cost to be added to the root path cost field in a configuration BPDU received on this port so the cost of the path to the root through this port can be determined.

Designated Root: This is a view-only field which shows the unique Bridge Identifier of the Bridge recorded as the Root in the Configuration BPDUs transmitted by the Designated Bridge for the segment to which the port is attached.

Designated Cost: This is a view-only field that shows the path cost of the designated port of the segment connected to this port. This value is compared to the Root Path Cost field in received bridge BPDUs.

Designated Bridge: This is a view-only field that shows the bridge identifier of the bridge, which this port considers to be the designated bridge for this port's segment.

Designated Port: This is a view-only field that shows the port identifier of the port on the designated bridge for this port's segment.

To enable the spanning tree, click **Enable Spanning Tree** on. To disable the spanning tree, click in the **checkbox** to clear it.

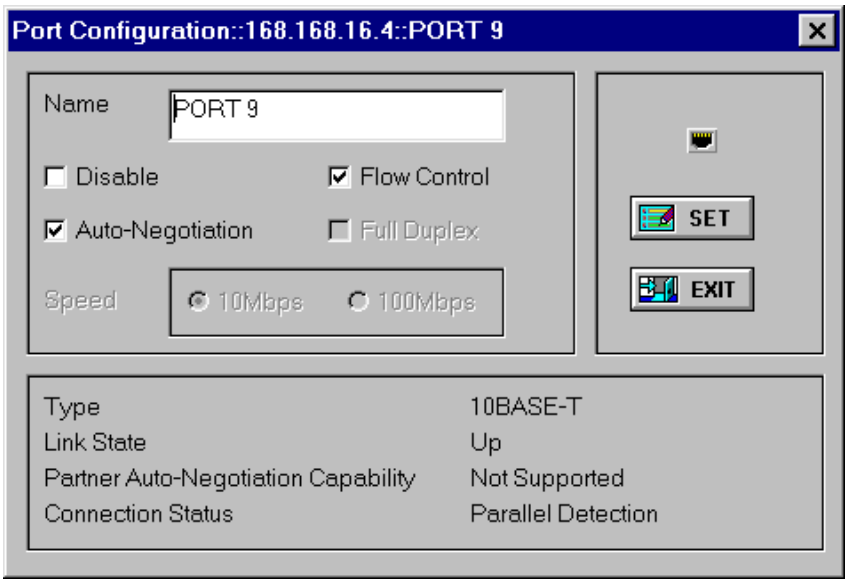
When you have configured all applicable parameters, click **SET** to save the configuration.

Port Configuration

The graphic port representations on the front panel in the device window allow individual port configuration. When you click on an individual port, a pop-up menu displays.

The Port Configuration option in the pop-up menu lets you view and change parameters relating to that port. These parameters can determine operational characteristics of the port when it is in use and allow for troubleshooting if necessary. The upper half of the screen presents parameters that you can change. The lower half of the screen displays view-only fields associated with the port.

When you select **Port Configuration** from an individual port's pop-up menu, the following screen appears:



Items in this screen are described in the following paragraphs.

Name: Specify a name, up to 12 alphanumeric characters of your choice, for the selected port.

Disable: Use this field to disable the port. A disabled port does not transmit any packets to the connected segment, nor forward any received packets to the switching backplane.

Flow Control: Use this field to enable or disable flow control for the port. Flow control and full duplex mode cannot both be enabled at the same time.

Auto-Negotiation: Use this field to enable or disable auto-negotiation. Auto-negotiation decides the port speed and duplex mode of the port upon linkup. When enabled, the Full Duplex checkbox and the Port Speed selection are not available. This field applies to the 100Base-TX ports.

Full Duplex: Use this field to enable or disable full duplex mode for the port. To make full duplex mode work properly, both ends of the link should be configured to full duplex mode. This field is not available when auto-negotiation is enabled for the port.

Speed: Use this field to force the connection speed of the link to 10 Mbps or 100 Mbps. This field is not available when auto-negotiation is enabled for the port.

Type: Displays the current port type (10Base-T, 100Base-TX, or 100Base-FX).

Link State: Displays the current link status (Up or Down) of the port.

Partner Auto-Negotiation Capability: Displays the detected auto-negotiation capability of the partner, either Supported or Not Supported. If the partner has no such capability, the auto sensing process will detect the connection speed. This field is displayed when the selected port supports auto-negotiation.

Connection Status: Displays the current connection status of the port. There are three types status: Auto-negotiation, when partner auto-negotiation capability is supported; Parallel Detection, when partner auto-negotiation capability is not supported or is disabled; User Mode, when an auto-negotiation port is disabled. This field is displayed when the selected port supports auto-negotiation.

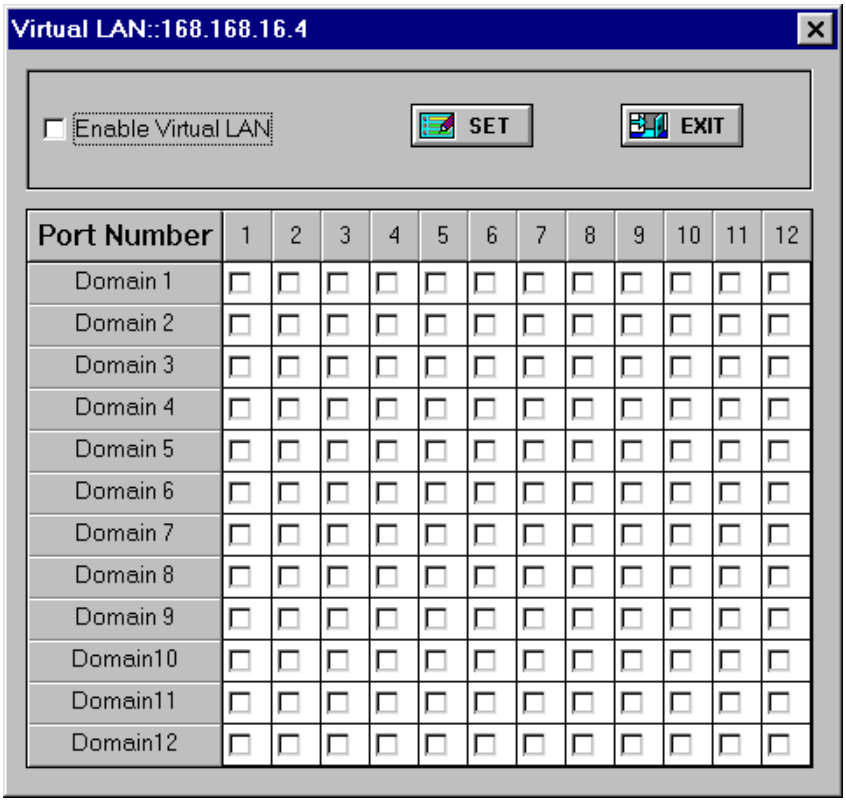
After setting these parameters, click **SET** to save the new settings into the switch's EEPROM.

FE-DS12 and FE-DS12TF Switches Options

Additional management and switch options can be accessed through the Options menu. These additional options are described in the following paragraphs.

Configuring Virtual LANs

Virtual LANs let you segment a local area network into multiple broadcast domains. For examples and more background on virtual LANs, see the Virtual LANs chapter in Part 1. To configure virtual LANs, select **Virtual LAN** from the Options menu. The Virtual LAN screen appears.



Items in this screen are described in the following paragraphs.

Enable Virtual LAN: To enable the Virtual LAN function, click **Enable Virtual LAN** on.

Port Number: These represent the ports on the switch. Click on the box or boxes below the desired port number and in the desired domain row until an "x" appears. This assigns the port to that domain.

Domain 1, etc.: These represent the domains to which you can assign ports. Each switch can support up to 12 domains. All ports with an "x" in a domain row are part of that domain.

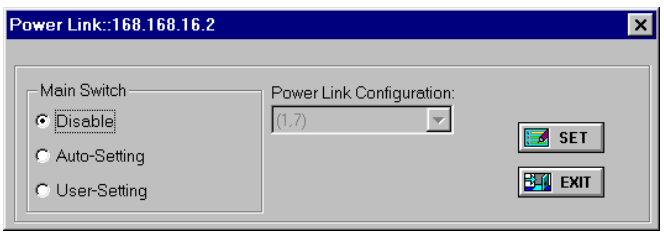
To save the domain configuration, click **SET**.

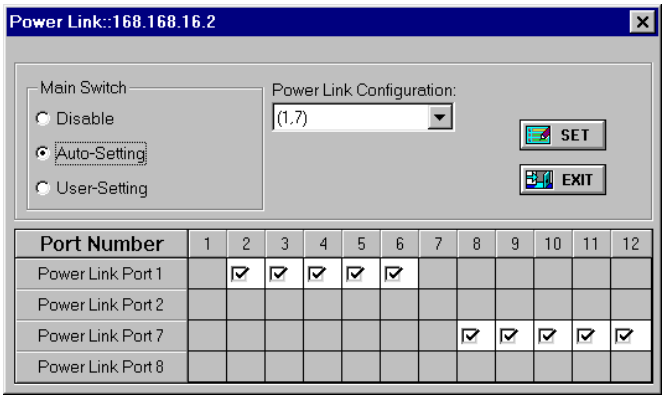
Power Link

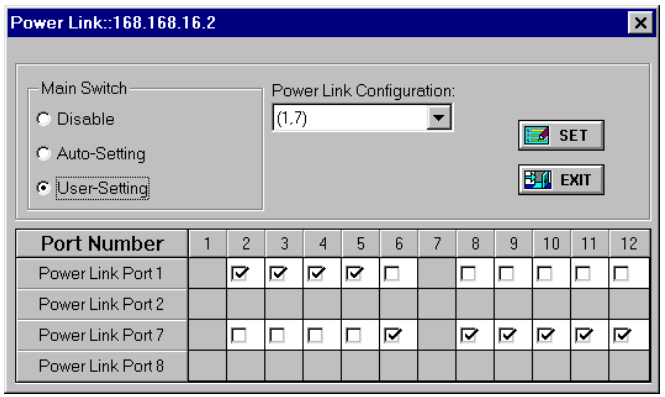
When connecting two NPI NuSwitch hubs or switches, you can use the Power Link function of the switches to increase bandwidth efficiency. Power links allow either two or four link paths to be made to another compatible NuSwitch hub or switch without forming a loop in your bridged network. These link paths can operate in half duplex mode or full duplex mode. The FE-DS12 and FE-DS12TF Switches have four ports that can be used as power links: ports 1, 2, 7, and 8.

To avoid forming a loop, you should configure power links before connecting cables to the ports you have set as power link ports.

To configure power links, select **Power Link** from the Options menu. One of three Power Link screens appears, depending on the current power link configuration.







Items in these screens are described in the following paragraphs.

Main Switch: If the Power Link option is currently disabled, the first screen just shown displays. If the Auto-Setting switch is currently on for the Power Link option, the second screen just shown displays, and if the User-Setting switch is currently on, the third screen just shown displays.

Specify how power links are to be configured, or turn on **Disable** to disable power links.

If you want the FE-DS12 and FE-DS12TF Switches to configure power links, turn on **Auto-Setting**. When you choose Auto-Setting, the power link ports are set to 1 and 7 by default. In this default setting, ports 2-6 are

assigned to port 1, and ports 8-12 are assigned to port 7. In this mode, the switch achieves load-balancing by determining which power link port each port will use to forward data to remote destinations.

If you want to configure your own power link combinations "manually," turn on **User-Setting**. In this mode, you determine a load-balancing scheme by assigning each 10/100 Mbps switching port to one of the power link ports. (The User Setting screen just shown is a sample; in an actual installation the ports checked may be different.)

Power Link Configuration: In User-Setting mode, select one of the six allowed configurations from this list. (This field is not available in Auto-Setting mode.) The selected configuration becomes the link path to remote target destinations.

Port Number: In User-Setting mode, select any of the available ports to be a power link port by clicking on the desired Port Number box to put an checkmark in it.

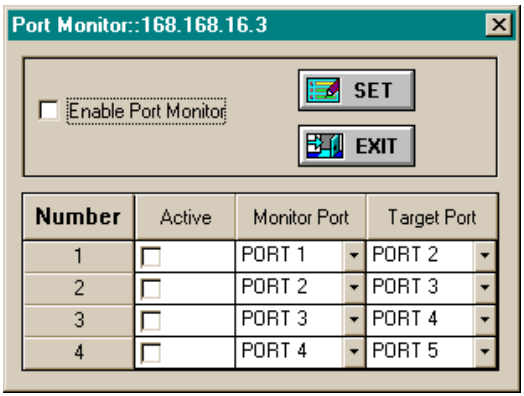
After configuring the power link ports, click **SET**.

Port Monitor

The Port Monitor function is used together with a network analyzer. This option is for configuring the monitor and monitored ports. Up to four pairs of monitor-and-target ports can be enabled. Correspondingly, you can connect up to of four network analyzers to four ports on the FE-DS12 and FE-DS12TF Switches. When configuring this function, keep the following in mind:

YES: 1 monitor port → 1 target port
YES: Many monitor ports → 1 target port
NO: 1 monitor port → Many target ports

When you select **Port Monitor** from the Options menu, the following screen appears.



To enable the Port Monitor function, click **Enable Port Monitor** on. Items in this screen are described in the following paragraphs.

Number: Identifies the four port monitor groups you can configure.

Active: To enable a port monitor group, click the **checkbox** on.

Monitor Port: Select the port you want to be a monitor port. The monitor port is used to connect to a network analyzer. This monitor port receives a copy of all data forwarded by or transmitted to the associated target port.

Target Port: Select the port to be monitored by the monitor port (network analyzer). This target port forwards a copy of all data it receives to the monitor port. Any data forwarded to the target port from other ports is also copied to the monitor port.

NOTE: A monitor port cannot receive traffic from a client or server. Therefore, any traffic generated on this segment will not be transmitted onto the switch backplane.

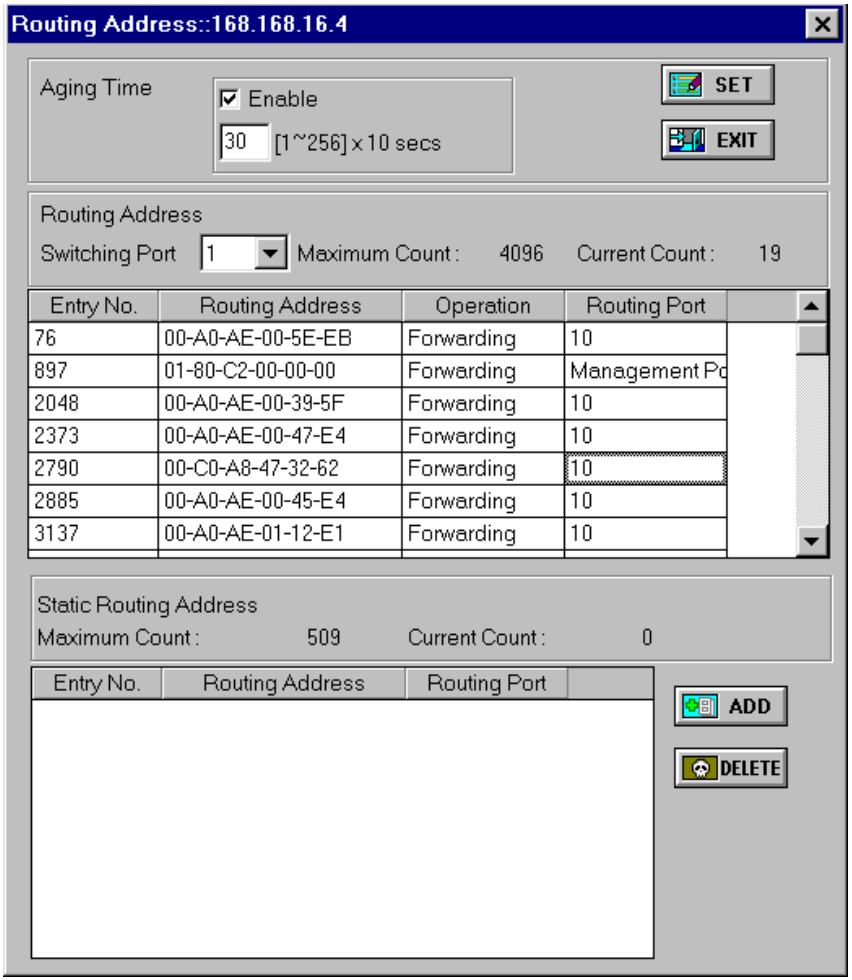
To save the configuration, click **SET**.

Routing Address

The Routing Address option lets you view the address table for each switching port. Each port on the switch is capable of automatically learning addresses. A maximum of 4,096 addresses can be learned and stored for each 10 Mbps port and each 100 Mbps port. These addresses can then be aged out (option setting) according to the aging time parameter. You can assign an address to a specific port by entering it as a static address. You can reduce the number of addresses that need to be learned by each port by typing in static routing addresses. A maximum of 509 static routing addresses can be saved. Aging does not apply to static routing addresses.

NOTE: If you move a network device that has a static routing address to another port, ensure that you remove the original route information.

When you select **Routing Address** from the Options menu, the following screen appears:



Items in this screen are described in the following paragraphs.

Aging Time: If you want to age the entries in your Routing Address table, enable Aging Time by clicking **Enable** on. Then enter the desired aging

time, from 10-2560 seconds. This count begins when the address was last learned, not when it was first entered in the address table. The default is 300 seconds.

Routing Address: This section displays the routing address information for the switching port indicated.

Switching: Select the number of the port that you want to view.

Maximum Count: Indicates the number of address entries allowed.

Current Count: Indicates the number of addresses the switching port has in its table.

Entry No.: The hash value of the MAC address in the switching port's entry table.

Routing Address: The MAC address for this entry.

Operation: The action (forwarding or filtering) this switching port is to perform on received packets with this MAC address.

Routing Port: The port where this MAC address resides. The system could take several seconds to extract this information, depending on the entry number and number of entries stored.

Static Routing Address: If desired, enter any user-defined addresses in this table.

Maximum Count: Indicates the maximum number of user-defined static addresses allowed.

Current Count: Indicates the number of static addresses presently defined.

Entry No.: The entry value assigned to static addresses as they are entered. Of the 512 static addresses allowed, the first three are system reserved static addresses, so the first available entry for user-defined addresses is number 4. The first available entry for a user-defined address is 1.

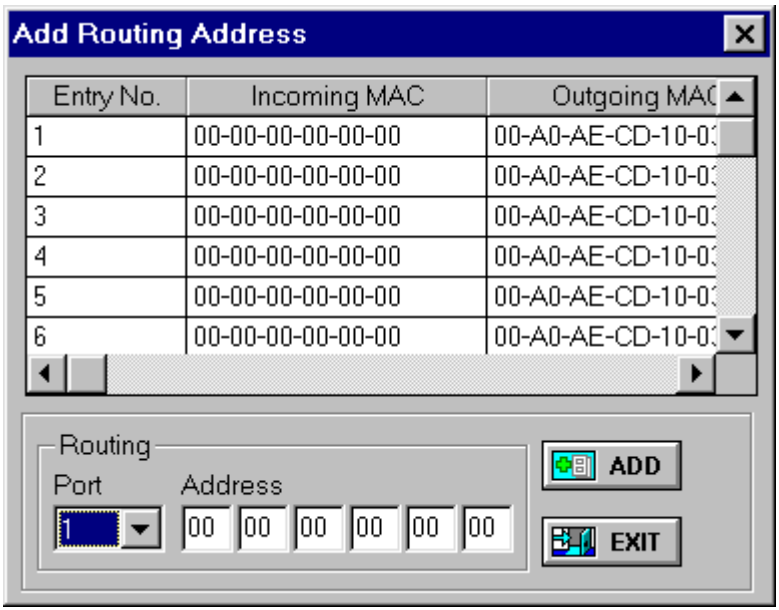
Routing Address: The MAC address of this static entry.

Routing Port: The port where this MAC address resides.

To remove a static routing address, highlight the entry for it, then click **DELETE**.

To save the configuration, click **SET**.

To add static routing addresses, click **ADD**. The following screen appears:



The table in this screen shows the source MAC address of the last frame received (Incoming MAC) and transmitted (Outgoing MAC) for each port. This is for reference purposes only.

In the Routing section, select a port from the Port drop-down list, then the Routing section and enter an address. Click **ADD** to add the new address to the Static Routing Address table. The last entry in the Port drop-down list is “All” ports. This is used with multicast address entries when the Virtual LAN function is enabled. By assigning a multicast address to “All”

ports, these unknown destination frames will be forwarded to all ports in the specified virtual LAN, instead of being filtered.

To save your entries and leave this screen, click **EXIT**.

When the Routing Address screen shown earlier re-appears, you can remove a static routing address by highlighting its entry and clicking **DELETE**.

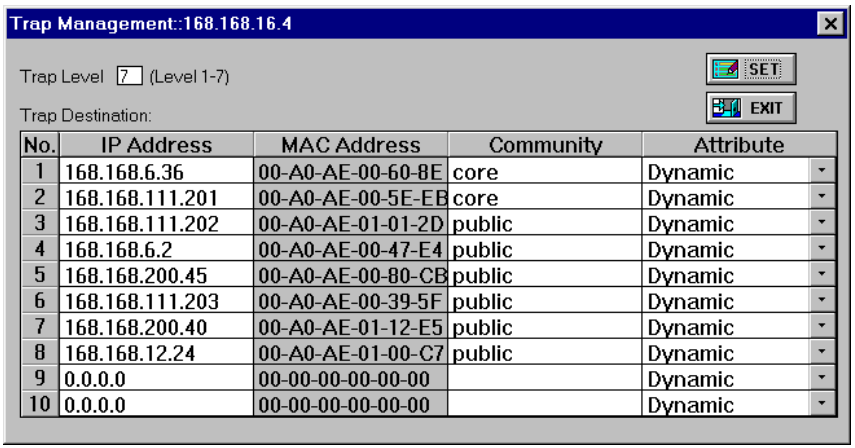
To save the configuration, click **SET**.

Trap Management

To manage a network properly, you must regularly monitor the status of the network. Traps are a method to monitor significant events that happen in a managed device. For example, a trap might record an operational error, topology change, or a function modification that requires attention.

Traps should be sent to a network manager's station or management console. The Trap Management option lets you enter the destination addresses of the network managers. Different trap levels can also be set to determine which events are reported. For trap definitions, see Appendix E in Part 1.

When you select **Trap Management** from the Options menu, the following screen appears:



No.	IP Address	MAC Address	Community	Attribute
1	168.168.6.36	00-A0-AE-00-60-8E	core	Dynamic
2	168.168.111.201	00-A0-AE-00-5E-EB	core	Dynamic
3	168.168.111.202	00-A0-AE-01-01-2D	public	Dynamic
4	168.168.6.2	00-A0-AE-00-47-E4	public	Dynamic
5	168.168.200.45	00-A0-AE-00-80-CB	public	Dynamic
6	168.168.111.203	00-A0-AE-00-39-5F	public	Dynamic
7	168.168.200.40	00-A0-AE-01-12-E5	public	Dynamic
8	168.168.12.24	00-A0-AE-01-00-C7	public	Dynamic
9	0.0.0.0	00-00-00-00-00-00		Dynamic
10	0.0.0.0	00-00-00-00-00-00		Dynamic

Items in this screen are described in the following paragraphs.

Trap Level: To set a trap level, click on the trap level slider and drag it until the desired trap level (1-7) appears. Only trap definitions with a level equal to or less than the set level are sent to the management console.

No.: You can specify up to 10 destinations for sending traps.

IP Address: Specify a trap destination address by typing in the individual IP address

MAC Address: This is a view-only field that shows the MAC address of the management console.

Community: Enter the community name to use with this management console.

Attribute: Use this field to specify whether the specific IP address of this management console is to be permanently saved in the FE-DS12 and FE-DS12TF Switches' EEPROM. A permanent memory setting keeps the IP address and community name associated with this management console in memory until it you change it. The benefit of this is that other management consoles do not need to keep a topology map open, with this switch defined, just to receive traps from the switch. A dynamic memory setting

does not prevent your management console from receiving traps if all other trap destination entries are used. Active management consoles polling this switch are automatically registered as a dynamic entry.

After the IP trap level and destination entries are defined, click **SET** to save the new settings.

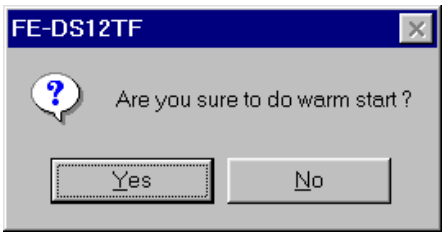
Resetting the FE-DS12 and FE-DS12TF Switches

If an abnormal operating condition occurs, you may need to reset the switch. You can reset the switch by doing a warm start or a factory reset. Use the Fault menu for either.

Warm Start

Before resetting the system make sure that no connections are active on switch. To reset the switch:

1. Select **Warm Start** from the Fault menu. A confirmation message appears.



2. Once you click Yes, the warm start cannot be canceled, so make sure you are ready before clicking Yes. To cancel the warm start, click **No**. When you click **Yes**, a warning message appears.

3. Click **OK**. Warm start proceeds and is completed when the Event# view-only field in the status bar at the bottom of the screen is incremented.

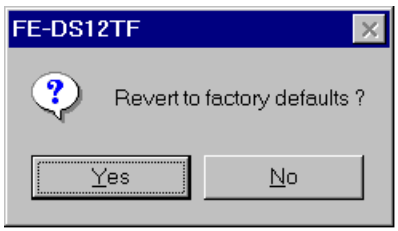
Factory Reset

When customizing your switch settings, it is possible to unintentionally produce a combination of settings that prevents your network from operating properly. If this appears to be the case, you may need to restore the NuSwitch settings to the factory defaults. Doing a Factory Reset restores the factory default settings.

NOTE: A factory reset also resets the switch's IP address. For directions on establishing the switch's default IP address, see the directions for IP Addresses in the section titled *Configuring the FE-DS12 and FE-DS12TF Switches* eralier in this chapter.

For a list of the factory default settings, see Chapter 1 in Part 1 of this user's guide. To perform a factory reset:

1. Select **Factory Reset** from the Fault menu. The following confirmation message appears:



2. Once you click Yes, the factory reset cannot be canceled, so make sure you are ready before clicking Yes. To cancel the factory reset, click **No**. When you click **Yes**, a warning message appears.

3. Click **OK** to begin restoring the factory default settings

5
Remote Managing with RMON

This chapter tells you how to use the RMON Manager function available with the FE-DS12 and FE-DS12TF Switches.

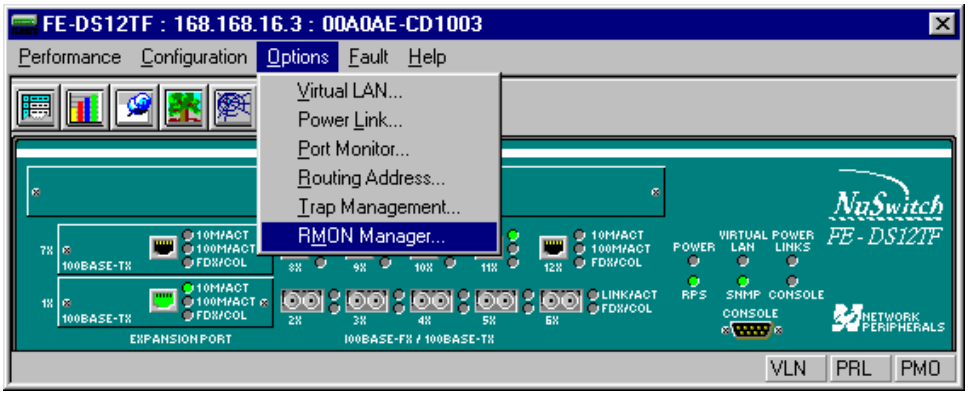
Accessing the RMON Manager

You can access the RMON Manager using either of these methods:

- Through the management module for FE-DS12 or FE-DS12TF Switches, as described in this section. The management module is on a diskette that is shipped with FE-DS12 and FE-DS12TF Switches. (For installation instructions, see Chapter 2 in Part 2 of this guide.)
- Through the NuSight Network Management System for NuSwitch FE-Series Products (the NuSight platform). The NuSight platform is available from NPI. It must be purchased and installed separately at a management console. If you have the NuSight platform installed, see the *NuSight 2.0 Network Management System for NuSwitch FE-Series Products User's Guide* for more information.

To access the RMON Manager:

1. Select **RMON Manager** from the Options menu in the device window.



2. The RMON Startup screen displays. Use the various menus, tools, and status information in the RMON Manager Startup screen for management. The RMON Manager has five main areas, shown in the following figure.

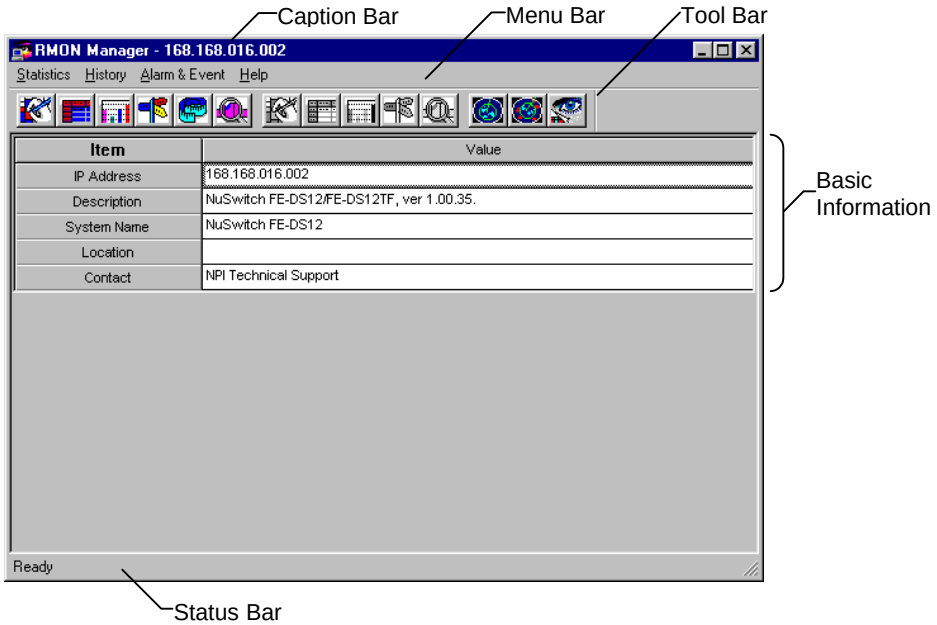


Figure 3. The RMON Manager Startup Screen Description

The **Caption Bar** contains the screen title and the IP address (168.168.016.002 in Figure 3) for the connected device.

The **Menu Bar** shows the names of menus for monitoring and managing the FE-DS12 and FE-DS12TF Switches.

The **Statistics** menu lets you configure real-time performance statistics counters and view performance statistics and analyses in text form or graph form.

The **History** menu lets you view recorded performance history in text form or graph form.

The **Alarm & Event** menu lets you configure event notification and alarm triggering based on performance thresholds that you can define. It also lets you view an event log.

The **Help menu** gives you information about the current RMON Manager version (About). It also lets you view this guide on-line.

Tool Bar icons give you access to the management functions. Clicking on an icon in the tool bar is the fastest way to access a management function.

Colored Icons…

 Ethernet Statistics Configure

 Ethernet Statistics

 Ethernet Rate Analysis

 Ethernet Destination Analysis

 Ethernet Packet Size Analysis

 Ethernet Errors Analysis

 Ethernet Event Setup

 Ethernet Alarm Setup

 Ethernet View Event Log

Black-and-white icons…

 Ethernet History Statistics

 Ethernet History Rate Analysis

 Ethernet History Destination Analysis

 Ethernet History Errors Analysis

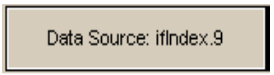
 Ethernet History Control Configure

Basic Information displays five items associated with the device being monitored: IP Address, Description, System Name, Location, and Contact.

The **Status Bar** shows the current operating status of the RMON Manager.

Many of the statistics and history screens have the same buttons that let you view an entry. Because most of these buttons can be used in the same way in all of these screens, they are explained once in the following table.

Table 2. Buttons Common to Statistics and History Screens

Button	Description
	Shows the Index of the currently selected entry.
	Shows the owner of the currently selected entry.
	Shows the number of samples requested for the currently selected entry (History screens only).
	In Statistics screens, clicking on this button lets you change the interval over which the data is sampled. This interval can be set between 1 and 3600 seconds. The Statistics screens default is 10 seconds. In History screens, this is a view-only field that shows the interval set for the currently selected entry. The History screens default is 1800 seconds.
	In a History screen, clicking on this button updates the current History screen.

Checking Ethernet Statistics

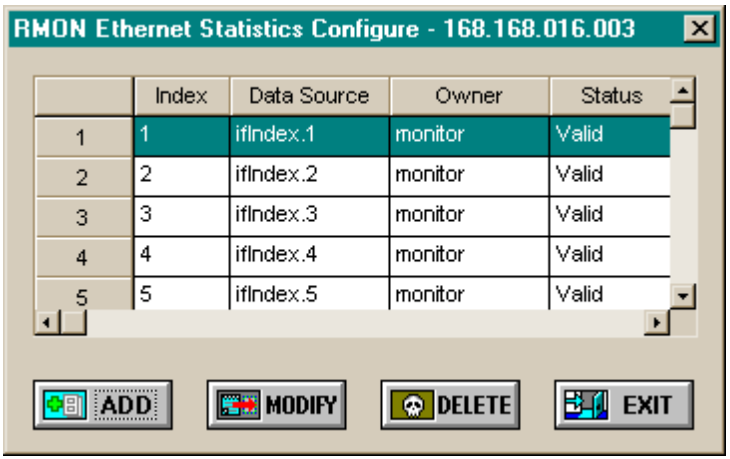
The Statistics menu lets you check Ethernet statistics collected by the RMON Manager about each interface monitored by the RMON agent in the FE-DS12 and FE-DS12TF Switches. You can use these statistics to detect changes in traffic and error patterns in critical areas of your network, and view various analyses of Ethernet activity in the network.

The Ethernet Statistics group contains statistics measured by the agent for each monitored interface on the device. You can create an Ethernet Statistics entry for a specific interface.

Creating a Statistics Entry

The Configure option on the Statistics menu is used to add, modify or delete a statistics entry. There are two ways to access the Configure option. Select it from the Statistics menu or click **CONFIG** on the other five Statistics screens: Ethernet Statistics, Ethernet Rate Analysis, Ethernet Destination Analysis, Ethernet Packet Size Analysis, or Ethernet Errors Analysis.

When you select **Configure** or click **CONFIG**, the following screen appears:



This screen shows information about the source of the data that this entry is configured to analyze, the name for the creator, and the operating status of an identified entry. Items in this screen are described in the following paragraphs.

Index: A number that uniquely identifies this statistics entry among the various statistics entries configured.

Data Source: This parameter indicates the source of the data that this statistics entry is configured to analyze. This source can be any interface on the connected device. The default parameter is ifIndex.n, where n represents the identical interface. In the FE-DS12 Switch, for example, ifIndex.6 in the table indicates port 6 on the switch.

Owner: The entity that configured this entry and is therefore using the resources assigned to it.

Status: If the status is Valid, the entry is currently operating successfully as configured. If the status is Under Creation, the RMON Manager has not yet been able to add the new entry, and will delete the entry request without further notice. To prevent this, delete any entry whose status is Under Creation then re-create it.

To create a new entry, click **ADD**. When the Add RMON Ethernet Statistics Entry dialog box displays, select the data source, enter an owner name, then click **OK**.

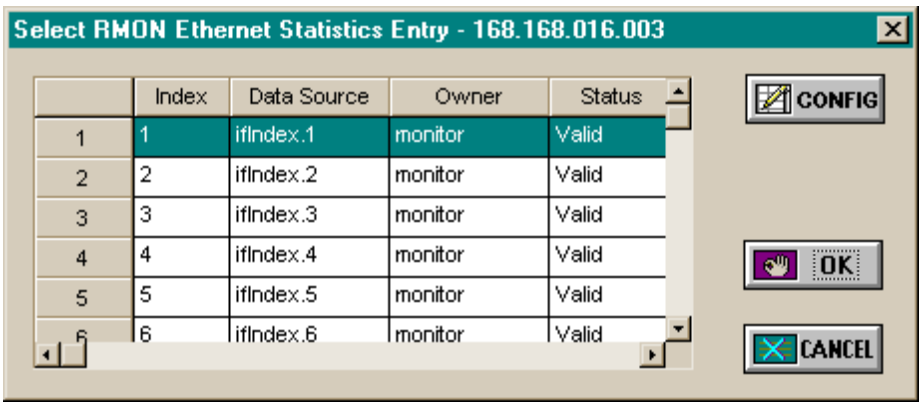
To change the owner in an existing entry, select the entry from the table, then click **MODIFY**. When the Modify RMON Ethernet Statistics Entry dialog box displays, enter the new owner name, then click **OK**.

To delete an entry, select it, then click **DELETE**. When a message displays asking if you really want to delete this entry, click **Yes**.

When you are finished adding, modifying, or deleting entries in this screen, click **EXIT** to save the information and leave this screen.

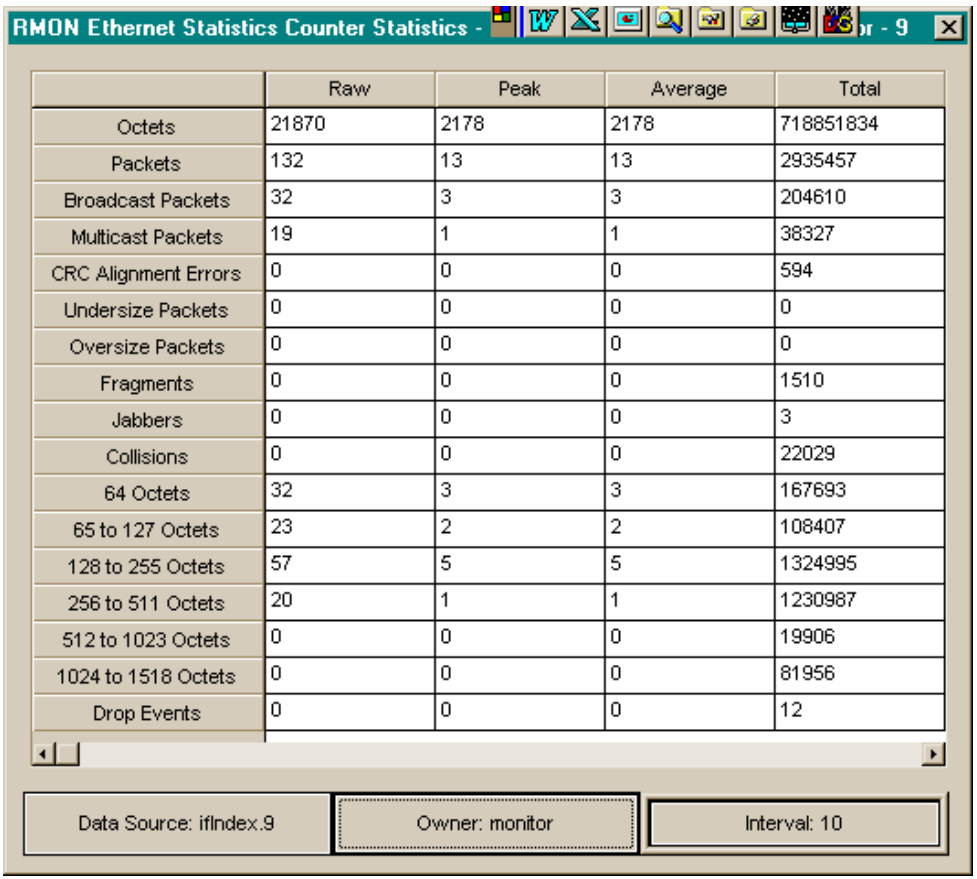
Viewing Statistics

The Statistics menu has five options, which let you view Ethernet statistics in both text and graph form. When you access one of these options, the Select RMON Ethernet Statistics Entry screen appears.



The Ethernet Statistics option lets you view real-time information about traffic through the switch. The Ethernet Rate Analysis, Ethernet Destination Analysis, Ethernet Packet Size Analysis, and Ethernet Errors Analysis show graphical views of the information in the Ethernet Statistics table.

When you select **Ethernet Statistics**, select an entry, and click **OK**, the following screen appears:



	Raw	Peak	Average	Total
Octets	21870	2178	2178	718851834
Packets	132	13	13	2935457
Broadcast Packets	32	3	3	204610
Multicast Packets	19	1	1	38327
CRC Alignment Errors	0	0	0	594
Undersize Packets	0	0	0	0
Oversize Packets	0	0	0	0
Fragments	0	0	0	1510
Jabbers	0	0	0	3
Collisions	0	0	0	22029
64 Octets	32	3	3	167693
65 to 127 Octets	23	2	2	108407
128 to 255 Octets	57	5	5	1324995
256 to 511 Octets	20	1	1	1230987
512 to 1023 Octets	0	0	0	19906
1024 to 1518 Octets	0	0	0	81956
Drop Events	0	0	0	12

The counters displayed in the RMON Ethernet Statistics Counter Statistics screen show statistics for the selected entry.

Items in this screen are described in the following paragraphs.

Octets: Number of received octets of data (including those in bad packets.)

Packets: Number of received packets, including bad packets, broadcast packets, and multicast packets.

Broadcast Packets: Number of good broadcast packets received.

Multicast Packets: Number of good multicast packets received.

CRC Alignment Errors: Number of packets received of the proper size (between 64 and 1,518 octets) but with either a CRC error or an alignment error (not an integral number of octets).

Undersize Packets: Number of packets received that were well formed but less than 64 octets long.

Oversize Packets: Number of packets received that were well formed but greater than 1,518 octets long.

Fragments: Number of packets received that were less than 64 octets long and with either a CRC error or an alignment error (not an integral number of octets).

Jabbers: Number of packets received that were greater than 1,518 octets long and with either a CRC error or an alignment error (not an integral number of octets).

Collisions: The best estimate of the total number of collisions.

64 Octets: Number of packets (including bad packets) received that were 64 octets in length.

65 to 127 Octets: Number of packets (including bad packets) received that were between 65 to 127octets in length.

128 to 255 Octets: Number of packets (including bad packets) received that were between 128 to 255 octets in length.

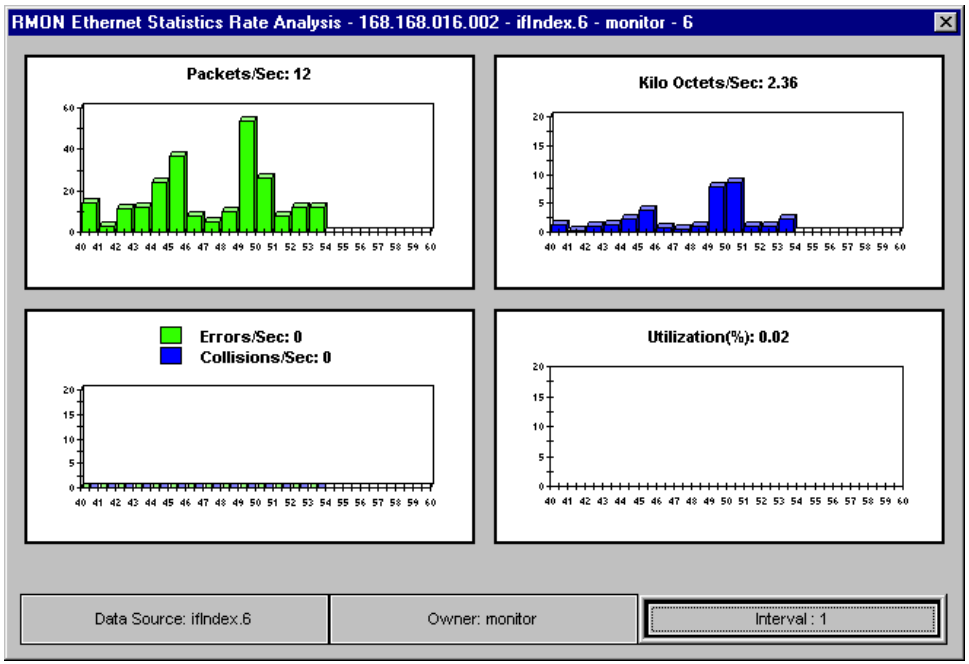
256 to 511 Octets: Number of packets (including bad packets) received that were between 256 to 511 octets in length.

512 to 1023 Octets: Number of packets (including bad packets) received that were between 512 to 1023 octets in length.

1024 to 1518 Octets: Number of packets (including bad packets) received that were between 1024 to 1518 octets in length.

Drop Events: Number of events in which packets were dropped by the monitor due to lack of resources. This is not necessarily the actual count of packets dropped, but the number of times this condition has been detected.

When you select **Ethernet Rate Analysis**, select an entry, and click **OK**, the following screen appears:



Items in this screen are described in the following paragraphs.

Packets/Sec: The average number of packets received per second over the interval.

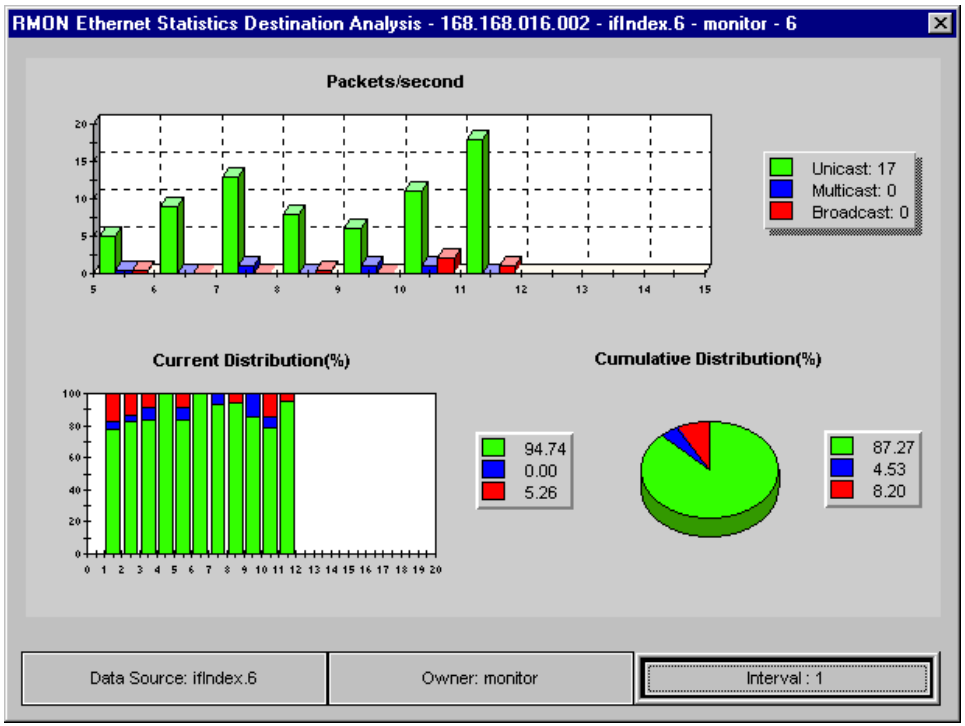
Kilo Octets/Sec: The average number of kilo octets received per second over the interval.

Errors/Sec: The average number of errors per second over the interval.

Collisions/Sec: The average number of collisions that occurred per second over the interval.

Utilization: Indicates the percentage of packets that are transmitted and received compared to overall bandwidth.

When you select **Ethernet Destination Analysis** from the Statistics menu, the following screen appears:



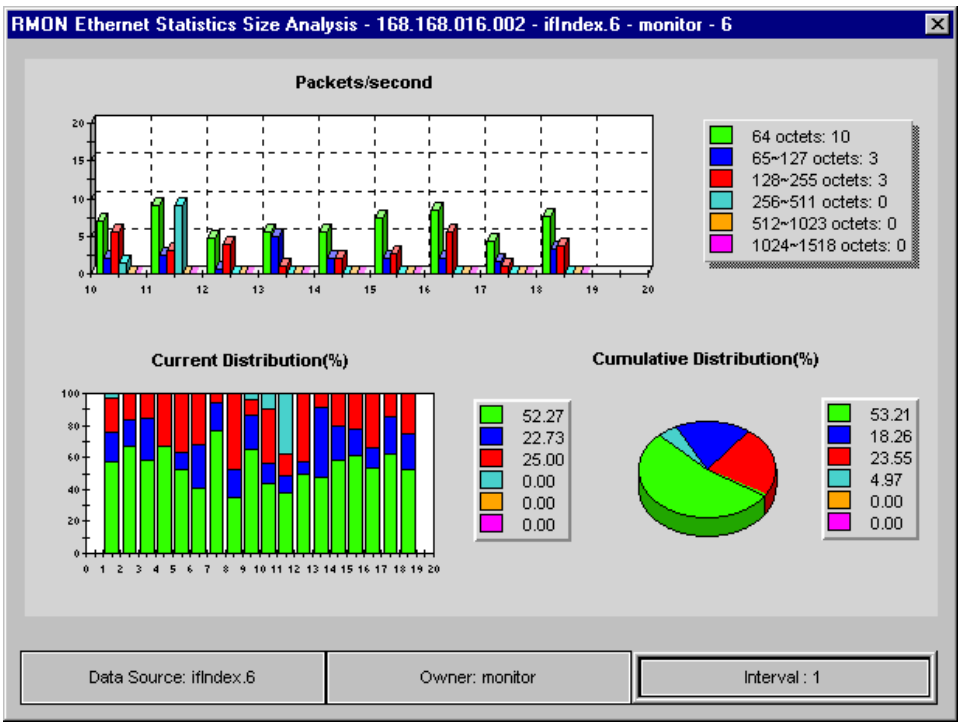
Items in this screen are described in the following paragraphs.

Packets/second: The average number of packets forwarded to three types of destination, including Unicast, Multicast, and Broadcast.

Current Distribution(%): The percentages of the Unicast, Multicast, and Broadcast for each interval.

Cumulative Distribution(%): The percentages of the Unicast, Multicast, and Broadcast accumulated from the time you first monitored this entry.

When you select **Ethernet Packet Size Analysis** from the Statistics menu, the following screen appears:



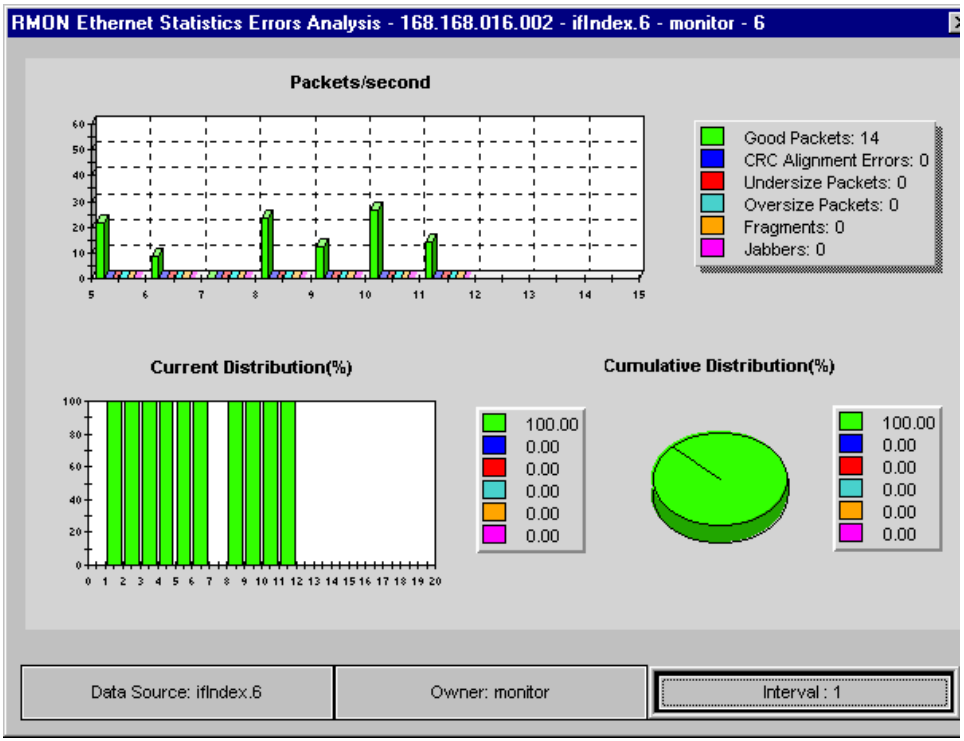
Items in this screen are described in the following paragraphs.

Packets/second: The average number of packets per second over the interval. There are six kinds of octets in the bar chart, including 64, 65-127, 128-255, 256-511, 512-1023, 1024-1518 octets.

Current Distribution(%): The percentages of six kinds of octets over the interval.

Cumulative Distribution(%): The percentages of six types of octets accumulated from the time you first monitored this entry.

When you select **Ethernet Errors Analysis** from the Statistics menu, the following screen appears:



Items in this screen are described in the following paragraphs.

Packets/second: The average of five types of errors per second over the interval, including CRC Alignment Errors, Undersize Packets, Oversize of Packets, Fragments, and Jabbers.

Current Distribution(%): The average percentages of five types of errors over the interval.

Cumulative Distribution(%): The percentages of five types of errors accumulated from the time you first monitored this entry.

Checking Ethernet History

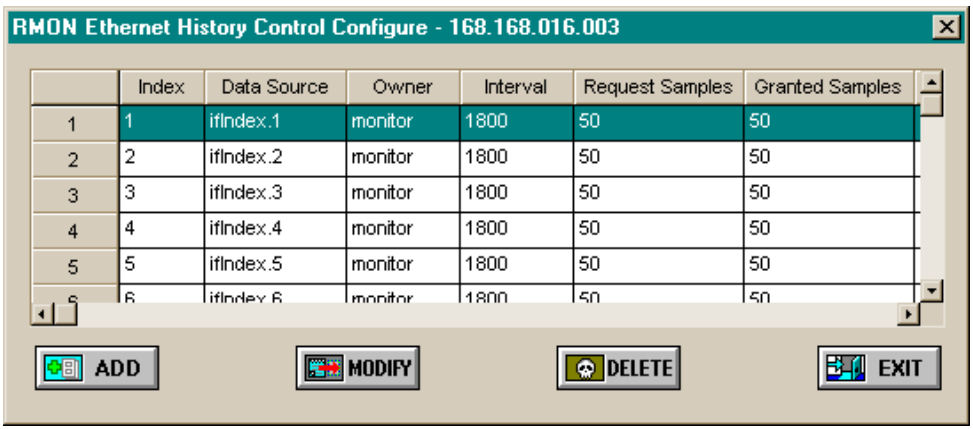
The History operation in the RMON Manager records periodic statistical sampling of data from the network. You can use these samplings to analyze traffic patterns, track trends on a LAN segment, then establish baseline information representing normal parameters.

Creating an Ethernet History Entry

Use the Ethernet History Control Configure option on the History menu to add, modify, or delete a history entry. There are two methods of accessing the Ethernet History Control configure option:

- Select **Ethernet History Control Configure** from the History menu.
- Click **CONFIG** on the other four History screens: Ethernet History Statistics, Ethernet History Rate Analysis, Ethernet History Destination Analysis, and Ethernet History Errors analysis.

In either method, the following screen appears:



Items in this screen are described in the following paragraphs.

Index: A number that uniquely identifies this statistics entry among the various statistics entries configured.

Data Source: This parameter indicates the source of the data that this statistics entry is configured to analyze. This source can be any interface on the connected device. The default parameter is ifIndex.n, where n represents the identical interface. In the FE-DS12 Switch, for example, ifIndex.6 in the table indicates port 6.

Owner: The entity that configured this entry and is therefore using the resources assigned to it.

Interval: The interval, from 1-3600 seconds, between samplings of data. An interval of 1800, for example, means that data is sampled every 1800 seconds (30 minutes). The default interval is 1800 seconds.

Request Samples: The requested number of discrete time intervals over which data is to be saved. When this parameter is modified, the RMON agent sets the number of samplings as close to the requested value as possible.

Granted Samples: The actual number of discrete sampling intervals over which data is to be saved. When the number of samplings reaches the value of the Granted Samples parameter, sampling stops. If you want to delete the oldest samplings so that new samplings can be added, use the Update button in the RMON Ethernet History Counter Statistics screen for this entry (described later in this chapter).

Status: If the status is Valid, the entry is currently operating successfully as configured. If the status is Under Creation, the RMON Manager has not yet been able to add the new entry, and will delete the entry request without further notice. To prevent this, delete any entry whose status is Under Creation then re-create it.

To add, change, or delete a parameter in this screen, click **ADD, MODIFY**, or **DELETE** as applicable.

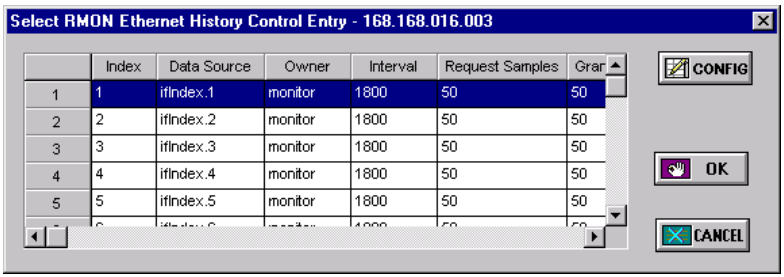
To save the information in this screen and leave the screen, click **EXIT**.

Viewing History Statistics and Analyses

There are four Ethernet history options, which let you view history in both text and graph form:

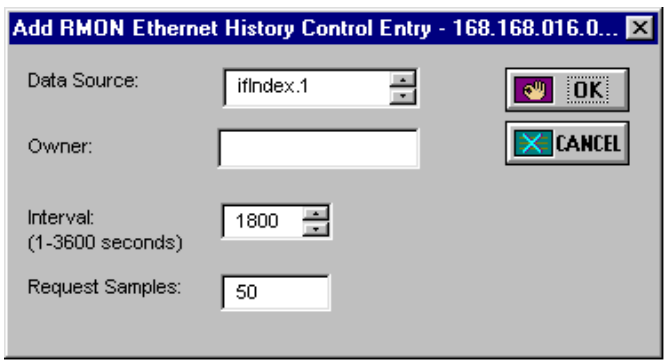
- The Ethernet History Statistics option shows recorded information about traffic through the switch.
- The Ethernet History Rate Analysis, Ethernet History Destination Analysis, and Ethernet History Errors Analysis options show graphical views of information in the Ethernet history table.

When you choose any of these options, the Select RMON Ethernet History Control Entry screen appears.



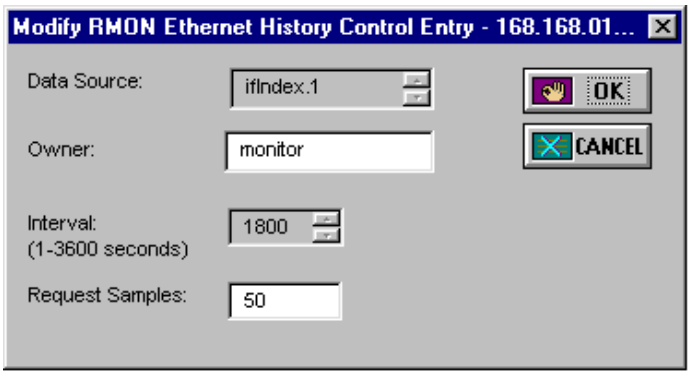
To change a setting, create a history entry, or delete a history entry, click **CONFIG**. The RMON Ethernet History Control Config screen appears as shown earlier under *Creating an Ethernet History Entry*.

To create a new entry, click **ADD**. The following screen appears:



Configure the new entry as described earlier under *Creating an Ethernet History Entry*.

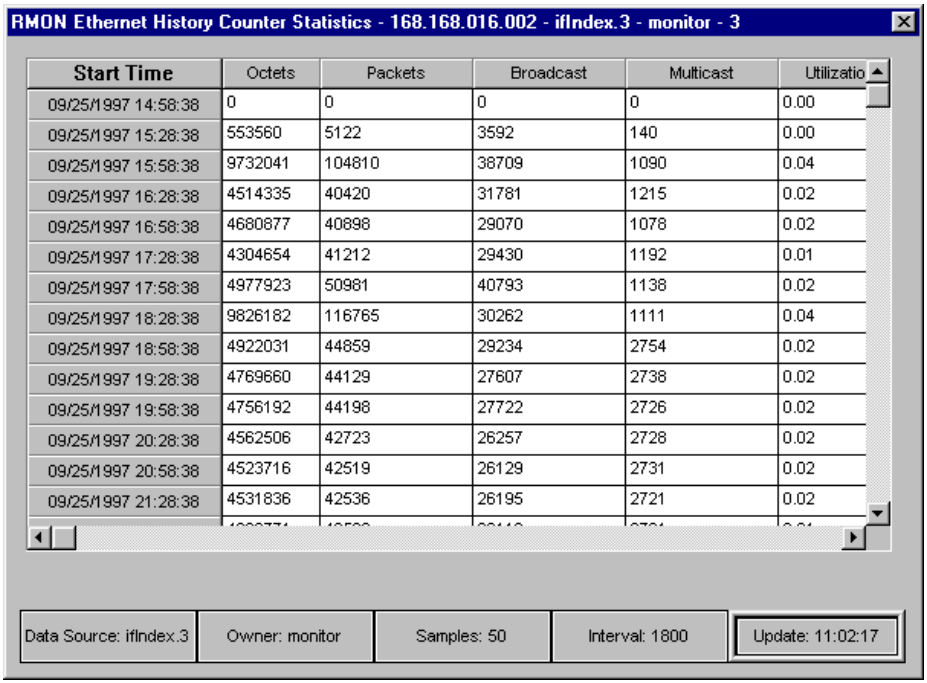
To change the owner or number of requested samples for an existing entry, click **MODIFY**. The following screen appears:



Change the owner name or the Requested Samples number as described earlier under *Creating an Ethernet History Entry.*

To delete an entry, select it from the displayed table, then click **DELETE**. When a message displays asking if you really want to delete this entry, click **Yes**.

When you access the Ethernet History Statistics option, select the entry you created, then click **OK**. The following screen appears:



The counters displayed in this screen show history statistics for the selected entry.

Items in this screen are described in the following paragraphs.

Start Time: The start of the interval over which this sample was measured.

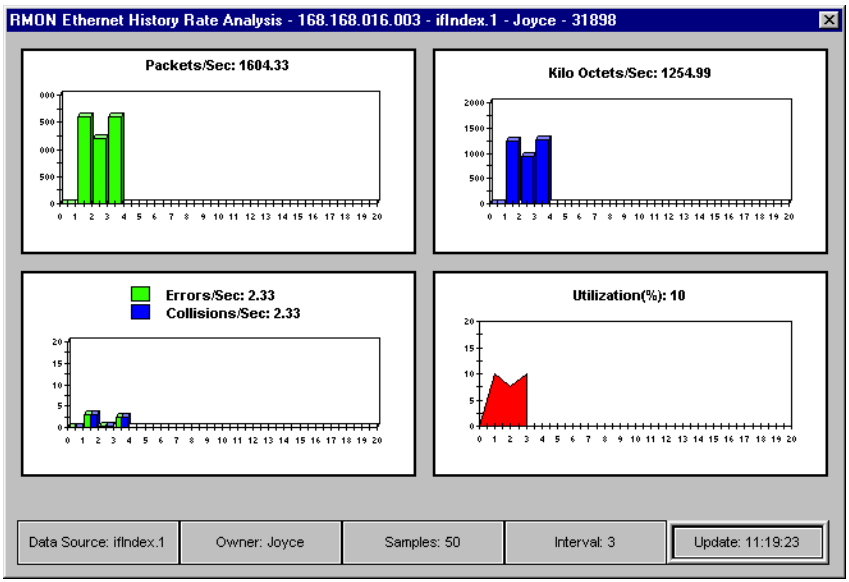
Octets
Packets
Broadcast
Multicast
Utilization

Same as for *Checking Ethernet Statistics*

Drop Events **CRC Align Errors** **Undersize** **Oversize** **Fragments** **Jabbers** **Collisions**	Same as for *Checking Ethernet Statistics*

If you want to delete the oldest samplings of this statistics entry so that new samplings can be added, click **Update**. This screen then displays the latest samples in the amount shown in the Samples button. This Update option is especially useful when a sampling interval is very short and the table changes frequently.

When you select **Ethernet History Rate Analysis**, select an entry, then click **OK**, the following screen appears:



Items in this screen are described in the following paragraphs.

Packets/Sec: Indicates the average number of packets received per second over the interval.

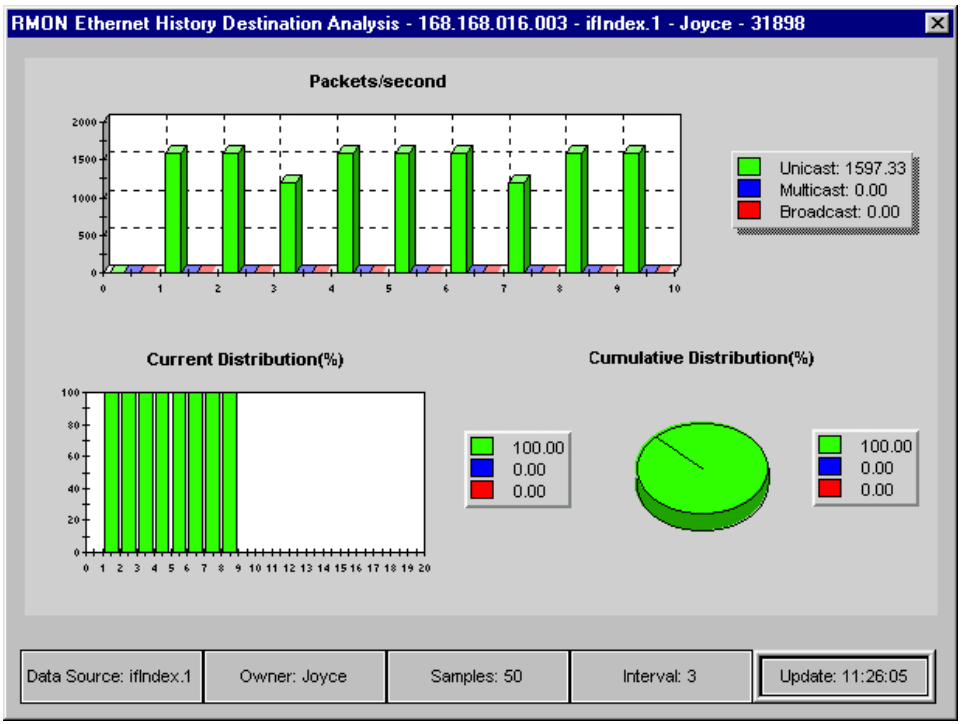
Kilo Octets/Sec: The average number of kilo octets received per second over the interval.

Errors/Sec: The average number of errors occurred over the interval.

Collisions/Sec: The average number of collisions occurred per second over the interval.

Utilization(%): The percentage of packets transmitted and received compared to the overall bandwidth over the interval.

When you select **Ethernet History Destination Analysis**, the following screen appears:



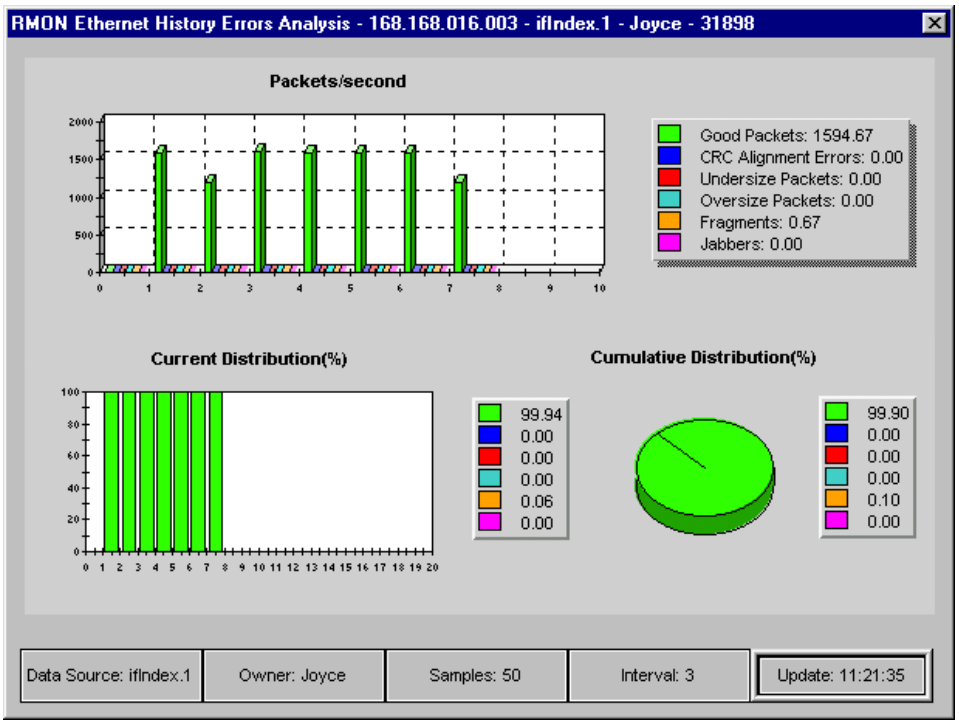
Items in this screen are described in the following paragraphs.

Packets/second: The average number of packets forwarded to three types of destination, including Unicast, Multicast, and Broadcast over the specified interval (the default is 10 seconds).

Current Distribution(%): The percentage of the Unicast, Multicast, and Broadcast for each interval.

Cumulative Distribution(%): The percentage of the Unicast, Multicast, and Broadcast accumulated from the time you first monitored this entry.

When you select **Ethernet History Errors Analysis**, the following screen appears:



Packets/second: The average of five types of errors per second over the interval, including CRC Alignment Errors, Undersize Packets, Oversize of Packets, Fragments, and Jabbers.

Current Distribution(%): The average scale of five types of errors over the interval.

Cumulative Distribution(%): The percentage of five types of errors accumulated from the time you first monitored this entry.

Checking Alarms and Events

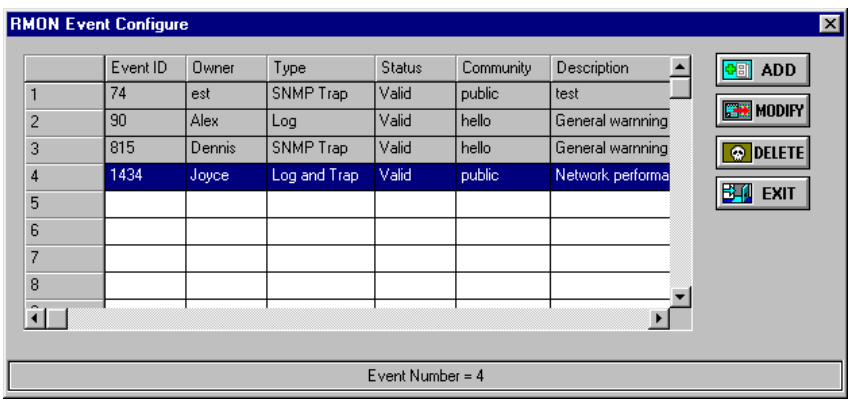
Before you can check alarms and events, you must configure more than one event entry that can trigger an alarm. This entails setting thresholds.

The alarm operation periodically takes statistical samples from the RMON agent and compares them to thresholds that have been set. Through the Event Setup option, the alarm operation can trigger action responses (Event Log entries and/or SNMP traps) through the event operation.

Configuring an Event Entry

Use the Event Configure option in the Alarm & Event menu to add, modify, or delete an event entry.

When you select **Event Configure**, the following screen appears:



Items in this screen are described in the following paragraphs.

Event ID: An integer that uniquely identifies a specific event entry.

Owner: The entity that configured this entry and is therefore using the resources assigned to it.

Type: The action you want the RMON Manager to take when an RMON variable crosses a threshold, including None, Log, SNMP Trap, or Log and SNMP Trap. (In a Log action, an entry is made in the View Log option for each event entry. In an SNMP Trap action, an SNMP trap is sent to one or more management consoles for each event.)

Status: If the status is Valid, the entry is currently operating successfully as configured. If the status is Under Creation, the RMON Manager has not yet been able to add the new entry, and will delete the entry request without further notice. To prevent this, delete any entry whose status is Under Creation then re-create it.

Community: The community of management consoles to receive the trap if an SNMP trap is to be sent.

Description: Allows you to describe the event entry you created. From the **Description** list, select the desired description.

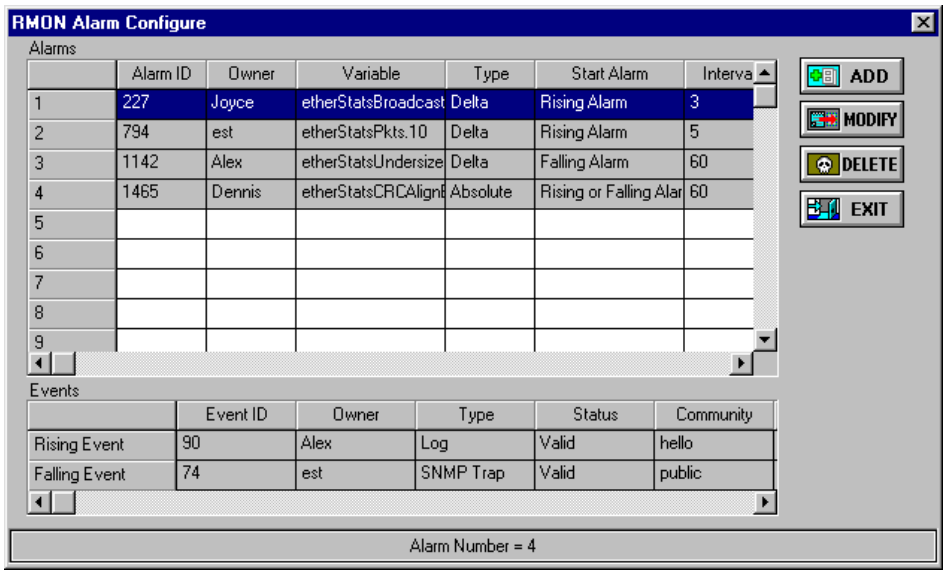
To configure an event entry, click **ADD**. The following screen appears.

The Event ID, Owner, Type, Description, Community, and Status fields are the same as just described for the RMON Event Configure screen.

To save the settings and add the event, click **OK**.

To change or delete an existing event entry from the RMON Event Configure screen, click **MODIFY** or **DELETE**.

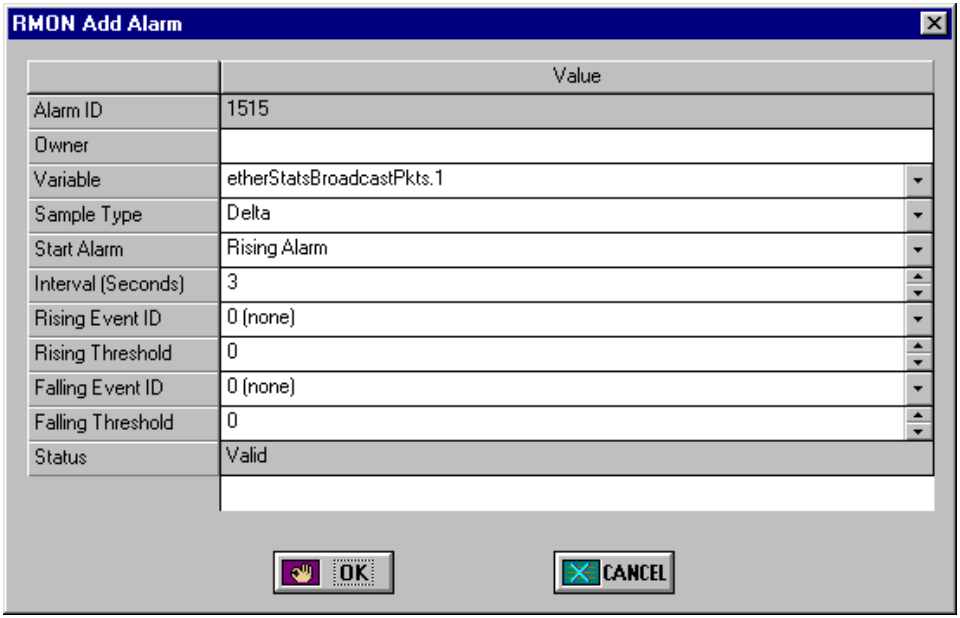
Configuring an Alarm



Use the Alarm Configure option to set thresholds for network performance. For example, an alarm could be generated if there are more than 500 CRC errors (the threshold) in any 5-minute period (the interval).

There are two tables in the Alarm Configure option: Alarms and Events. The upper table is Alarms, which shows you information about the alarm entry. You can add, modify, or delete the alarm entry. The lower table is Events, which shows you information about the event that you have specified for the alarm entry.

To create an alarm entry, click **ADD**. The following screen appears:



Items in this screen are described in the following paragraphs.

Alarm ID: An integer that uniquely identifies a specific alarm entry.

Owner: The entity that configured this entry and is therefore using the resources assigned to it.

Variable: The particular variable (an object identifier in the RMON MIB) to be sampled. Select the desired **Variable** from the list (as shown in the preceding screen. Suppose, for example, that you want to create an alarm for detecting the CRC alignment errors in port 2 on the FE-DS12 Switch. You would:

1. Select the variable “etherStatsCRCAlignErrors.1”.
2. Click **1** and type **2**. The variable then reads “etherStatsCRCAlignErrors.2.”

Instead of choosing the variable from the Variable list, you can type it in the Variable field. To do this, position the mouse cursor in the Variable

field then click. The current variable is highlighted and the cursor changes to an I-beam. Type any MIB variable that is an integer, a counter, a gauge, or a time tick. Press Return when you are finished typing.

A counter example is the total number of bytes received through a port.

A gauge example is the number of output packets in q queue.

A time tick example is the time since an object entered its current state in hundredths of a second.

Sample Type: The method for calculating the value to be compared to the thresholds. Absolute means the value of the selected variable is be compared directly with the thresholds. Delta means the value of the selected variable at the last sample is subtracted from the current value, and the difference is compared to the thresholds.

Start Alarm: Indicates whether an alarm will be generated if the latest sample is greater than or equal to the Rising Threshold, less than or equal to the Falling Threshold, or both.

Interval (Seconds): The interval in seconds over which data is sampled and compared with the rising and falling thresholds. The interval must be an integer greater than 0. The default is 60 seconds.

Rising Event ID: The index of the event entry that is used when the rising threshold is crossed. If you want to generate an event when the Rising Threshold is crossed, select the desired event from the **Rising Event ID** list.

Rising Threshold: The rising threshold for the sampled statistics.

Falling Event ID: The index of the event entry that is used when the falling threshold is crossed. If you want to generate an event when the Falling Threshold is crossed, select the desired event from the **Falling Event ID** list.

Falling Threshold: The falling threshold for the sampled statistic.

Status: If the status is Valid, the entry is currently operating successfully as configured. If the status is Under Creation, the RMON Manager has not

yet been able to add the new entry, and will delete the entry request without further notice. To prevent this, delete any entry whose status is Under Creation then re-create it.

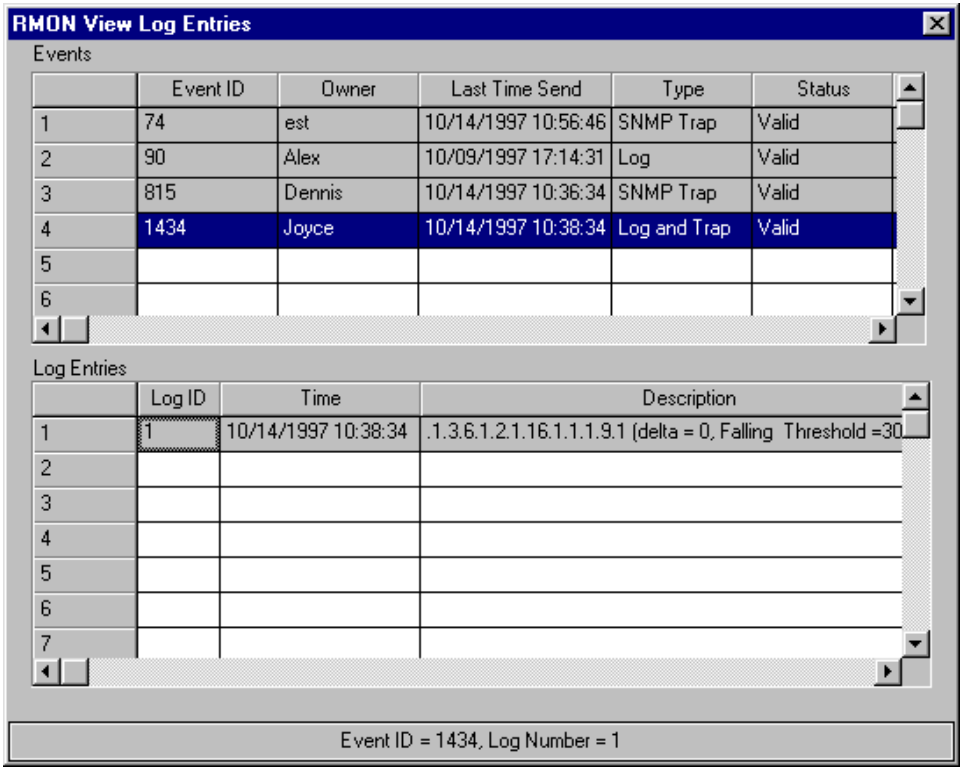
To change an existing alarm entry or its threshold setting:

1. Select the desired entry from the RMON Alarm Configure screen.
2. Click **MODIFY**. The RMON Modify Alarm screen appears, containing all the same parameters as the RMON Add Alarm screen.
3. Change the desired parameters in the same manner as for adding an alarm, described earlier.
4. When changes are completed, click **OK** to save them and return to the RMON Alarm Configure screen.

To delete an existing entry, select it in the RMON Alarm Configure screen, then click **DELETE**.

Viewing Event Log Entries

You can view log entries through the View Log Engries option in the Alarm & Event menu. The Event Log records all events that have been specified to be logged. When you select this option, the following screen appears:



There are two tables: Events and Log Entries. The Events table shows you the index of the event entries you have created. When you select a specific event entry from this table, the Log Entries table shows you the history of the logged entries associated with the event.

Index

E

F

G

H

I

J

K

L

M

N

O

P

R

S

T

U

V, W