

Connectrix Manager

Version 6.03

USER GUIDE

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EMC Corporation

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This publication is intended for data center administrators, LAN administrators, operations personnel, and customer support personnel who administer user access to the Connectrix Manager application.

Organization

Here is an overview of where information is located in this guide.

Chapter 1, *Introduction*, provides a brief introduction to the Connectrix Manager application, and its function and features.

Chapter 2, *Connectrix Manager and Server Administration*, provides steps for logging in to and exiting the Connectrix Manager, setting up remote workstations to access the Connectrix service processor, administering user access to the Connectrix Manager, and configuring SNMP traps.

Chapter 3, *Using the Connectrix Manager*, provides instructions for using the Connectrix Manager window to access management, administrative, and monitoring functions. It includes information on using the features of the main windows, and accessing the Product Manager application.

Chapter 4, *Using the Fabrics View*, provides information on accessing the Topology view and the Zone Set view, and explains how to use the features of Fabrics view for managing fabrics.

Chapter 5, *Fabric Zoning*, describes the fabric zoning feature, which enables you to partition devices attached to switches and directors into groups called zones. It includes a reference table of zoning tasks and procedures.

Chapter 6, *Product Administration and Status*, covers administering products to work with the Connectrix Manager, determining product status, configuring e-mail notification for product events, configuring the call-home feature, testing remote notification, configuring link-down events, and configuring Nicknames.

Chapter 7, *Connectrix Manager Logs*, explains how to access and understand the Connectrix Manager's Audit Log, Event Log, Session Log, Product Status Log, and Fabric Log. It also explains how to export log files.

Appendix A, *Configuring Remote Workstations*, describes how to download and install the Connectrix Manager for Windows systems.

Appendix B, *Connectrix Service Processor SNMP Agent*, describes how to use SNMP to manage information stored in the Connectrix service processor.

The *Glossary* defines terms, abbreviations, and acronyms used in this manual.

An *Index* is also provided.

Related Documentation

Related documents include:

- ◆ *Connectrix v6.03 2 Gb/s Enterprise Storage Network System Planning Guide*, P/N 069001208
- ◆ *Connectrix DS-16M Fibre Channel Switch User Guide*, P/N 069001080
- ◆ *Connectrix DS-16M2 Fibre Channel Switch User Guide*, P/N 069001175
- ◆ *Connectrix DS-24M2 Fibre Channel Switch User Guide*, P/N 069001203
- ◆ *Connectrix DS-32M Fibre Channel Switch User Guide*, P/N 069001081
- ◆ *Connectrix DS-32M2 Fibre Channel Switch User Guide*, P/N 069001206
- ◆ *Connectrix ED-64M Fibre Channel Director User Guide*, P/N 069001096
- ◆ *Connectrix ED-64M 2 Gb Fibre Channel Director User Guide*, P/N 069001204
- ◆ *Connectrix ED-140M Fibre Channel Director User Guide*, P/N 069001202

Conventions Used in this Guide

EMC uses the following conventions for notes, cautions, warnings, and danger notices.

A note presents information that is important, but not hazard-related.



CAUTION

A caution contains information essential to avoid data loss or damage to the system or equipment. The caution may apply to hardware or software.



WARNING

A warning contains information essential to avoid a hazard that can cause severe personal injury, death, or substantial property damage if you ignore the message.

Typographical Conventions

This document uses the following type style conventions:

Palatino	◆ Normal text
Palatino, bold	◆ Dialog box, button, icon, and menu items
	◆ Selections you make from the user interface, including buttons, icons, and field names
<i>Palatino, italic</i>	◆ New terms or unique word usage
	◆ Book titles when used in cross references
Courier	System prompts and displays; file content
Courier, bold	User entry.
Courier, italic	Variables in user input or screen/file output.
AVANTGARDE	Keystrokes.

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Introduction

This chapter presents an overview of the features of the Connectrix Manager. The chapter contains the following sections:

- ◆ Introduction to Connectrix Management 1-2
- ◆ Connectrix Manager Overview 1-5
- ◆ Product View 1-7
- ◆ Summary of Connectrix Management Operations 1-9

Introduction to Connectrix Management

The Connectrix Management system is a Client/Server application that runs on the Connectrix service processor. The Client can also run on remote workstations on the network. Up to eight concurrent remote users (in addition to the local Connectrix service processor user) can log in to the Connectrix Management application.

For details on configuring remote workstations, refer to Appendix A.

Subsequent references in this document to the Connectrix Manager imply the Connectrix Manager Client application unless otherwise noted.

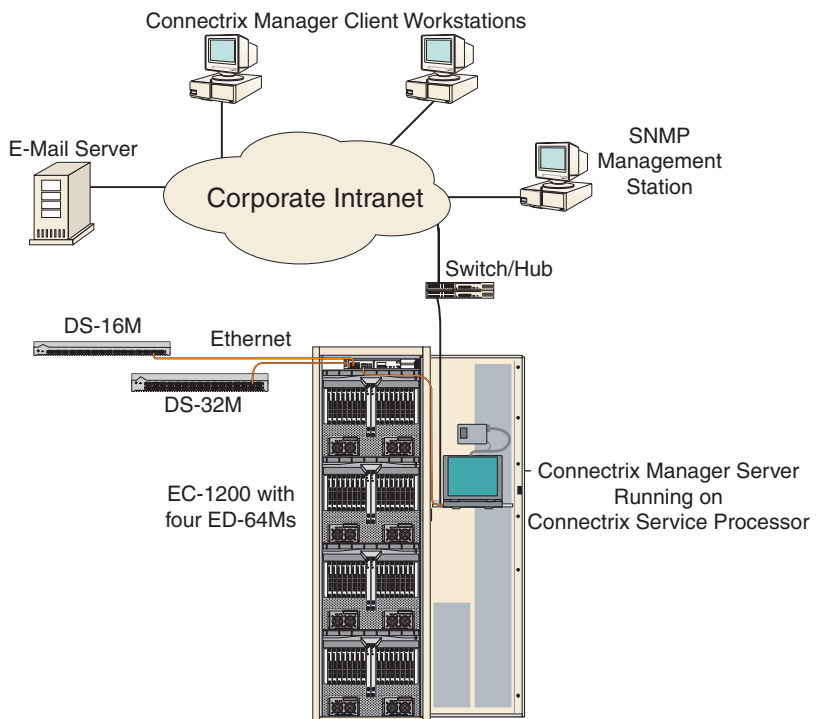


Figure 1-1 Connectrix Service Processor and Remote Workstation Configuration

Connectrix Management Components

The Connectrix Management system is a Java-based graphical user interfaces (GUIs) that provides local access to managed products. The management system is composed of the Connectrix Manager and Product Manager.

The Connectrix Manager and Product Manager are separate applications; however, the Product Manager is accessible only through the Connectrix Manager.

Access Method

The recommended access method to Connectrix Manager uses dual Ethernet adapters (configured in the Connectrix service processor in the EC-1200 cabinet), where:

- ◆ Adapter 1 (the primary adapter) is connected to the customer's intranet, providing access by remote workstations.
- ◆ Adapter 2 (the secondary adapter) links the Connectrix Directors and switches with the Connectrix service processor over a private network.

The EC-1200 ships from the factory with this configuration, which should not be changed unless absolutely necessary. If this is a requirement, contact your EMC Global Services Representative for further information.

Figure 1-1 on page 1-2 shows an example of the dual Ethernet configuration.

Connectrix Service Processor

The Connectrix service processor is a laptop PC platform that provides a central point of control for managed Fibre Channel products. The Connectrix service processor is required for installing, configuring, and managing these products.

Although products can perform normal operations without a Connectrix service processor, the service processor should operate at all times to monitor product operations, report failures, log event and configuration changes, and call home to the EMC Support Center.

Automatic Data Backup

Backup and restoration of critical Connectrix Manager data on the Windows NT system is provided by the Iomega QuikSync application on the Connectrix service processor. QuikSync automatically mirrors the contents of the `EfcData` directory (which contains the Connectrix Manager data) to the attached Zip drive any time the contents of that directory change or the server is rebooted.

Whenever you make a configuration change, add or remove a managed product, or make any other changes through the Connectrix Manager or Product Manager, the data is backed up automatically. (The existing backup file is updated; no separate versions of the backup file are maintained.)

Refer to *Automatic Data Backup* on page 2-17 for more information on data backup.

Connectrix Manager Overview

Figure 1-2 shows the an example of the Connectrix Manager window.

Refer to *Running the Connectrix Manager* on page 3-2 for instructions on starting and logging in to the Connectrix Manager.

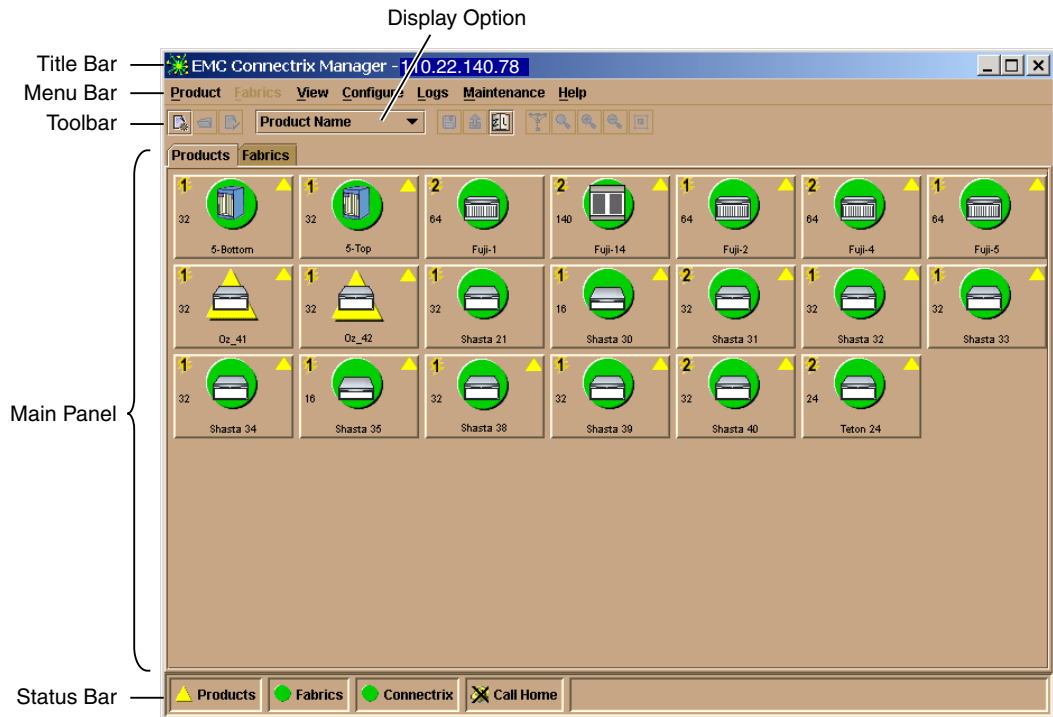


Figure 1-2 Connectrix Manager Main Window

The major components of the Connectrix Manager window are:

- ◆ Microsoft Windows title bar.
- ◆ Menu Bar — Contains menus of administrative tasks for the Connectrix Manager. Refer to *Using the Menu Bar Functions* on page 3-5.
- ◆ Toolbar — Contains icons for quick access to frequently used menu items.
- ◆ Main Panel — Has two tabs available at the top left for selecting a view: Products and Fabrics. Refer to *Using the Main Panel Views* on page 3-16 for more information.
- ◆ Status Bar — Contains icons that indicate product status, fabric status, call-home status, and server status, as well as a text area for messages. Refer to *Using the Connectrix Manager Status Bar* on page 3-19 for more information.

Product View

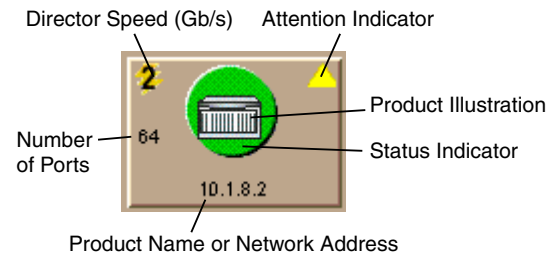
Sort Options

This option displays additional options for displaying product icons.

- ◆ **By Name** — Arrange icons alphabetically, by product name.
- ◆ **By Severity** (Default) — Arrange icons according to the product's operating status. Failed products appear first, followed by products with degraded, then unknown, then fully operational status. Within these groupings, icons appear alphabetically by their network address (IP address or DNS host name) or product name, depending on the selected display option.

Product Icons

Information in each product icon includes the following:



Object descriptions:

- ◆ Director data speed, 1 Gb/s (ED-64M only) or 2 Gb/s, is configured through the Product Manager application for a specific ED-64M. (The ED-140M and DS-24M2 always run at 2 Gb/s.)
- ◆ Attention indicator — A yellow triangle means that product requires attention. Open the Product Manager application for the director by double-clicking on the icon to find out more information.
- ◆ Product name or network address — You can determine which appears by right-clicking on the open area away from the product icons and selecting **Display Options** from the pop-up menu.

Whichever identifier appears, you can display a pop-up window with the other identifier by moving the cursor over the product icon.

- ◆ Status indicator (the symbol behind the product illustration):
 - A red and yellow diamond means that the product has failed and requires immediate service.
 - A yellow triangle means that the product is degraded, but is still performing as designed.
 - A green circle means that the product is fully operational.
 - A grey square means that the Connectrix Manager cannot determine product status.
 - If a status symbol does not display behind the product, the product is not managed by the Connectrix service processor to which you are logged in.

The most critical status reflected by a product in the view is also reflected in the **Products** status box in the left corner of the Connectrix Manager window.

Summary of Connectrix Management Operations

This section summarizes the operations available through the Connectrix Manager and Product Manager.

Connectrix Manager

This section describes the menu bar and toolbar on the main Connectrix Manager window.

Menus

Menus and the options on them are described in greater detail under *Using the Menu Bar Functions* on page 3-5 and the specific sections identified in the lists:

Product

Options on the Product menu are:

- ◆ **New** — Allows you to add a product to be managed by the Connectrix Manager and to assign a network address to the new product. Refer to *Adding a Product* on page 6-2.
- ◆ **Open** — Allows you to open the Product Manager for a specific switch. Refer to *Opening a Product Manager* on page 3-22.
- ◆ **Delete** — Allows you to delete a product's icon from the display. Refer to *Deleting a Product* on page 6-3.
- ◆ **Modify** — Allows you to change the network address that appears under a product icon. Refer to *Modifying a Product* on page 6-3.
- ◆ **Properties** — Displays a list of properties for the managed product. Refer to *Displaying Product Properties* on page 6-4.
- ◆ **Logout** — Allows you to log out of the Connectrix Manager. Refer to *Logging Out* on page 3-4.
- ◆ **Exit** — Allows you to close the Connectrix Manager. Refer to *Exiting the Connectrix Manager* on page 3-4.

Fabrics

Options on the Fabrics menu are:

- ◆ **Rename** — Allows you to rename a *persistent fabric*. This option is only available if the fabric is persisted.
- ◆ **Persist Fabric Topology** — Allows you to save a *snapshot* of the fabric's current configuration (switches, directors, and ISLs) in the Fabrics view, including the location of the icons in the view. This snapshot is applied to all clients.

- ◆ **Unpersist Fabric Topology** — Allows you to remove the *grouped* status of a configuration that was persisted.
- ◆ **Export Fabric Topology** — Allows you to export the current fabric topology to an XML-formatted file. Refer to *Exporting the Fabric Topology* on page 4-6 for more information.
- ◆ **Show Route** — allows you to view the path Fibre Channel frames must take between two end devices in a multiswitch fabric. Refer to *Viewing Routes* on page 6-11.
- ◆ **Hide Route** — allows you to remove a route currently displayed in the Topology tab view area.
- ◆ **Show Zone Members** — Displays the members of a zone. Refer to *Viewing Zone Members* on page 5-23.
- ◆ **Show View Port** — Displays a separate view of the entire fabric that is in the Topology view.

You can drag the view port to enlarge it. Click inside the view port, and move the cursor in any direction to adjust what you see in the Topology view. The view port makes navigation easier when a large fabric is displayed in the Topology view.

- ◆ **Show Fabric Tree** — Displays a hierarchical list of the components of the fabric displayed in the main panel.
- ◆ **Enterprise Fabric Mode** — (applicable only if Enterprise Fabric Extensions option is installed) Automatically enables features and operating parameters that are necessary in multiswitch enterprise fabric environments.
- ◆ **Fabric Binding** — (applicable only if Enterprise Fabric Extensions option is installed) Allows or prohibits switches and directors from merging with a selected fabric.

Fabric binding allows users to specify the specific switches that are allowed to participate in a fabric. The fabric maintains a shared Fabric Binding Membership List that can be automatically constructed via the Fabric Binding GUI interface. Once fabric binding is activated throughout the fabric, users allow additional switches to join the fabric by simply adding switch WWN and Domain ID information to the Membership List. The Fabric Binding feature utilizes ANSI-approved EFMD commands, allowing interoperability with other switch vendors.

View

Options on the View menu are:

- ◆ **User Sessions** — Displays a list of all the current management sessions, including the name of each user connection, the network address of the user, and the time when the connection was established.
- ◆ **Zoom** — Allows you to increase or decrease the size of fabric elements.
- ◆ **Arrange Icons** — Allows you to modify the display to show the product icons in order of either product name or by status. (Refer to *Display Options* on page 3-13.)
- ◆ **Layout Icons** — Allows you to shorten the length of the ISLs in the view area and *spring* in the product icons closer together (by selecting **Spring**) or display the fabric in a more spread out, circular layout (by selecting **Circular**).
- ◆ **Center in Topology** — Allows you to center a product icon in the view area.
- ◆ **Refresh Topology** — Allows you to refresh the topology in the view area.
- ◆ **Clear ISL Alert** — Allows you to clear any outstanding alerts for a selected ISL.
- ◆ **Clear All ISL Alerts** — Allows you to clear any outstanding alerts for all ISLs in a persisted fabric. (Refer to *Persisted Fabrics* on page 4-17.)
- ◆ **Enable Fly Over Display** — Allows you to display additional information when you pass the cursor over an icon.

Configure

Options on the Configure menu are:

- ◆ **Users** — Lists current users who can access the Connectrix service processor and enables the system administrator to add or delete users, modify information for existing users, and establish or display user rights. Refer to *Administering Users* on page 2-4.
- ◆ **Nicknames** — Allows you to configure a *nickname*, which is a name assigned to a WWN. Refer to *Configuring Nicknames* on page 5-37.

- ◆ **Sessions** — Allows you to permit or prohibit access to the Connectrix service processor from remote user workstations. Refer to *Modifying Connectrix Service Processor Session Parameters* on page 2-12.
- ◆ **SNMP Agent** — Allows you to enable the SNMP agent that runs on the Connectrix service processor and to enable *authorization traps*. Refer to *Configuring the SNMP Agent* on page 2-15.
- ◆ **Activate zone set** — Allows you activate a zone set. Refer to *Activating a Zone Set* on page 5-16.
- ◆ **Zoning Library** — Allows you to perform most zoning configuration. Refer to *Zoning Library* on page 5-7.
- ◆ **Advanced Zoning** — Allows you to deactivate a zone set or enable/disable the default zone. Refer to *Deactivating a Zone Set* on page 5-29 and *Enabling/Disabling the Default Zone* on page 5-35.

Logs

Options on the Logs menu are:

- ◆ **Audit Log** — Contains a history of user actions performed through the Connectrix Manager. Refer to *Audit Log* on page 7-3.
- ◆ **Event Log** — Lists errors related to Connectrix Manager operation. Refer to *Event Log* on page 7-5.
- ◆ **Session Log** — Lists the users that have logged in and logged out of the Connectrix service processor. Refer to *Session Log* on page 7-7.
- ◆ **Product Status Log** — Records the operational status changes of each managed product. Refer to *Product Status Log* on page 7-8.
- ◆ **Fabric Log** — Records all the significant changes that have occurred in the managed fabric.

Maintenance

Options on the Maintenance menu are:

- ◆ **Configure E-Mail** — Allows you to configure network addresses for administrators or others who should receive notification of product events through e-mail, and to enable e-mail notification. Refer to *Configuring E-mail Notification for Events* on page 6-7.
- ◆ **Test Remote Notification** — Allows you to test the e-mail notification and the call-home feature. Refer to *Testing Remote Notification* on page 6-9.

- ◆ **Configure Ethernet Events** — Allows you to configure Ethernet events and enable notification for all Product Managers. Refer to *Configuring Ethernet Events* on page 6-10.
- ◆ **Configure Call Home Event Notification** — Enables/disables the call-home feature. Refer to *Enabling Call-Home Event Notification* on page 6-6.

Toolbar Options

Toolbar options are described in greater detail under *Using the Toolbar Functions* on page 3-12 and the specific sections identified in the lists:

- ◆ **New Product** — Allows you to add a new product icon. Refer to *Adding a Product* on page 6-2.
- ◆ **Open Product** — Allows you to open the Product Manager for a product. Refer to *Opening a Product Manager* on page 3-22.
- ◆ **Properties** — Allows you to display a list of properties for a product or fabric. Refer to *Displaying Product Properties* on page 6-4.
- ◆ **Display Options** — Allows you to select the type of identifier that appears under each product icon. Refer to *Display Options* on page 3-13.
- ◆ **Persist Fabric Topology** — Allows you to save a *snapshot* of the fabric's current configuration (switches, directors, and ISLs) in the Fabrics view. Refer to *Persisted Fabrics* on page 4-17.
- ◆ **Export Fabric Topology** — Allows you to save a fabric topology to an XML file. Refer to *Exporting the Fabric Topology* on page 4-6.
- ◆ **Show Zoning Library** — Allows you to perform most zoning configuration. Refer to Chapter 5.
- ◆ **Layout Icons** — Refreshes the display, using the setting selected (**Circular** or **Spring**) for **Layout Icons** on the View menu (described under *View* on page 1-11).
- ◆ **Show View Port** — Allows you to display a separate view of the entire fabric that is in the Topology view.
- ◆ **Zoom In, Zoom Out** — Allow you to make the fabric display larger or smaller.
- ◆ **Fit Topology in View** — Allows you to display the entire fabric in the Topology view. Note that for larger fabrics, text and icons may be difficult to see.

Product Manager

This section describes the menu bar and view tabs on the main Product Manager window. The operations described here are documented in greater detail in the switch-specific user guides.

Where the word *switch* is used, it applies to both directors and switches.

Menus

The menu bar consists of these menus:

Product

Options on the Product menu are:

◆ **Port:**

- **Port Properties** — Displays information about the port.
- **Node Properties** — Displays information about the node attached to the port.

This function is not available on the DS-24M2.

- **Port Technology** — Displays hardware information about the port and its cable connection.
- **Block Port** — Allows you to block port transmission.
- **Enable Beaconing** — Allows you to make the amber LED by the port blink on the actual switch and the amber indicator blink for the port in the Hardware view.
- **Diagnostics** — Is used by service personnel to run an internal loopback and external loopback test on the port.
- **Channel Wrap** (S/390 Mode only) — Allows a channel wrap test to be initiated from an attached host or device.
- **Swap Ports** (S/390 mode only) — Allows you to swap addresses between ports.
- **Clear Link Incident Alert(s)** — Allows you to clear the attention indicator on the Hardware view, the Port List view, and the Performance view.
- **Reset Port** — Allows you to reset the link on a port.
- **Port Binding** — Allows you to enable or disable port binding.
- **Clear Threshold Alert(s)** — Allows you to clear threshold alerts.

- ◆ **FRU:**
 - **Open Port Card View** — Opens the port card view.
 - **FRU Properties** — Displays a Properties window for the port card.
 - **Enable Beacons** — Allows you to enable or disable beacons for the card.
 - **Block All Ports** — Allows you to block all ports on the selected card.
 - **Unblock All Ports** — Allows you to unblock all ports on the selected card.
 - **Diagnostics** — Is used by service personnel to run internal loopback and external loopback tests on port card ports.
- ◆ **Clear System Error Light** — Turns off the amber system error LED, located below the green power LED on the front of the director.
- ◆ **Enable Unit Beacons** — Causes a system error light on the front of the director to blink, to help users locate the actual unit in an equipment room.
- ◆ **Properties** — Displays such information as the director name, description, location, and contact person.
- ◆ **Close** — Closes the Product Manager window.

Configure

Options on the Configure menu are:

- ◆ **Identification** — Allows you to specify information that will appear in the identification table at the top of the Hardware view and in the Connectrix Manager Products view.
- ◆ **Operating Parameters** — Allows you to set the following Fibre Channel and fabric operating parameters:
 - Switch parameters:
 - **Operating Mode** (S/390 or Open Systems) (not available on the DS-24M2)
 - **Domain ID**
 - **Rerouting Delay**
 - **Director Speed** (ED-64M only)
 - **Insistent**
 - **Domain RSCNs**

- Fabric parameters:
 - **BB_Credit** (Buffer-to-Buffer Credit) (not available on the DS-24M2)
 - **R_A_TOV** (Resource Allocation Time Out Value)
 - **E_D_TOV** (Error Detect Time Out Value)
 - **Switch Priority**
 - **Interop Mode**
- ◆ **Switch Binding** — Allows users to restrict connections to an individual switch, for either E_Port connections, F_Port connections, or all connections. Users can automatically create the Switch Binding Membership List by enabling the feature after device and switch connections have been established. They can then attach new devices to the switch by simply adding device WWNs to the Membership List via the Connectrix Manager Product Manager interface or Telnet interface.
- ◆ **Ports** — Allows you to configure extended distance buffering for 10 to 100km, and enable LIN alerts for each port. You can also provide a name, block or unblock operation, define a port type (E_Port, F_Port, or G_Port), and set the port's operating speed (1Gb/s, 2Gb/s, Negotiate).
- ◆ **Addresses** (S/390 mode only) — Allows you to configure a name, blocked/unblocked state, and prohibited/allowed connection attributes for a port. You can also activate, modify, or delete existing address configurations.
- ◆ **SNMP Agent** — Allows you to configure network addresses and community names for up to six SNMP trap recipients.
- ◆ **Management Server** — Allows you to configure the open systems inband management program to function with the director. (The Open Systems Management Server feature must be installed in order to perform this procedure.)
- ◆ **Features** — Allows you to validate an installed feature for use.
- ◆ **Date/Time** — Allows you to set the date and time on the switch, and to set the switch to synchronize with the date and time on the Connectrix service processor.
- ◆ **Threshold Alerts** — Allows you to configure threshold alerts for ports. A threshold alert notifies users when the transmit (Tx) and/or receive (Rx) throughput reaches specified values for specific director ports or port types (E_Ports or F_Ports).

- ◆ **Export Configuration Report** — Allows you to save an ASCII text file containing all current user-definable configuration options in a printable format.
- ◆ **Enable Web Server** — Allows you to enable the Embedded Web Server interface on the switch.
- ◆ **Enable Telnet** — Allows you to enable Telnet access to the switch.

Logs

Options on the Logs menu are:

- ◆ **Audit Log** — Provides a record of all configuration changes made on the director.
- ◆ **Event Log** — Provides a record of significant events that have occurred on the director, such as hardware failures, degraded operation, and port problems.
- ◆ **Hardware Log** — Displays information on FRUs inserted and removed from the director/switch.
- ◆ **Link Incident Log** — Displays the most recent incidents with their date and time, port number, and description of the incident.
- ◆ **Threshold Alert Log** — Provides notifications of threshold alerts, including date and time each alert occurred, port for which the alert is configured, and type of alert (transmit throughput, receive throughput, or both).

Maintenance

Options on the Maintenance menu are:

- ◆ **Port Diagnostics** — Is used by service personnel to run internal and external loopback tests on ports.
- ◆ **Swap Ports (S/390 mode only)** — Allows you to swap one port address with another.
- ◆ **Data Collection** — Allows you to collect maintenance data into a file. This file is used by support personnel to diagnose system problems.
- ◆ **IPL** — Allows you to initiate an Initial Program Load on the director.
- ◆ **Set Online State** — Allows you to change the on-line state of the director to off line or on line.

- ◆ **Firmware Library** — Displays all firmware versions currently installed on the Connectrix service processor that can be downloaded to switches.
- ◆ **Enable E-Mail Notification** — Allows you to enable e-mail notification for a specific switch.
- ◆ **Enable Call Home Notification** — Allows you to enable the call-home function for the switch.
- ◆ **Backup & Restore Configuration** — Allows you to save the product configuration stored on a director to the Connectrix service processor hard disk or to restore the product configuration from the Connectrix service processor (to a director with the same IP address as the one that was backed up).
- ◆ **Reset Configuration** — Allows you to reset all switch configuration data back to the factory defaults.

Help

Options on the Help menu are:

- ◆ **Contents** — Displays online help for the Product Manager.
- ◆ **About** — Displays the version number for the Product Manager and copyright information.

Connectrix Manager and Server Administration

This chapter contains the following information and procedures:

- ◆ Accessing Remote Connectrix Service Processors2-2
- ◆ Administering Users.....2-4
- ◆ Managing Access to the Connectrix Service Processor2-10
- ◆ Modifying Connectrix Service Processor Session Parameters ..2-12
- ◆ Configuring the SNMP Agent.....2-15
- ◆ Automatic Data Backup2-17

Accessing Remote Connectrix Service Processors

To log in to a remote Connectrix service processor, follow the steps in this section.

1. If you are not already logged in to the Connectrix Manager on another Connectrix service processor, go to step 3.

If you *are* logged in to another Connectrix service processor, move the cursor over the **Logout/Exit** icon and click **Logout** on the pop-up menu. This logs you out and displays the Login window (Figure 2-1).

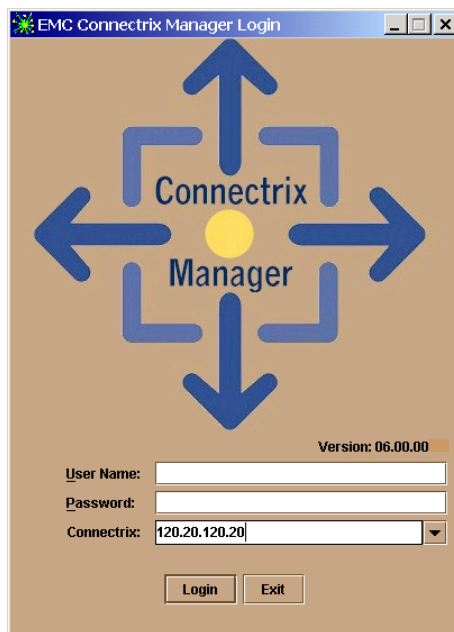


Figure 2-1 Connectrix Manager Login Window

2. Enter your user name and password (both are case-sensitive) into the appropriate fields of the Connectrix Manager Login window (Figure 2-1).

If user names have not been established, you can use the default user name (**Administrator**) and password (**password**). EMC recommends changing the default password as soon as possible.

3. Enter or select a valid Connectrix service processor IP address or DNS host name in the **Connectrix** field.
4. Click **Login**.

If the Connectrix Manager window appears, you have logged in to the service processor. The network address you entered will remain in the Connectrix service processor list for future logins.

If you fail to connect to the Connectrix service processor, the network address will not remain in the list.

Refer to Appendix A for further information on remote workstations.

Administering Users

To grant access to the Connectrix Manager, the administrator can assign user names, passwords, and access rights to users. The administrator can configure up to 32 users in the Connectrix Manager, but no more than nine users (including the local user) can simultaneously access one Connectrix service processor.

User Rights

Specific levels of access (called *user rights*) are assigned to Product Manager users by the Connectrix Manager's system administrator in the Connectrix Manager application.

The Connectrix Manager's system administrator has *view rights only* while actually operating in a specific Product Manager application. Conversely, a Product Manager's product administrator has *view rights only* while operating in the Connectrix Manager application.

Any or all of four levels of user rights can be assigned to specific users:

- ◆ *System Administrator*
- ◆ *Product Administrator*
- ◆ *Maintenance*
- ◆ *Operator*

By default, all users have *view rights*, which allow for the viewing of configurations but not the changing of configurations. *View rights* cannot be removed.

The user(s) with System Administrator rights can make all control and configuration changes implemented through the Connectrix Manager application.

User Rights for Specific Functions

Table 2-1 lists the specific functions available to Connectrix Manager users. If a user does not have the right to perform a specific operation, a `Not Authorized` message appears when the operation is attempted.

Table 2-1 User Rights for Connectrix Manager Functions

Rights	System Administrator	Product Administrator	Maintenance	Operator
Clear Logs	X			
Configure Call-Home Event Notification	X		X	
Configure Email			X	
Configure Ethernet Events	X		X	
Configure Nicknames	X			
Configure Product	X			
Configure Session Options	X			
Configure SNMP	X			
Configure User	X			
Configure Zoning	X			
Display Options	X		X	X
Export Fabric Topology	X			
Export Logs	X			
Fabric Zoom	X			
Persist Fabric	X			
Remote Notification			X	
Show Route	X			
Show zone	X			
View Logs	X			X

Configuring User Rights

Follow these steps to view and modify user rights:

1. From the Configure menu, select **Users**. This displays the Configure Users dialog box (Figure 2-2).

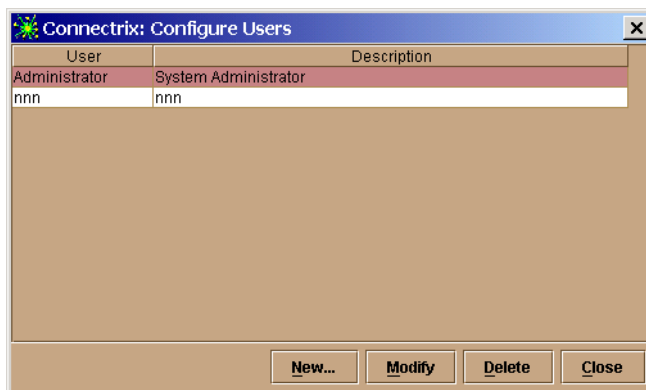


Figure 2-2

Configure Users Dialog Box

Use the appropriate buttons along the bottom of the dialog box to administer users.

2. Select a user from the **User** column.
3. Click **Rights**. This displays a list of rights assigned to the user.
4. Click **Close** to close the User Rights window.
5. Click **Close** to close the Configure Users dialog box.

Adding a New User

Use the New User dialog box (Figure 2-3) to create new users for the Connectrix Manager. Assign a user name, a password, and certain permissions (*rights*) to each user configured.

1. From the Configure menu, select **Users**. This displays the Configure Users dialog box (Figure 2-2).
2. Click **New**. This displays the New User dialog box (Figure 2-3).

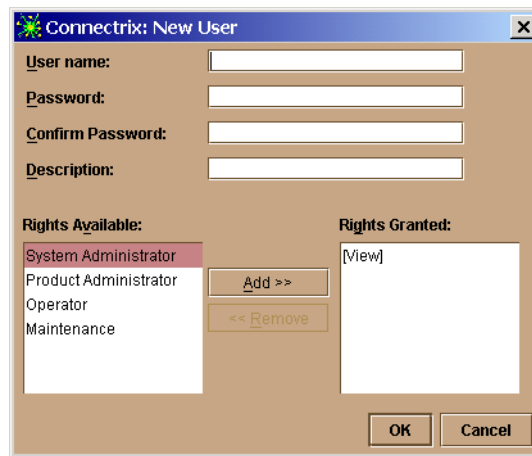


Figure 2-3 New User Dialog Box

3. In the **User name** field, enter a user name, up to 16 characters.

The user name is case-sensitive.
4. In the **Password** field, enter a password of up to 16 characters for the new user.

The password is case-sensitive.
5. In the **Confirm Password** field, re-enter the password exactly as you entered it in the **Password** field.
6. (Optional) In the **Description** field, provide a description of the user (for example: employee number, department, and function).

Assign rights to the new user using the **Add** and **Remove** buttons. Select a right in the **Rights Available** list and click **Add** to display the right in the **Rights Granted** list. For a discussion of user rights, refer to *Managing Access to the Connectrix Service Processor* on page 2-10.

By default, *View* rights are granted to all users.

7. Click **OK** to activate the administration and close the New User dialog box.
8. Click **Close** to close the Configure Users dialog box.

Modifying User Parameters

To change the configuration for an existing user, follow these steps:

1. From the Configure menu, select **Users**. This displays the Configure Users window (Figure 2-2).
2. In the **User** column, select the user whose parameters you want to modify.
3. Click **Modify**. This displays the Modify User dialog box (Figure 2-4), with the name of the selected user in the **User name** field.

Figure 2-4 **Modify User Dialog Box**

4. Modify the parameters as desired. (Remember that the password is up to 16 characters and is case-sensitive.)

5. Re-assign rights to the user using the **Add** and **Remove** buttons to display the right in the **Rights Granted** list. Refer to *User Rights* on page 2-4 for definitions of user rights.

By default, *View* rights are granted to all users.

6. Click **OK** to activate the administration and close the dialog box.
7. Click **Close** to close the Configure Users dialog box.

Deleting a User

Delete users from the system through the Configure Users dialog box (Figure 2-2 on page 2-6).

1. From the Configure menu, select **Users**. This displays the Configure Users dialog box.
2. In the **User** column, select the user to be deleted.
3. Click **Delete**.

A warning window opens asking you to confirm the deletion; click **Yes**.

4. Click **Yes** to delete the user from the Connectrix Manager.
5. Click **Close** to close the Configure Users dialog box.

Managing Access to the Connectrix Service Processor

Users at the Connectrix service processor can open the Connectrix Manager and Product Managers loaded on the server itself. Users at remote PC workstations can also access the same Connectrix service processor or other Connectrix service processors if the workstations meet minimum hardware and software requirements and are running the Connectrix Manager application. Workstations must also be configured to connect with the Connectrix service processor over a TCP/IP network connection.

The following figure illustrates two remote user workstations connected to the Connectrix service processor through a corporate intranet. Note that this is a configuration example only.

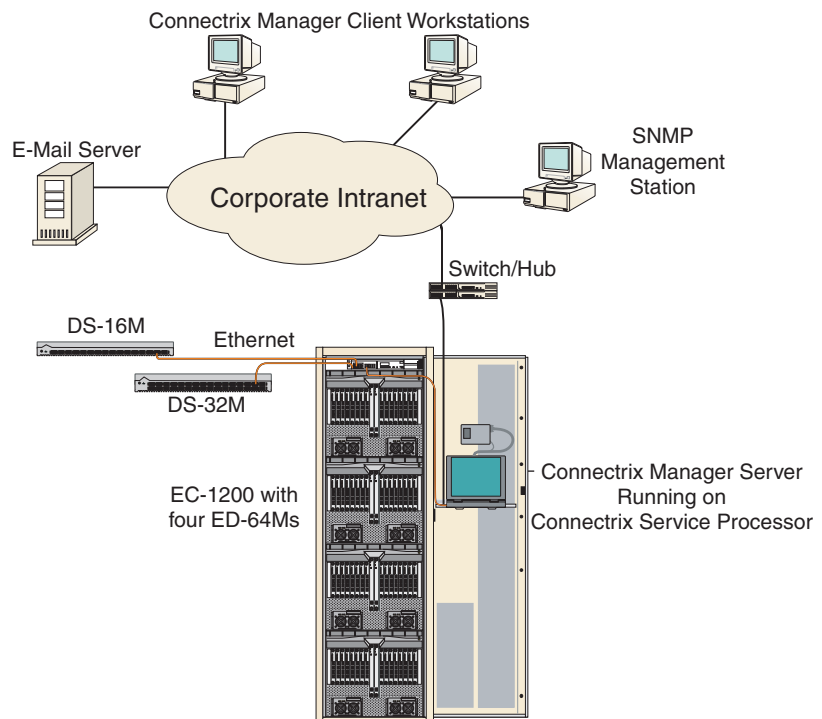


Figure 2-5 Remote Workstation Configuration

Operators at remote workstations can manage and monitor all products controlled by the Connectrix service processor. Each active connection between a remote workstation and a Connectrix service processor and managed products is called a *session*. Up to eight concurrent remote users (in addition to the local Connectrix service processor user) can log in to the Connectrix Manager application.

Installing Software onto Remote Workstations

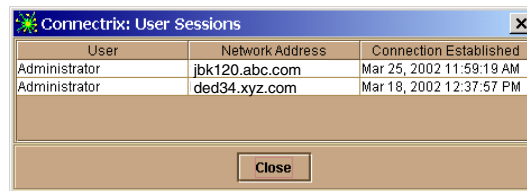
The Connectrix Manager Client software is downloaded and installed to user workstations from the Connectrix service processor.

For the minimum system requirements and installation procedures for remote workstations, refer to Appendix A.

Displaying User Sessions

Up to eight concurrent remote users (in addition to the local Connectrix service processor user) can log in to the Connectrix Manager application. Use the User Sessions option to display the current active sessions for the Connectrix service processor to which you are logged in.

From the Connectrix Manager View menu, select **User Sessions** to display a view similar to Figure 2-6.



The screenshot shows a window titled "Connectrix: User Sessions" with a close button in the top right corner. Inside the window is a table with three columns: "User", "Network Address", and "Connection Established". There are two rows of data. The first row shows "Administrator" as the user, "jbk120.abc.com" as the network address, and "Mar 25, 2002 11:59:19 AM" as the connection established time. The second row shows "Administrator" as the user, "ded34.xyz.com" as the network address, and "Mar 18, 2002 12:37:57 PM" as the connection established time. Below the table is a "Close" button.

User	Network Address	Connection Established
Administrator	jbk120.abc.com	Mar 25, 2002 11:59:19 AM
Administrator	ded34.xyz.com	Mar 18, 2002 12:37:57 PM

Figure 2-6 User Sessions Window

The User Sessions window displays active session information in this format:

- ◆ **User** — The name of the current user.
- ◆ **Network Address** — The network address of the current user.
- ◆ **Connection Established** — The date and time the session was established.

Modifying Connectrix Service Processor Session Parameters

You can allow access to the Connectrix service processor from all remote workstations or from specific workstations.

From the Configure menu, select **Sessions**. This displays a dialog box similar to Figure 2-7.

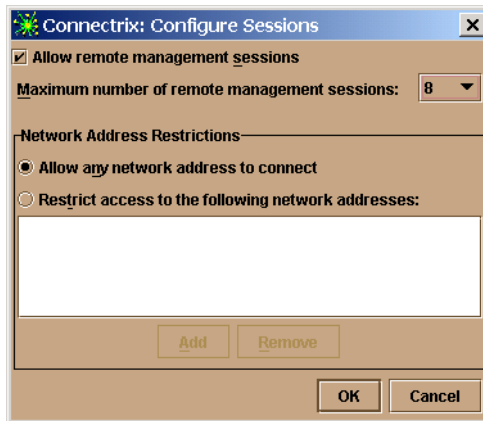


Figure 2-7 Configure Sessions Dialog Box

Allowing Remote Management

If the box to the left of **Allow remote management sessions** is checked, access to the service processor is allowed from remote workstations. If the box is not checked, remote access is blocked, even if you provide access information in other parts of this window.

Click the check box to add or remove a checkmark.

You can use this check box to prohibit remote access while saving the current access administration in this window.

If you change this configuration to block remote access for a client that is currently logged in, that client will not be logged out; however, the client will not be able to log back in once it has logged out.

If this option is not enabled, existing sessions will not terminate; however, future sessions will be prohibited.

Setting the Number of Sessions

Select the number of sessions to be allowed from the **Maximum number of remote management sessions** list.

Regulating Access

If you do not want to restrict access to the Connectrix Manager, click **Allow any network address to connect**.

If you want to limit access, follow these steps:

If you want to allow unlimited access now but restrict access to one or more workstations later, you can also use this dialog box to establish a list of those workstations.

1. Click **Restrict access to the following network addresses** on the Configure Sessions dialog box.
2. Click **Add**.

This displays a New Network Address dialog box (Figure 2-8).

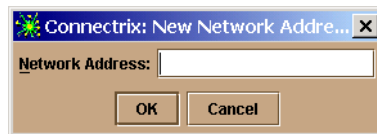


Figure 2-8 **New Network Address Dialog Box**

3. Enter the IP address of a remote workstation to be authorized in the **Network Address** field.
4. Click **OK**.
5. Repeat steps 2 through 4 for each additional workstation for which you want to allow access.
6. If you are specifying one or more workstations for later restricted access, but want unrestricted access now, select **Allow any network address to connect** on the Configure Sessions dialog box. The address(es) remain in the display, but cannot be selected.

Removing Access

If you want to remove the access currently granted to a remote workstation:

1. Click **Restrict access to the following network addresses** on the Configure Sessions dialog box.
2. Select the address to be deleted.
3. Click **Remove**.
4. Click **Yes** in the Warning dialog box.
5. Click **OK** to save the required changes.

Configuring the SNMP Agent

The Connectrix service processor contains a simple network management protocol (SNMP) agent component. The SNMP agent instruments the objects defined in the Fibre Channel Management (FCMGMT) Management Information Base (MIB) Version 3.1, the FibreAlliance MIB, and a small number of objects defined in MIB II. Through instrumentation of these MIB objects, the agent acts as a translator of information stored on the Connectrix service processor and attached switches into a form usable by SNMP management stations such as HP OpenView.

You can configure network addresses and community names for up to 12 SNMP trap recipients, which receive messages through SNMP for specific events that occur on the Connectrix service processor.

When configuring SNMP, you can configure just the community names of valid SNMP management stations. In this case, you do not need to fill in the **Trap Recipient** column or the **UDP Port Number** column.

To configure and enable SNMP traps, use the following steps:

1. From the Connectrix Manager Configure menu, select **SNMP Agent**. This displays the Configure SNMP window (Figure 2-9).

Community Name	Write Authorization	Trap Recipient	Active	UDP Port Number
	☐		☐	
	☐		☐	
	☐		☐	
	☐		☐	
	☐		☐	
	☐		☐	
	☐		☐	
	☐		☐	
	☐		☐	
	☐		☐	
	☐		☐	
	☐		☐	

Figure 2-9 Configure SNMP Window

2. Click in the **Community Name** column and enter the SNMP community name for a trap recipient. This name defines the community name that SNMP managers use for reading variables from or writing variables to the Connectrix service processor. This name must be 64 characters or fewer.

To modify existing fields in this dialog box, click in the field and enter your changes.

For use with ESN Manager, the Community Name must be configured with a community name of **public**.

3. Select the **Write Authorization** check box to grant or deny the configured SNMP management station write authorization. When this option is selected, an administrator at an SNMP management station has write permissions for writable MIB objects on the Connectrix service processor.
4. Click in the **Trap Recipient** column and enter the IP address or DNS host name for a trap recipient (SNMP management station). This must be 64 characters or fewer.
5. If you want the trap recipient to be an active recipient, select the check box in the **Active** column (if necessary) to add a checkmark. If you want to configure the recipient and then activate the recipient at a later time, leave the check box empty.
6. To override the default UDP port number for a trap recipient with any legal, decimal UDP number, enter the new UDP port number in the **UDP Port Number** column.
7. To enable or disable the SNMP agent to capture events, select the **Enable SNMP Agent** check box.
8. To enable or disable authorization traps to be sent when unauthorized management stations try to access SNMP information through the Connectrix service processor, select the **Enable Authorization Traps** check box.
9. Click **Activate** to accept and activate the data.

Automatic Data Backup

Backup and restoration of critical Connectrix Manager data on the Windows NT system is provided by the Iomega QuikSync application on the Connectrix service processor.

As long as a Zip drive (with a disk in it) is connected to the Connectrix service processor and the user remains logged in to the Windows NT operating system, QuikSync automatically mirrors the contents of the `EfcData` directory (which contains the Connectrix Manager data) to the Zip disk. Critical information from both the Product Manager and Connectrix Manager applications is automatically backed up to the Zip disk when the data directory contents change or when you reboot the Connectrix service processor. (The existing backup file is updated; no separate versions of the backup file are maintained.)

Connectrix Manager maintains a mirror image of its configuration data on the `D:\` drive of the service processor. The automatic backup to the Zip disk occurs only when you log in to the service processor or when the service processor is rebooted. If you want the automatic backup to occur all of the time (which is recommended), the best way to accomplish this is to not log out of the service processor, but rather to lock the workstation by pressing `CTRL-ALT-DEL` and selecting **Lock Workstation**.

QuikSync is installed on the Connectrix service processor during installation of the Iomega Zip drive, and is included on the Connectrix Management Applications CD. A blank Zip disk is included with the Connectrix Manager software kit.



CAUTION

To ensure trouble-free backups, it is imperative that you leave the Zip drive connected to the Connectrix service processor, and leave a Zip disk in that drive.

QuikSync starts when you log into Windows NT on the Connectrix service processor. Any data that has changed in the `EfcData` directory while you were logged out will be backed up automatically.

What Gets Backed Up

QuikSync backs up this data:

- ◆ All Connectrix Manager configuration (for example: product definitions, user names, passwords, user rights, Nicknames, session options, SNMP configuration, and e-mail addresses)
- ◆ Logs for the Connectrix Manager and any Product Managers
- ◆ Zoning library, including all zone sets and zone definitions
- ◆ Firmware library
- ◆ Call-home configuration information

QuikSync does *not* back up certain Windows NT configurations that must be reconfigured on a newly restored Connectrix service processor. (Use other means to back up this type of information.) The following is not backed up:

- ◆ Windows NT user names and passwords
- ◆ TCP/IP network configuration (such as IP address, gateway address, and DNS names)

Product Manager Backup

Because the configuration data for each individual product is stored in NVRAM on the product itself, a separate backup option in each Product Manager allows you to save the product configuration to the Connectrix service processor. If you perform a product configuration backup through the Product Manager, the configuration data is stored in the `EfcData` directory and mirrored to the QuikSync Zip disk.

Enabling QuikSync

If the QuikSync icon (Figure 2-10) appears in the bottom right corner of the Windows NT system window, QuikSync is ready to back up data. (This icon spins when data is writing to the Zip disk.)



Figure 2-10 QuikSync Icon

If the icon does not appear, enable the application as follows:

1. From the Windows taskbar, click **Start, Programs, Iomega QuikSync, QuikSync, QuikSync**. This displays the QuikSync dialog box (Figure 2-11).

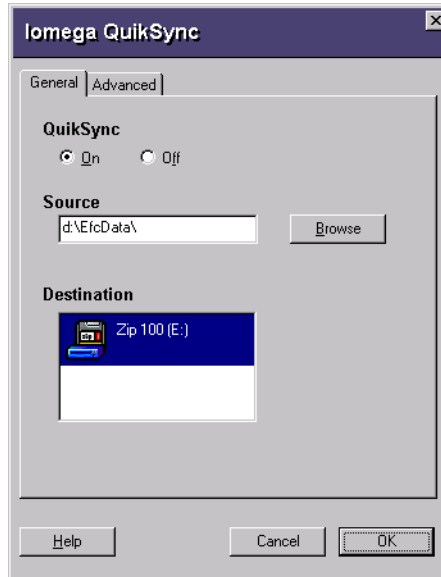


Figure 2-11 QuikSync Dialog Box

The directory `d:\EfcData\` is a mirror of `c:\EfcData\`. Do not change this location in the **Source** box.

2. Click **On** to enable QuikSync.
3. Click **OK**.

QuikSync Settings

Do not change the default settings for automatic backup of the EfcData directory. If you think that QuikSync is not functioning properly, check the settings using the following steps:

1. Double-click the **QuikSync** icon in the Windows status area (on the right side of the taskbar) to open the QuikSync dialog box (Figure 2-11).

If for some reason the icon is not present, open the dialog box by following step 1 under *Enabling QuikSync* on page 2-19.

2. Verify that the dialog box is configured as shown in Figure 2-11.
3. Click the **Advanced** tab to display the dialog box in Figure 2-12.

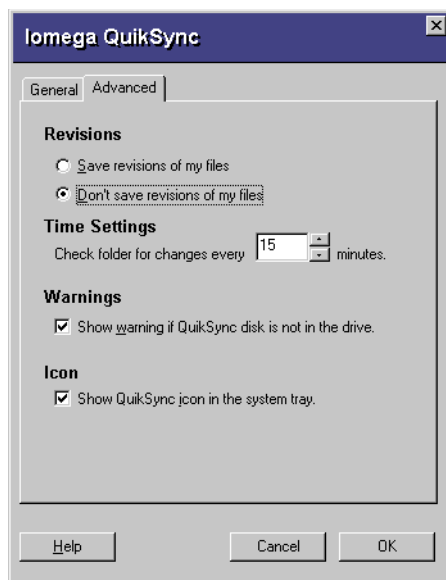


Figure 2-12 QuikSync Dialog Box (Advanced Settings)

4. Configure the dialog box exactly as shown in Figure 2-12; then click **OK** to save the configuration.

Restoring Data

In the event of a system failure, you will be able to return your database to a known state. To restore data from the backup disk to the Connectrix service processor:

1. Close down the Connectrix Manager application.
2. From the Windows taskbar, click **Start, Programs, Windows NT Explorer**.
3. Copy the `EfcData` directory from the Zip disk to the EFC root directory (typically `c:\EfcData`).
4. Close the **Exploring** window. (Leave the Zip disk in the drive for QuikSync backup.)
5. Reboot the Connectrix service processor:
 - a. On the Windows taskbar, click **Start**; then click **Shut Down**.
 - b. On the **Shut Down Windows** dialog box, click **Restart the Computer**; then click **Yes**.
 - c. When prompted, simultaneously press CTRL-ALT-DELETE to display the Windows NT Logon Information dialog box.
 - d. Enter your user name and password and click **OK**.
6. When the Connectrix Manager login screen appears, enter your user name and password. Make sure that **localhost** is selected in the **Connectrix** field.
7. Click **Login** to open the Connectrix Manager.

Using the Connectrix Manager

This chapter provides a description of Connectrix Manager features. It explains how to access the various views, use menus, and back up the Connectrix Manager database.

This chapter contains the following sections:

- ◆ Running the Connectrix Manager3-2
- ◆ Using the Menu Bar Functions.....3-5
- ◆ Using the Toolbar Functions.....3-12
- ◆ Using the Main Panel Views.....3-16
- ◆ Using the Connectrix Manager Status Bar3-19
- ◆ Opening a Product Manager3-22

Running the Connectrix Manager

Logging In

Follow these steps to start (if necessary) and log in to the Connectrix Manager:

1. The Connectrix Manager application on the Connectrix service processor starts automatically when the service processor is powered on.

If you need to start the Client application:

- a. If necessary, switch the Connectrix service processor on.
- b. On the Windows desktop, double-click the **Connectrix Manager** icon:



2. On the Connectrix Manager Login screen (Figure 3-1), enter your username and password. (Usernames and passwords are case-sensitive.)

If usernames have not been established, use the default username (**Administrator**) and password (**password**).

You should change the default password as soon as possible. Refer to the appropriate sections under *Modifying User Parameters* on page 2-8.

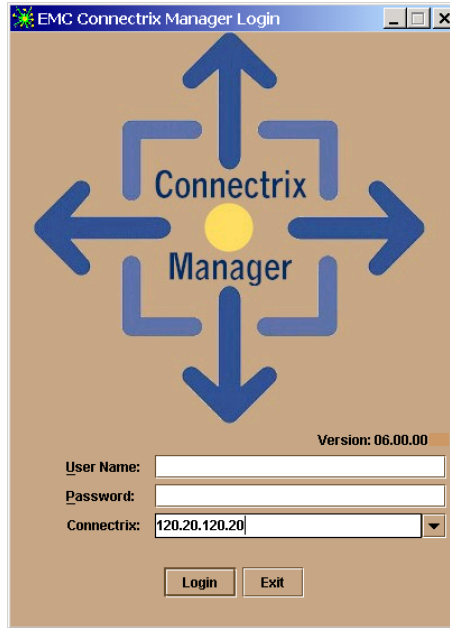


Figure 3-1 Connectrix Manager Login Window

3. The default address that appears in the Connectrix field is the address of the last service processor or server accessed. Click the arrow to the right of the field display the network addresses of all Connectrix service processors that were accessed from your PC/workstation.

To start the application on the Connectrix Service processor, the Connectrix field must be set to **localhost**. To start the application on a Client, enter the IP address of the Connectrix Service processor.

4. Click **Login**.

The main Connectrix Manager window opens to the Products view (Figure 3-2).

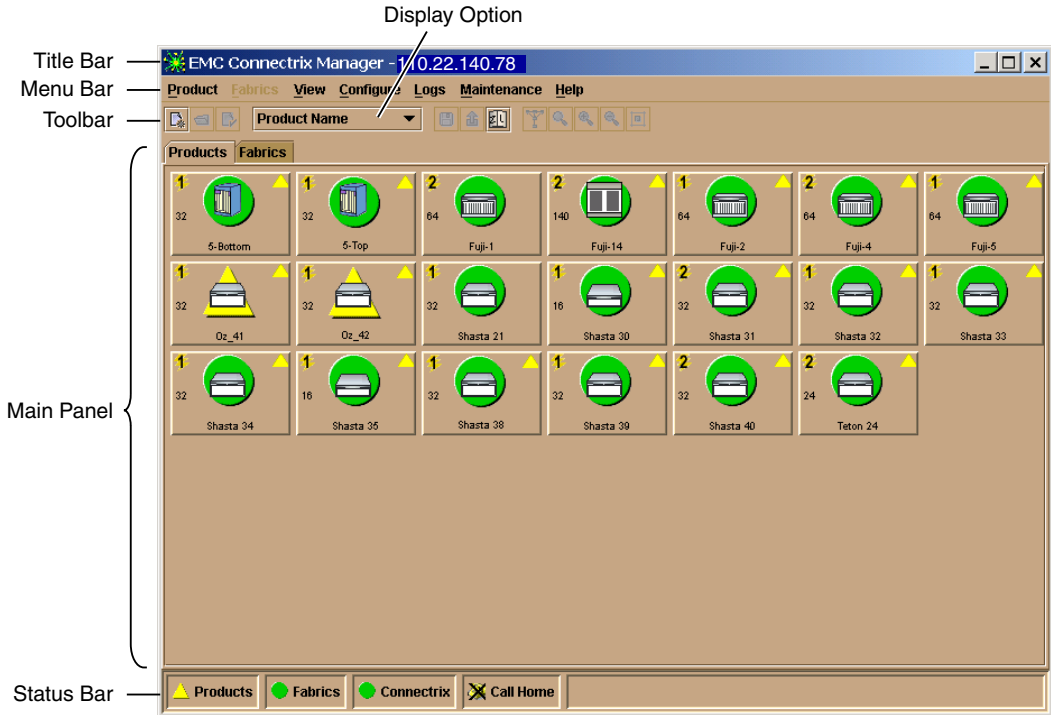


Figure 3-2 Connectrix Manager Main Window Showing Products View

Logging Out

To log out of the Connectrix Manager so you can access the Connectrix Manager running on another Connectrix service processor, click **Product** on the menu bar and select **Logout** from the drop-down menu.

To log in again, refer to *Logging In* on page 3-2.

Exiting the Connectrix Manager

To exit the Connectrix Manager application, click the **Product** tab on the menu bar and select **Exit** from the drop-down menu.

Using the Menu Bar Functions

The menu bar (Figure 3-3) contains menus of administrative tasks for the Connectrix Manager.

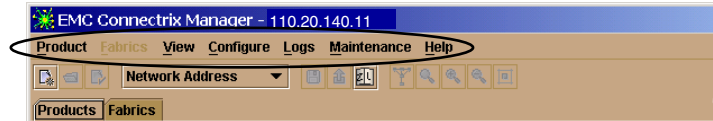


Figure 3-3 Connectrix Manager Menu Bar

Product Menu

The Product menu contains these items:

- ◆ **New** — Allows you to add a product to be managed by the Connectrix Manager and to assign a network address to the new product. (This function is available only from the Products view.) Refer to *Adding a Product* on page 6-2.
- ◆ **Open** — Allows you to open the Product Manager for a specific switch. Refer to *Opening a Product Manager* on page 3-22.
- ◆ **Delete** — Allows you to delete a product's icon from the display. Refer to *Deleting a Product* on page 6-3.



CAUTION

Deleting a product from the display removes all information about the product from the Connectrix Manager. This includes configuration information, event logs, diagnostic information, and any other data maintained by the corresponding Product Manager.

- ◆ **Modify** — Allows you to change the network address that appears under a product icon (assuming the display options is set to **Network Address**, as described under *Display Options* on page 3-13).

Refer to *Modifying a Product* on page 6-3.

- ◆ **Properties** — Displays a list of properties for the managed product.
Refer to *Displaying Product Properties* on page 6-4.
- ◆ **Logout** — Allows you to log out of the Connectrix Manager.
Refer to *Logging Out* on page 3-4.
- ◆ **Exit** — Allows you to close the Connectrix Manager.
Refer to *Exiting the Connectrix Manager* on page 3-4.

Fabrics Menu

The Fabrics menu is accessible only if the Connectrix Manager is displaying the Fabric view. (To display the Fabrics view, click the **Fabrics** tab on the main panel of the Connectrix Manager.)

The Fabrics menu contains these items:

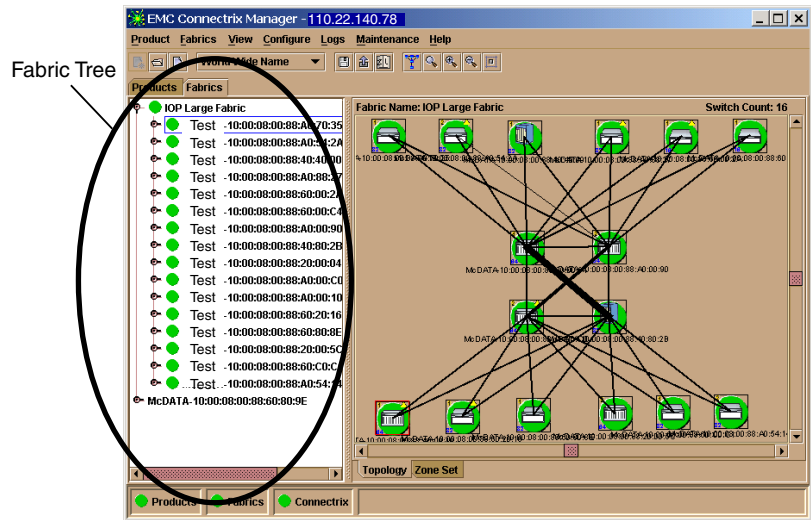
- ◆ **Rename** — Allows you to rename a *persistent fabric*. This option is only available if the fabric is persisted (as described in the next item).
Refer to *Renaming a Persisted Fabric* on page 4-20.
- ◆ **Persist Fabric Topology** — Allows you to save a *snapshot* of the fabric's current configuration (switches, directors, and ISLs) in the Fabrics view, including the location of the icons in the view. This snapshot is applied to all clients.
Refer to *Persisting a Fabric* on page 4-18.
- ◆ **Unpersist Fabric Topology** — Allows you to remove the *grouped* status of a configuration that was persisted.
Refer to *Unpersisting a Fabric* on page 4-20.
- ◆ **Export Fabric Topology** — Allows you to export the current fabric topology to an XML-formatted file.
Refer to *Exporting the Fabric Topology* on page 4-6.
- ◆ **Show Route** — allows you to view the path Fibre Channel frames must take between two end devices in a multiswitch fabric.
Refer to *Viewing Routes* on page 6-11.
- ◆ **Hide Route** — allows you to remove a route currently displayed in the Topology tab view area.
- ◆ **Show Zone Members** — Displays the members of a zone.
Refer to *Viewing Zone Members* on page 5-23.

- ◆ **Show View Port** — Displays a separate view of the entire fabric that is in the Topology view.

You can drag the view port to enlarge it. Click inside the view port, and move the cursor in any direction to adjust what you see in the Topology view. The view port makes navigation easier when a large fabric is displayed in the Topology view.

- ◆ **Show Fabric Tree** — Displays a hierarchical list of the components of the fabric displayed in the main panel.

Example:



- ◆ **Enterprise Fabric Mode** — (available only if the Enterprise Fabric Extensions option is installed) Automatically enables features and operating parameters that are necessary in multiswitch Enterprise Fabric environments.

Refer to *Enterprise Fabric Mode* on page 4-26.

- ◆ **Fabric Binding** — (available only if the Enterprise Fabric Extensions option is installed) Allows you to configure binding for a specific fabric, restricting unspecified switches from attaching to fabrics in the SAN.

Refer to *Fabric Binding* on page 4-21.

View Menu

The View menu displays options that alter the view of application components.

- ◆ **User Sessions** — Displays a list of all the current management sessions, including the name of each user connection, the network address of the user, and the time when the connection was established.

- ◆ **Zoom** — Allows you to increase or decrease the size of fabric elements.

Select the **Fit In View** option to display the entire fabric in the view area. Note that for larger fabrics, text and icons may be difficult to see. Select **Default** from the Zoom menu to return to the original view, or use the **Out** option to selectively reduce the view.

- ◆ **Arrange Icons** — (available only when the **Products** tab is selected) Allows you to modify the display to show the product icons in order of either product name (alphabetically) or by status (from most to least critical: failed products, products with degraded status, products with unknown operational status). Within status groupings, icons appear alphabetically by their network address (IP address or DNS host name) or product name, depending on the selected display option. (Refer to *Display Options* on page 3-13.)

- ◆ **Layout Icons** — (available only when the **Fabrics** tab is selected) Allows you to shorten the length of the ISLs in the view area and *spring* in the product icons closer together (if you select **Spring**). Selecting the **Circular** option displays the fabric in the more spread out, circular layout.

- ◆ **Center in Topology** — Allows you to center a product icon in the view area.

Selecting this option without selecting an icon centers the entire fabric in the view area.

- ◆ **Refresh Topology** — Allows you to refresh the topology in the view area.
- ◆ **Clear ISL Alert** — (available only when the **Fabrics** tab is selected) Allows you to clear any outstanding alerts for a selected ISL. (This option is not available when there is no alert outstanding for the ISL.) An alert occurs when an ISL is removed from a persisted fabric.

- ◆ **Clear All ISL Alerts** — (available only when the **Fabrics** tab is selected) Allows you to clear any outstanding alerts for all ISLs in a persisted fabric. (This option is not available when there are no ISL alerts.)

Refer to *Persisted Fabrics* on page 4-17.

- ◆ **Enable Fly Over Display** — Allows you to display additional information when you pass the cursor over an icon. If flyover is enabled:
 - In the Products view, moving the cursor over a product icon displays the product's network address or product name, whichever does not already appear below the icon.
Refer to *Display Options* on page 3-13.
 - In the Fabrics view, moving the cursor over a product icon displays the product's WWN.
 - Also in the Fabrics view, moving the cursor over the ISL lines between products displays the actual number of ISLs between the products.

Configure Menu

The Configure menu provides options for configuring and managing users, products, sessions, and SNMP options.

- ◆ **Users** — Lists current users who can access the Connectrix service processor and enables the system administrator to add or delete users, modify information for existing users, and establish or display user rights.

Refer to *Administering Users* on page 2-4.

- ◆ **Nicknames** — Allows you to configure a *nickname*, which is a name assigned to a WWN.

Refer to *Configuring Nicknames* on page 5-37.

- ◆ **Sessions** — Allows you to permit or prohibit access to the Connectrix service processor from remote user workstations.

Refer to *Modifying Connectrix Service Processor Session Parameters* on page 2-12.

- ◆ **SNMP Agent** — Allows you to enable the SNMP agent that runs on the Connectrix service processor and to enable *authorization traps* (identify and enable specific SNMP users to receive SNMP status messages).

Refer to *Configuring the SNMP Agent* on page 2-15.

- ◆ **Activate zone set** — Allows you activate a zone set.
Refer to *Activating a Zone Set* on page 5-16.
- ◆ **Zoning Library** — Allows you to perform most zoning configuration.
Refer to *Zoning Library* on page 5-7.
- ◆ **Advanced Zoning** — Allows you to deactivate a zone set or enable/disable the default zone.
Refer to *Deactivating a Zone Set* on page 5-29 and *Enabling/Disabling the Default Zone* on page 5-35.

Logs Menu

The Logs menu provides access to all of the Connectrix Manager logs. The log overwrites the oldest entries after 1000 entries are recorded.

- ◆ **Audit Log** — Contains a history of user actions performed through the Connectrix Manager.
Refer to *Audit Log* on page 7-3.
- ◆ **Event Log** — Lists errors related to Connectrix Manager operation.
Refer to *Event Log* on page 7-5.
- ◆ **Session Log** — Lists the users that have logged in and logged out of the Connectrix service processor.
Refer to *Session Log* on page 7-7.
- ◆ **Product Status Log** — Records the operational status changes of each managed product.
Refer to *Product Status Log* on page 7-8.
- ◆ **Fabric Log** — Records all the significant changes that have occurred in the managed fabric.

If you unpersist the fabric, the fabric log is lost. If you want to save the fabric log, export the log before unpersisting the fabric.

Maintenance Menu

The Maintenance menu provides tools for setting remote communication options.

- ◆ **Configure E-Mail** — Allows you to configure network addresses for administrators or others who should receive notification of product events through e-mail, and to enable e-mail notification.
Refer to *Configuring E-mail Notification for Events* on page 6-7.
- ◆ **Test Remote Notification** — Allows you to test the e-mail notification and the call-home feature.
Refer to *Testing Remote Notification* on page 6-9.
- ◆ **Configure Ethernet Events** — Allows you to configure Ethernet events and enable notification for all Product Managers. An Ethernet event occurs when the Ethernet link between the Connectrix service processor and the managed product is lost.
Refer to *Configuring Ethernet Events* on page 6-10.
- ◆ **Configure Call Home Event Notification** — Enables/disables the call-home feature.
Refer to *Enabling Call-Home Event Notification* on page 6-6.

Help Menu

The Help menu displays two options.

- ◆ **Contents** — Opens Connectrix Manager on-line help.
- ◆ **About** — Displays version and copyright information for the Connectrix Manager.

Using the Toolbar Functions

The toolbar provides a number of icons for quick access to frequently used menu items, namely, commands to work with a product or to work with a fabric.

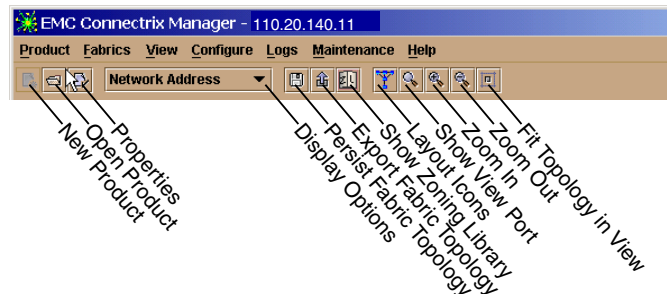


Figure 3-4 Connectrix Manager Toolbar

New Product



This button (available only in the Products view) allows you to add a new product icon. The button has the same functionality as the **New** option on the Product menu. (Refer to *Adding a Product* on page 6-2.)

Open Product



This button is available when you select a product icon in the Products view or on the Topology screen in the Fabrics view.

This button allows you to open the Product Manager for a product. The button has the same functionality as the **Open** option on the Product menu. (Refer to *Opening a Product Manager* on page 3-22.)

Properties



This button is available when you select a product icon in the Product view or on the Topology screen in the Fabrics view.

The button allows you to display a list of properties for a product or fabric. (Refer to *Displaying Product Properties* on page 6-4.)

Display Options



This button contains a drop-down menu that allows you to select the type of identifier that appears under each product icon:

This menu is also available if you right-click on the Products or Fabrics view, away from any product icons.

- ◆ **Product Name** — Displays the products' names.
Product names are configured through the Product Manager; refer to the product-specific User Guide(s) for instructions on changing names.
Product names can be up to 24 characters; however, the Products view generally displays no more than 17 (due to screen size). To display the full name of a product, move the cursor over the product icon. A blue border appears around the icon to indicate that it is selected, and the complete product name appears in the icon label.
- ◆ **Network Address** — Displays the products' IP addresses or DNS (Domain Name Server) host names.
Refer to *Modifying a Product* on page 6-3 for instructions on configuring addresses.
- ◆ **World Wide Name** — (Fabrics view only) Displays the product's 8-byte WWN.
- ◆ **Domain ID** — (Fabrics view only) Displays the product's domain identification number (1-31) assigned by the fabric.
- ◆ **Nickname** — (Fabrics view only) Displays the nickname, if configured; otherwise displays the WWN. (Refer to *Configuring Nicknames* on page 5-37.)

Persist Fabric Topology



This button (available only on the Topology view in the Fabrics view) allows you to save a *snapshot* of the fabric's current configuration (switches, directors, ISLs, and icon location) in the Fabrics view. The button has the same functionality as the **Persist Fabric Topology** option on the Fabrics menu.

Visual indicators appear if products or ISLs are deleted or added. This also creates a Fabric Log (available from the Logs menu on the menu bar) that tracks changes to the fabric over time.

Refer to *Persisted Fabrics* on page 4-17 for information about persisted fabrics.

Export Fabric Topology



This button (available only on the Topology view in the Fabrics view) allows you to save a fabric topology to an XML file. The button has the same functionality as the **Export Fabric Topology** option on the Fabrics menu.

Refer to *Exporting the Fabric Topology* on page 4-6 for more information.

Show Zoning Library



This button allows you to:

- ◆ Configure zone sets
- ◆ Clear zones
- ◆ Delete zones and zone sets
- ◆ Import and export zone sets
- ◆ Display zone properties
- ◆ Copy zones and zone sets
- ◆ Find zone members in zones; rename or replace members.
- ◆ Find zones in zone sets
- ◆ Display zone sets, zones, and zone members in the library

This button has the same functionality as the **Zoning Library** option on the Configure menu.

Refer to Chapter 5 for details on zoning.

Layout Icons



This button (available only on the Topology view in the Fabrics view) refreshes the display, using the setting selected (**Circular** or **Spring**) for **Layout Icons** on the View menu. (Refer to *Layout Options* under *View Menu* on page 3-8.)

Show View Port



This button (available only on the Topology view in the Fabrics view) allows you to display a separate view of the entire fabric that is in the Topology view.

You can drag the view port to enlarge it. Click inside the view port, and move the cursor in any direction to adjust what you see in the Topology view. The view port makes navigation easier when a large fabric is displayed in the Topology view.

This button has the the same functionality as the **Show View Port** option on the Fabrics menu.

Zoom In, Zoom Out



These buttons (available only on the Topology view in the Fabrics view) allow you to make the fabric display larger or smaller.

Fit Topology in View



This button (available only on the Topology view in the Fabrics view) allows you to display the entire fabric in the Topology view. Note that for larger fabrics, text and icons may be difficult to see.

To return to the original size, select **View, Zoom, Default** from the Connectrix Manager menu bar.

Using the Main Panel Views

The Connectrix Manager's main panel contains three views:

- ◆ Products view
- ◆ Fabrics view: Topology view
- ◆ Fabrics view: Zone Set view

Products View

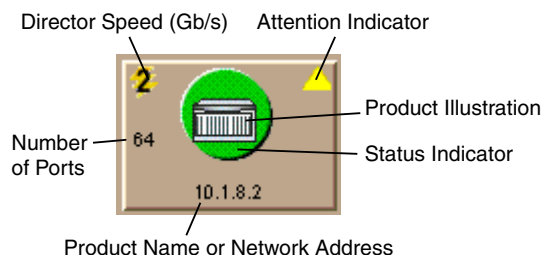
Icons in the Products view (shown in Figure 3-2 on page 3-4) represent each managed product. In a full-screen environment on an 800 x 600 resolution monitor, this panel displays up to 48 product icons. (Use the scroll bar to display any icons that are out of view.)

You can determine the type of product by looking at the icon in the main panel of the Products view or the Fabrics/Topology view. To display more information about the product, right-click the icon, and click **Properties** on the pop-up menu that appears.

For a complete description of the *Products View*, refer to the product-specific user guide(s).

Product Icons

Information in each product icon includes the following:



Object descriptions:

- ◆ Director data speed, 1 Gb/s (ED-64M only) or 2 Gb/s, is configured through the Product Manager application for a specific ED-64M. (The ED-140M and DS-24M2 always run at 2 Gb/s.)
- ◆ Attention indicator — A yellow triangle means the product requires attention. Open the Product Manager for the director by double-clicking the icon to find out more information.
- ◆ Product name or network address — You can determine which appears by right-clicking on the open area away from the product icons and selecting **Display Options** from the pop-up menu.

Whichever identifier appears, you can display a pop-up window with the other identifier by moving the cursor over the product icon.

- ◆ Status indicator (the symbol behind the product illustration):
 - A red and yellow diamond means that the product has failed and requires immediate service.
 - A yellow triangle means that the product is degraded, but is still performing as designed.
 - A green circle means that the product is fully operational.
 - A grey square means that the Connectrix Manager cannot determine product status.

If a status symbol does not appear behind the product, the product is not managed by the Connectrix service processor to which you are logged in.

The most critical status reflected by a product in the view is also reflected in the **Products** status box in the left corner of the Connectrix Manager window.

Determining Product Status

Determine product operational status from the symbols that appear behind the product icons. The meanings of the symbols are the same as for the status symbols described in Table 3-1 on page 3-21. If a product icon has no status symbol, that product is not managed by the Connectrix service processor to which you are logged in.

Fabrics View

The Fabrics view is divided into two panels:

- ◆ The left panel is a *fabric tree* that contains an expandable list of fabrics, products in fabrics, and nodes connected to products. The tree displays all fabrics currently known to the Connectrix service processor.
- ◆ The right panel is the view area. At the bottom of the view area are two tabs that change the view of the fabric between a Topology view and a Zone Set view.

For a complete description of the *Fabrics View*, refer to Chapter 4.

- Topology View** In the Topology view, right-click a product icon for a menu of options for the particular product. Right-click a blank part of the view to display a menu of options for the fabric.
- Zone Set View** The Zone Set view displays the currently active zone set for fabrics you select in the fabric tree.

Using the Connectrix Manager Status Bar

The Connectrix Manager status bar (Figure 3-5) displays icons that indicate the status of products, fabrics, and the Connectrix service processor. Another icon shows whether call-home notification is enabled for all managed products.



Figure 3-5 Connectrix Manager Status Bar

Moving the cursor over an icon displays a description of the function in the field to the right of the icons.

Products This icon indicates the most-critical status among all products managed by the Connectrix Manager. To find the product(s) that are causing the non-operational status, examine the product icons in the Products view.

For example, if nine products are fully operational and only one product has failed, the Connectrix Manager status bar displays a red diamond with a yellow background in the Products area of the status bar.

Double-clicking the icon display the Product Status Log, which records information when managed products change status. Refer to *Product Status Log* on page 7-8 for more information.

Fabrics This icon indicates the most-critical status among all fabrics known to the Connectrix Manager. To find the fabric(s) that are causing the non-operational status, examine the fabrics in the Fabrics view.

Double-clicking the icon display the Fabric Log, which records information when a persisted fabric changes status. Refer to *Fabric Log* on page 7-10 for more information.

- Connectrix** This icon indicates the status of the Connectrix service processor into which the Connectrix Manager is logged.
- Double-clicking the icon display the Event Log, which displays events or error conditions recorded by the Connectrix Management Services application. Refer to *Event Log* on page 7-5 for more information.
- Call Home** This icon shows whether call-home notification is configured for all managed products.
- If an **X** appears over the icon, call-home on one or more products is disabled (through the Product Manager application). (If no **X** appears, call-home notification is enabled for all products.) Refer to *Enabling Call-Home Event Notification* on page 6-6 for more information.
- Double-clicking the icon display a Call-Home Notification Summary, which lists whether call-home is enabled for the Connectrix Manager and each managed product
- Text Panel** The panel to the right of the symbols provides additional information about a command when you move the cursor over a status symbol, or over a toolbar icon or over menu item at the top of the Connectrix Manager window. (This information is available even if the **Enable Fly Over Display** option on the View menu is not checked.)

Table 3-1 shows all possible status symbols.

Table 3-1 **Operational States and Symbols**

Symbol	State	Description		
		Products	Fabrics	Service Processor (EFC)
	Operational	The product is fully operational.	The fabric is fully operational. No attention indicators appear on ISLs in the Topology view.	The Connectrix service processor is fully operational.
	Degraded	The product is degraded, but is still performing as designed. This condition is typical when a redundant FRU fails and the backup FRU is operational.	All fabric connections are intact; however, one or more attention indicators appear on ISLs in the Topology view.	The service processor is degraded, and requires attention.
	Failed	The product has failed and requires immediate service.	The fabric has split into two or more fabrics.	The service processor has failed, and requires immediate service.
	Unknown	The Connectrix Manager cannot determine the status of the product, because of a communication failure between the product and the Connectrix service processor, or because the product is not responding. This is normal if the product is managed by another service processor.	The Connectrix Manager cannot determine the status of the fabric.	The Connectrix Manager cannot determine the status of the service processor.

Opening a Product Manager

The Product Manager provides in-depth management and monitoring functions for individual Fibre Channel devices. The Product Manager hardware view provides views of hardware components and includes component status. Through these views, you can quickly manage and monitor the Fibre Channel devices on your network.

You can open the Product Manager for a managed product in any of these ways:

- ◆ Double-click the product's icon in the Products or Fabrics view.
- ◆ Right-click the product's icon, and select **Open** on the pop-up menu.
- ◆ Click the product's icon; then click **Product** on the menu bar and select **Open** on the drop-down menu.

Through a Product Manager, you can:

- ◆ Configure the device name, location, description, and contact person.
- ◆ Monitor the operational status of a managed device and its components.
- ◆ Perform other configuration and monitoring tasks specific to the type of Product Manager.

Up to eight remote users (in addition to the local Connectrix service processor user) can concurrently access Product Managers for a specific product.

A Product Manager's menu bar functions like the menu bar in the Connectrix Manager. The Product Manager also has a status bar with alert status colors and symbols that are identical to those in the Connectrix Manager.

The Connectrix Manager window is still available as a separate window when a Product Manager is open. You can drag the Product Manager window away from the Connectrix Manager window and view both on your desktop. You can also minimize each window.

Refer to the product-specific user guide(s) for information on using the Product Manager.

Using the Fabrics View

This chapter includes information on how to use the Fabrics view to monitor, configure, and manage the Fibre Channel fabrics in which managed products operate.

This chapter contains the following sections:

- ◆ Displaying the Fabrics View4-2
- ◆ Using the Topology View4-4
- ◆ Using the Zone Set View4-10
- ◆ Fabric Tree4-15
- ◆ Persisted Fabrics.....4-17
- ◆ Fabric Binding4-21
- ◆ Enterprise Fabric Mode.....4-26

Displaying the Fabrics View

The Connectrix Manager Fabrics view displays all fabrics available to a user through the Connectrix Manager. To access the Fabrics view (Figure 4-1), click the **Fabrics** tab.

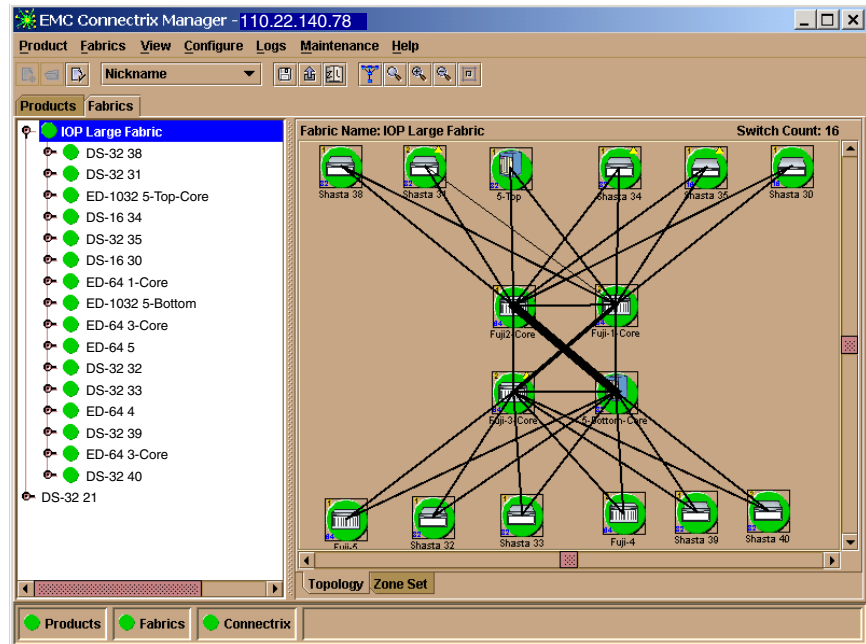


Figure 4-1 Fabrics View

The Fabrics menu on the Connectrix Manager menu bar has an entry **Show Fabric Tree**. If this option is enabled (with a checkmark), the main view area of the Fabrics view is split (as shown in Figure 4-1) to show the following:

- ◆ **Fabric tree** — A hierarchical list of zones and zone members. The outermost leaf displays the fabric name, which initially is the WWN of the fabric's principal switch; however, if the fabric is persisted, it has a name configured by the user.

If the fabric is persisted, the name is preceded by a fabric status icon. (Refer to *Persisted Fabrics* on page 4-17 for details).

- ◆ **Topology view (default) or Zone Set view:**

- The Topology view is a graphical representation of the fabric, including the products that make up the fabric and the ISLs connecting them.

Refer to *Using the Topology View* on page 4-4.

- The Zone Set view appears if you click the **zone set** tab near the bottom of the Connectrix Manager window. If you select this view and later display the Connectrix Manager Products view, the Zone Set view appears if you again select the Fabrics view (assuming you have not closed the Connectrix Manager in the meantime).

Refer to *Using the Zone Set View* on page 4-10.

A fabric can consist of a single managed product, multiple managed products, or a mix of managed and unmanaged products. If a switch is on a fabric but is not available to the Connectrix Manager's service processor (over Ethernet), only zoning management will be handled by the service processor. Call Home and other management functions will not be provided by this service processor.

Using the Topology View

The Topology view (shown in Figure 4-1 on page 4-2) displays all products in a fabric, as well as the interswitch links between products in a multiswitch fabric. Switches and directors that are being managed by a device other than the Connectrix service processor appear without a status symbol. (Refer to *Determining Product Status* on page 4-9.)

Product Icons

The text that appears under each product icon depends on what display option was selected. (Refer to *Display Options* on page 3-13.)

If fly-over is enabled (**View, Fly Over Display** from the Connectrix Manager menu bar), moving the cursor over a product icon displays the product's WWN above the icon, unless a nickname is configured for the product *and* the WWN already appears below the icon, in which case the nickname appears above it.

You can drag product icons to rearrange the layout in the Topology view. (All ISLs stay with the icon.) The icon arrangement can be saved by utilizing the Persistent Fabric feature. See 4-16 for further info on Persistent Fabrics.

Double-clicking a product icon opens the Product Manager for that product.

Right-clicking a product icon displays these menu options:

- ◆ **Open** — Opens the Product Manager for the product.
- ◆ **Center in Topology** — Centers the product icon and surrounding portion of the fabric in the view area. Selecting this option without selecting an icon centers the entire fabric in the view area.
- ◆ **Properties** — Displays a Properties window for the product.
- ◆ **Define Nickname** — Displays a Define Nickname dialog box, where you can configure a nickname for the product.

ISLs

Interswitch links (ISLs) appear in the Topology view as lines that connect product icons. Moving the cursor over a line displays the number of actual ISLs represented by that line.

Displaying ISL Properties

To display the Domain IDs and port numbers of the products connected by an ISL, double-click the ISL (or right-click and select **Properties** from the pop-up menu). This displays an ISL Properties window (Figure 4-2).

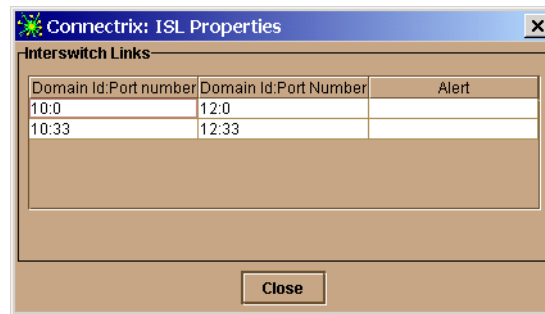


Figure 4-2 ISL Properties Window

If an alert is outstanding on an ISL, a status symbol appears in the **Alert** column.

Clearing ISL Alerts

To clear an outstanding alert for an ISL, right-click the ISL on the Topology view and select **Clear ISL Alert** from the pop-up menu. (You can also clear the alert by selecting **Clear ISL Alert** from the Connectrix Manager View menu.)

To clear all ISL alerts in the view, right-click the view away from any icons and ISLs, and select **Clear All ISL Alerts** from the pop-up menu. (You can also clear the alerts by selecting **Clear All ISL Alerts** from the Connectrix Manager View menu.)

Displaying Fabric Properties

To display properties for the fabric, select **Properties** from the Connectrix Manager Product menu, or right-click the Topology view away from any icons and select **Properties** from the pop-up menu.

The Properties window displays:

- ◆ **Fabric Status:**
 - **Operational** — All units in the fabric are operational. If one managed product is degraded but operational (indicated by a yellow triangle status symbol behind the product icon), the fabric is operational.
 - **Unknown** — No information about the fabric is available. This status typically results after removal or failure of the fabric's principal switch.
 - **Transitioning** — This state occurs during a fabric build just before the fabric becomes operational. Unless a problem occurs, this status appears only briefly.
- ◆ **Fabric Name** — The WWN (or nickname, if configured) of the principal switch, unless the fabric is persisted, in which case the fabric name is the name specified when the fabric was persisted. (Refer to *Persisted Fabrics* on page 4-17.)
- ◆ **Fabric Nickname** — The nickname, if configured, of the principal switch.
- ◆ **Fabric Binding** — This is an optional feature of Connectrix Manager that allows you to restrict unspecified switches from attaching to fabrics in the SAN.

Exporting the Fabric Topology

You can export the current fabric topology to an XML-formatted file, which can be opened and read using any ASCII editor (Notepad, for example). Information is grouped under the WWN of each managed product in the fabric.

Information includes:

- ◆ WWN and domain ID of the switch/director
- ◆ Switch/director port where an ISL is attached
- ◆ Link identification number for the ISL
- ◆ Port number on the remote switch/director where the ISL is attached

To export the topology:

1. In the Zone Set view, do either of the following:
 - Select Export Fabric Topology from the Fabrics menu.
 - Click the Export Fabric Topology button on the toolbar. (Refer to Figure 3-4 on page 3-12.)

This displays a window similar to the following.



Figure 4-3 Export Fabric Topology Window

2. Select a location, enter a filename, and click **Save**.

.XML File Example

Following is a partial exported file showing two members in a fabric.

```
<FabricTopology
  FabricWWN="McDATA-10:00:08:00:88:00:21:00">
  <FabricMember WWN="McDATA-10:00:08:00:88:00:21:00"
    DomainId="1">
    <FabricMemberConnection OutputPort="16"
      RemotePort="4" LinkId="11"/>
    <FabricMemberConnection OutputPort="4"
      RemotePort="12" LinkId="2"/>
    <FabricMemberConnection OutputPort="24"
      RemotePort="8" LinkId="12"/>
    <FabricMemberConnection OutputPort="28"
      RemotePort="4" LinkId="3"/>
    <FabricMemberConnection OutputPort="8"
      RemotePort="8" LinkId="4"/>
    <FabricMemberConnection OutputPort="20"
      RemotePort="4" LinkId="5"/>
  </FabricMember>
</FabricMember>
</FabricTopology>
```

```

    <FabricMemberConnection OutputPort="12"
RemotePort="20" LinkId="6"/>
    <FabricMemberConnection OutputPort="44"
RemotePort="0" LinkId="7"/>
    <FabricMemberConnection OutputPort="0"
RemotePort="0" LinkId="8"/>
    <FabricMemberConnection OutputPort="36"
RemotePort="4" LinkId="9"/>
    <FabricMemberConnection OutputPort="32"
RemotePort="0" LinkId="10"/>
    <FabricMemberConnection OutputPort="52"
RemotePort="4" LinkId="19"/>
    <FabricMemberConnection OutputPort="48"
RemotePort="4" LinkId="20"/>
</FabricMember>
<FabricMember WWN="McDATA-10:00:08:00:88:00:21:0A"
DomainId="11">
    <FabricMemberConnection OutputPort="4"
RemotePort="16" LinkId="1"/>
    <FabricMemberConnection OutputPort="0"
RemotePort="24" LinkId="12"/>
    <FabricMemberConnection OutputPort="20"
RemotePort="8" LinkId="2"/>
    <FabricMemberConnection OutputPort="12"
RemotePort="12" LinkId="21"/>
    <FabricMemberConnection OutputPort="8"
RemotePort="12" LinkId="22"/>
    <FabricMemberConnection OutputPort="28"
RemotePort="4" LinkId="23"/>
    <FabricMemberConnection OutputPort="24"
RemotePort="8" LinkId="24"/>
    <FabricMemberConnection OutputPort="32"
RemotePort="4" LinkId="13"/>
    <FabricMemberConnection OutputPort="36"
RemotePort="8" LinkId="14"/>
    <FabricMemberConnection OutputPort="40"
RemotePort="4" LinkId="15"/>
    <FabricMemberConnection OutputPort="44"
RemotePort="16" LinkId="16"/>
    <FabricMemberConnection OutputPort="48"
RemotePort="4" LinkId="17"/>
    <FabricMemberConnection OutputPort="56"
RemotePort="8" LinkId="18"/>

```

Determining Product Status

The Connectrix Manager status bar displays the most-critical status for any product managed by the Connectrix service processor. (Refer to *Using the Connectrix Manager Status Bar* on page 3-19.) Status symbols also appear behind product icons in the Topology view. If no symbol appears behind the icon (as shown in Figure 4-4), the product is not managed by the Connectrix service processor.

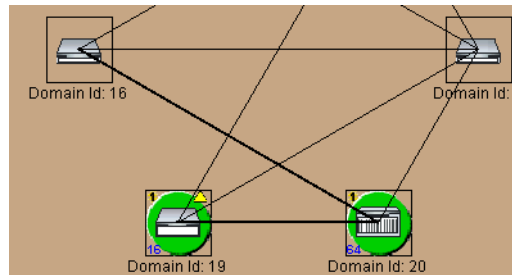


Figure 4-4 Products Not Managed by Connectrix Service Processor

To determine which fabric has a managed product with a degraded or failed status, click a fabric icon to display the Topology view for that fabric. Look for the degraded or failed status symbol behind the product's icon.

Opening a Product Manager

To open the Product Manager for a managed product, double-click the product icon in the Topology view (or right-click the icon and click **Open** on the pop-up menu). Refer to the switch-specific user guides for instructions on Product Manager operations.

Using the Zone Set View

The Zone Set view provides a complete view of the currently active zone set for fabrics that you select from the left side of the view. The zones and zone members that make up the zone set appear in a scrollable tree structure below the name of the active zone set.

Menu options allow you to quickly:

- ◆ determine fabric zoning structure (zone sets, zones, and zone members),
- ◆ determine logged in and logged out zone members,
- ◆ save active zones under another name,
- ◆ determine the default zone members,
- ◆ deactivate/activate zone sets, and
- ◆ change the default zone.

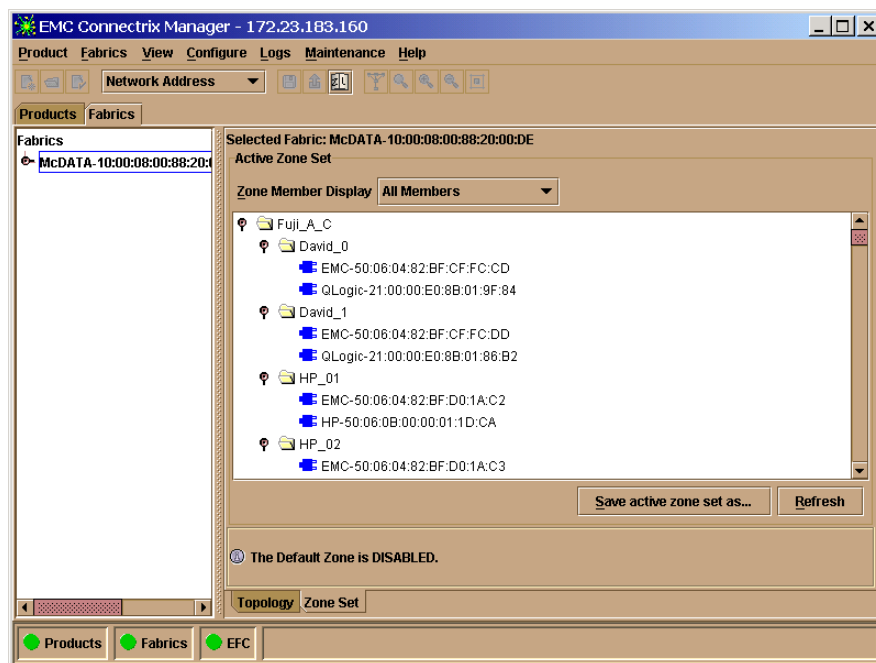


Figure 4-5 Zone Set View

You can specify whether this window will display WWNs or (if configured) nicknames for attached devices. Right-click anywhere in the panel that contains the zone set icons to display a menu of display options; then click the desired option.

One of three messages appears near the bottom center of the view:

- ◆ The Default Zone is ENABLED
- ◆ The Default Zone is DISABLED
- ◆ The active zone set does not currently match any of the stored zone sets

Members of the default zone appear in the display only if the default zone is enabled.

As Figure 4-5 shows, the default Zone Set view displays all zones and zone sets. To hide/display a list, click the magnifying glass symbol next to a zone set or zone name.

Zone members appear as a list of the following:

- ◆ **World Wide Names** — Unique 16-digit decimal numbers that identify the devices attached to ports; for example, 10:00:02:06:77:43:B0:1C. If nicknames have been configured, they will appear instead.
- ◆ **Domain ID, port numbers** — Unique Domain ID of a product (1 through 31) followed by the port number; for example, Domain 1, Port 7.

Determining the Default Zone Status

A *default* zone consists of all devices that have not been configured as members of a zone in the currently enabled (active) zone set. You can enable or disable the default zone separately from the active zone set.

EMC recommends leaving the default zone at the factory default of *Disabled*. This insures that when a link from a new N_Port is inserted into the switch, it will not be probed by any other N_Port and, in the case of a SCSI Initiator, it will not see any other N_Ports. However, this N_Port's login will be available in the Node List and Port List, and in the screens for building new zones.

Here are some factors relating to the default zone:

- ◆ When no zone set is active and the default zone is enabled, all devices are considered to be in the default zone.
- ◆ If a zone set is active and the default zone is enabled, all connected devices not included in at least one zone in the active zone set are included in the default zone.
- ◆ If a zone set is active and the default zone is disabled, all connected devices not included in at least one zone in the active zone set are *not* included in the default zone.
- ◆ If no zone set is active and the default zone is disabled, no device can access or communicate with any other device in the fabric.

Deactivating a Zone Set

Select **Advanced Zoning** from the Configure menu and click **Deactivate Zone Set** to display a Deactivate Zone Set window (Figure 4-6), where you can deactivate the active zone set..

Only one zone set can be active at a time.

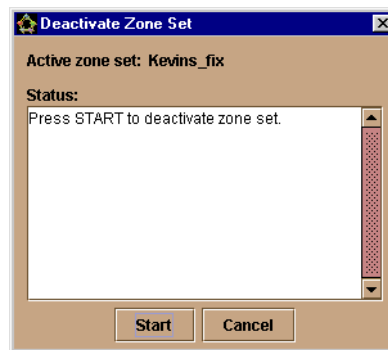


Figure 4-6 Deactivate Zone Set Window



CAUTION

Deactivating a zone set while on line with active I/O is likely to cause all servers to crash.

Click **Start** to deactivate the zone. Messages appear in the **Status** area indicating the progress and the **Cancel** button changes to a **Close** button.

When the process finishes, click **Close** to close the window.

Saving the Active Zone Set

Use the following procedure to save the active zone set as a different zone set in the Zoning Library or to save zoning configurations that you changed.

Saving an active zone set is an important procedure whenever merging two fabrics that have not been merged before. A fabric merge creates a new active zone set in the fabric, and the **Save Active zone set** operation puts this new zone set into the Zoning Library. Once the new zone set is in the library it can be managed and protected with a backup.

1. Click **Save active zone set as** at the bottom of the Zone Set view.
2. In the **Save Active zone set As** dialog box, enter a name for the selected zone set.
3. Click **OK**.

To view the new zone set, select **Zoning Library** from the Configure menu. This displays the **Zoning Library** window (Figure 4-7), with the new zone set listed.

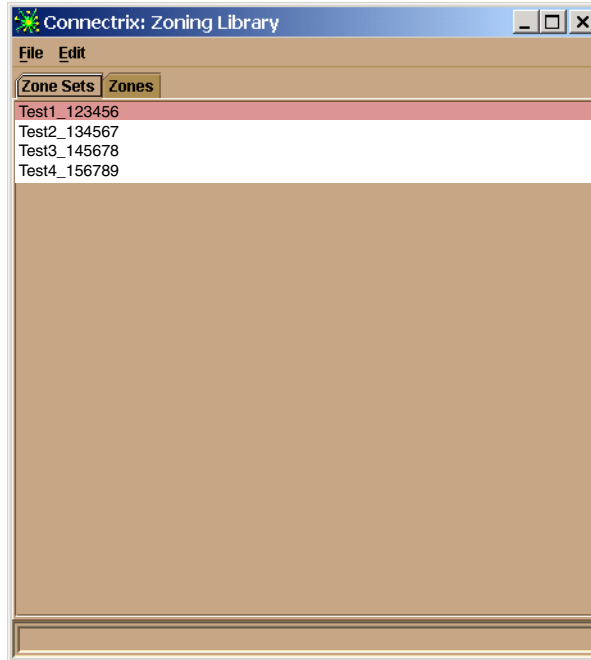


Figure 4-7 Zoning Library Window

Refer to Chapter 5 for complete information on managing zones and zone sets.

Fabric Tree

The fabric tree (Figure 4-8) displays all fabrics currently known to the Connectrix service processor. The outermost leaf displays the fabric name, which initially is the WWN of the fabric's principal switch; however, if the fabric is persisted, it has a name configured by the user.

If the fabric is persisted, the name is preceded by a fabric status icon. (Refer to *Persisted Fabrics* on page 4-17 for details).

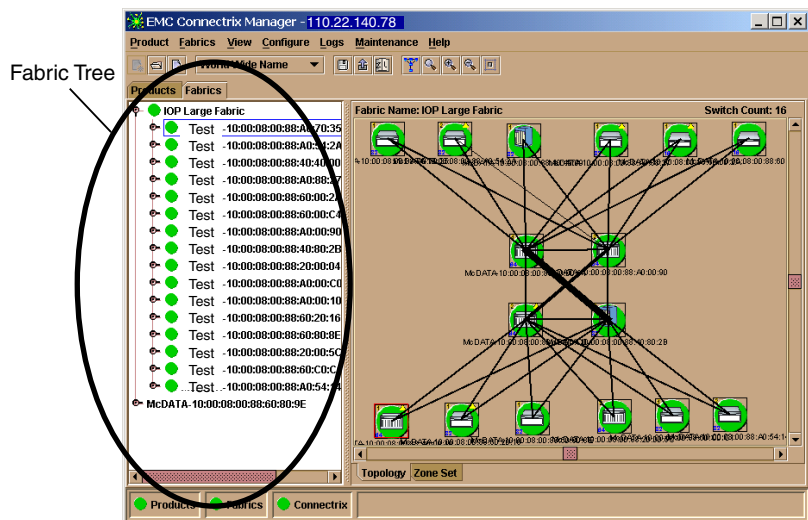


Figure 4-8 Fabric Tree

The status icons and pop-up menus that appear in the fabric tree panel relate to the Topology view.

On the fabric tree you can:

- ◆ click a fabric name or WWN to display the switches, directors, and ISLs in the fabric in the Topology view area.
- ◆ click the icon to the left of a fabric to display the products in the fabric.
- ◆ click the icon by a product to display the nodes attached to the product.

Status Icons

Icons reflecting the fabric and product operational status appear by names and WWNs in the fabric tree.

- ◆ Fabric status — Icons reflecting the fabric status appear before a fabric name only if the fabric is persisted.
 - A green circle means that the fabric is fully operational.
 - A yellow triangle means that all fabric connections are intact; however, attention indicators appear on one or more ISLs in the Topology view for the fabric.
 - A red and yellow diamond means that the fabric has split into two or more fabrics.
 - A grey square means that no information can be determined for the fabric.
- ◆ Product status — Icons reflecting the product status appear before each switch/director at all times:
 - A green circle means that the product is fully operational.
 - A yellow triangle means that the product is degraded, but is still performing as designed.
 - A red and yellow diamond means that the product has failed and requires immediate service.
 - A grey square means that the Connectrix Manager cannot determine product status.

If a status symbol does not appear behind the product, the product is not managed by the Connectrix service processor to which you are logged in.

Persisted Fabrics

A *persisted fabric* is one whose topology (products and ISLs) has been recorded and named, for the purpose of tracking changes to that topology. Persisting a fabric is similar to taking a snapshot of the fabric. When a fabric is persisted, its Topology view continues to show that snapshot even when changes are made. However, the changes are reflected by graphic indicators, such as status indicators, dimmed product icons, and dashed yellow lines as shown in Figure 4-9.

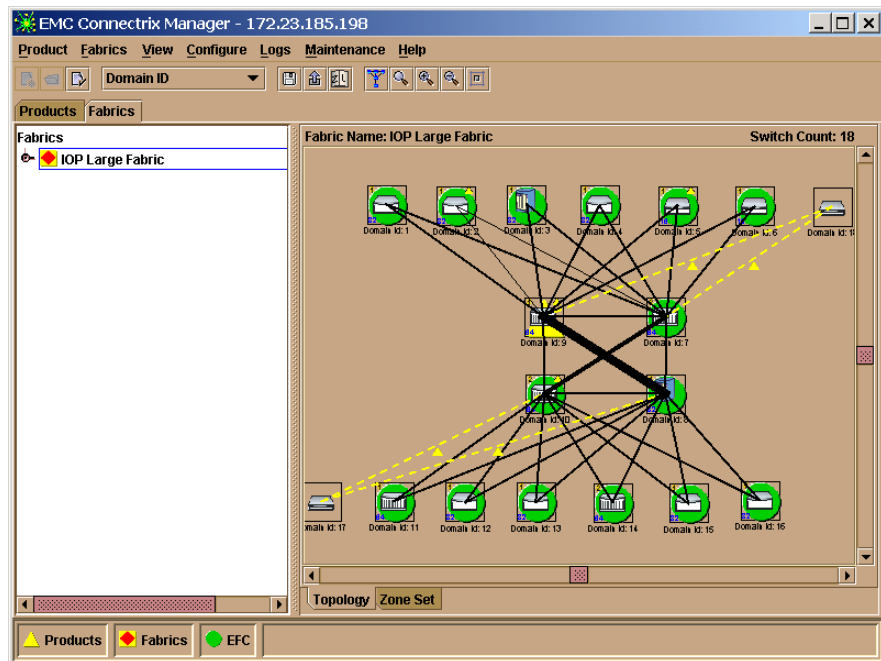


Figure 4-9 Persisted Fabric

Persisting a Fabric

To persist a fabric:

1. Display the Persist Fabric dialog box (Figure 4-10) in any of these ways:
 - In the Fabrics, Topology view, select **Persist Fabric Topology** from the Connectrix Manager Fabrics menu.
 - In the fabric tree panel, right-click the fabric's WWN/nickname, and select **Persist Fabric Topology** from the pop-up menu.
 - In the Topology view, right-click the fabric away from any icons, and select **Persist Fabric Topology** from the pop-up menu.



Figure 4-10 Persist Fabric Dialog Box

2. Enter a name for the persisted fabric, and click **OK**.

The fabric name appears in place of the fabric's WWN in the fabric tree panel and at the top of the view area.

Graphic Indicators

Changes to a persisted fabric are indicated in the Topology view as follows:

- ◆ If a switch/director is removed from or added to the fabric, the product appears in a dimmed state and ISL(s) connecting the product to the fabric appear as dashed yellow lines.
A plus sign or a minus sign appears in the lower right corner of the product's icon to identify whether the product was added or removed.
- ◆ If more than one ISL is connected to a product and all ISLs are disconnected, the ISLs change to dashed yellow lines, with yellow triangle status indicators. If one or more (but not all) ISLs are disconnected, the disconnected ISLs appear as black lines, with yellow triangle status indicators.

- ◆ If an ISL is added, it appears as a black line, with a yellow triangle status indicator.

If you persist the fabric again after changes have occurred, the changes are implemented in the views, and the newly persisted fabric appears as one with no outstanding changes.

Fabric Log

Changes to a persisted fabric are reflected in the Fabric Log (accessible from the Connectrix Manager Logs menu).

This log tracks:

- ◆ making zone sets active
- ◆ adding/removing switches
- ◆ adding/removing ISLs
- ◆ renaming the fabric
- ◆ persisting the fabric
- ◆ changing fabric status

The following is recorded in the log:

- ◆ Date and time of the change
- ◆ Change in the fabric status:
 - **Operational** — No attention indicators in view
 - **Degraded** — All fabric connections are intact, however one or more ISLs have attention indicators
 - **Failed** — The fabric has split into two or more fabrics
 - **Unknown** — No information is known about the fabric

This status is also reflected by icons next to the fabric name in the fabric tree. (Refer to *Status Icons* on page 4-16.)

- ◆ Description of the change

Unpersisting the fabric removes all data from the Fabric Log. (Refer to *Unpersisting a Fabric*.)

Renaming a Persisted Fabric

To rename a persisted fabric:

1. In the Fabrics view, do one of these:
 - Right-click the fabric.
 - Select **Rename** from the Fabrics menu.
2. Enter a name into the Rename Fabric dialog box, and click **OK**.

Unpersisting a Fabric

Unpersisting a fabric implements all changes that occurred since the fabric was persisted into the Connectrix Manager views, and causes subsequent changes to be implemented as they occur.

To unpersist a fabric:

1. Initiate the process in any of these ways:
 - In the Fabrics, Topology view, select **Unpersist Fabric Topology** from the Connectrix Manager Fabrics menu.
 - In the fabric tree panel, right-click the fabric's WWN/nickname, and select **Unpersist Fabric Topology** from the pop-up menu.
 - In the Topology view, right-click the fabric away from any icons, and select **Unpersist Fabric Topology** from the pop-up menu.
2. Click **Yes** on the warning window.

The Fabrics view changes to remove any fabric status indicators, and the name of the fabric in the fabric tree changes back to the fabric's WWN. A fabric status icon will not appear by the WWN.

Fabric Binding

Fabric Binding is an optional feature of Connectrix Manager. Once this feature is installed and enabled, you can configure binding for a specific fabric, restricting unspecified switches from attaching to fabrics in the SAN. This provides security from accidental fabric merges and potential fabric disruption when fabrics become segmented because they cannot merge.

Rules and Guidelines

In order for fabric binding to function, specific operating parameters and optional features must be enabled. Also, there are specific requirements for disabling these parameters and features depending on whether the switch is off line or on line.

Be aware of the following:

- ◆ Because directors and switches are bound to a fabric by World Wide Name and Domain ID, the Insistent Domain ID option in the Product Manager Configure Switch Parameters dialog box is automatically enabled if fabric binding is enabled.
- ◆ If fabric binding is enabled and the switch is on line, you cannot disable an insistent Domain ID.

If fabric binding is enabled and the switch is off line, you can disable an insistent Domain ID; however, this also disables fabric binding.
- ◆ You cannot disable fabric binding or switch binding if Enterprise Fabric Mode is enabled.

Enabling and Disabling Fabric Binding

Fabric binding is enabled, disabled, and configured through a dialog box. After you have enabled fabric binding, use the Fabric Membership List to add switches that you want to allow into the fabric.

To configure fabric binding:

1. Select the fabric from the Fabric Tree (left panel of the Fabrics view).
2. Select **Fabric Binding** from the Fabrics menu.

This displays the Fabric Binding dialog box (Figure 4-11).



Figure 4-11 Fabric Binding Dialog Box

3. The Fabric Name in the dialog box will be the fabric you selected. If the box next to **Enable Fabric Binding** is checked, fabric binding is enabled. Click the box to add or remove a checkmark.
4. Click **Next** to display the Fabric Binding Membership list (Figure 4-12).

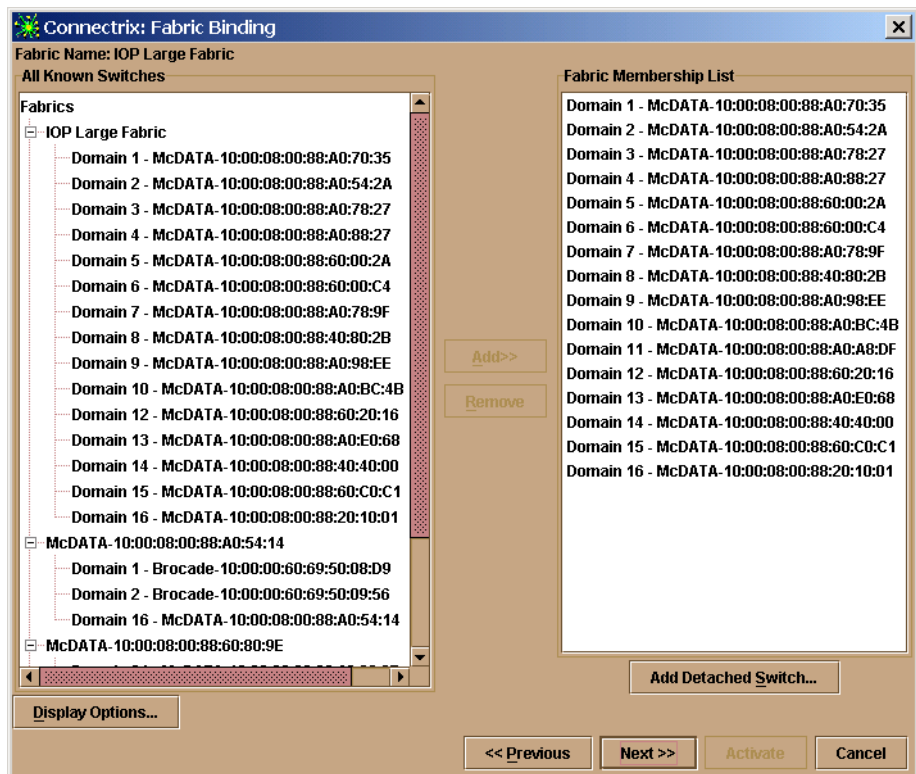


Figure 4-12 Fabric Binding — Fabric Membership List

Configure this window as described under *Configuring the Fabric Membership List*.

Configuring the Fabric Membership List

Once you have enabled fabric binding, you can add and remove switches from the membership list that can connect to the fabric.

In the Fabric Binding window (Figure 4-12):

- ◆ All switches currently in the fabric appear in the left panel. Switches are listed by their WWN or nickname under their respective fabrics.

To expand a list of switches in a fabric, click the icon to the left of the fabric name. You can display switches by their WWN or nickname (if configured) by clicking **Display Options** and selecting **Nickname** or **World Wide Name**.

- ◆ All switches that can connect to the fabric are listed by their Domain ID and WWN in the right panel.

Configure the Fabric Binding window as follows:

1. Add/remove switches:
 - To add a switch to the Fabric Membership List, select a switch in the All Known Switches panel, and click **Add**.
 - To add a switch not currently known in the fabric, click **Add Detached Switch**. This displays an Add Detached Node dialog box.
 - a. Click **Nickname** and enter a nickname for the switch (if configured), or click **WWN** and enter a World Wide Name for the switch.
 - b. Enter a Domain ID.
 - c. Click **OK**.
 - To remove a switch from the Fabric Membership List and thereby not allow this switch to connect to the fabric:
 - a. Isolate the switch from the fabric by performing one of these steps:
 - Configure the switch off line through the Product Manager for that switch: Select **Set Online State** from the Product Manager Maintenance menu. Then click **Set Offline** on the Set Online State dialog box.

- Block the E_Port where the switch is attached:
Right-click the port in the Product Manager Hardware view, and select **Block Port** on the pop-up menu.
 - Disconnect the switch's E_Ports.
- b. In the Fabric Membership List, select the switch you want to remove.
 - c. Click **Remove**.
2. Click **Next**.

A summary (shown in Figure 4-13) appears, listing the options selected when you enabled fabric binding, and the switches in the Fabric Membership List.

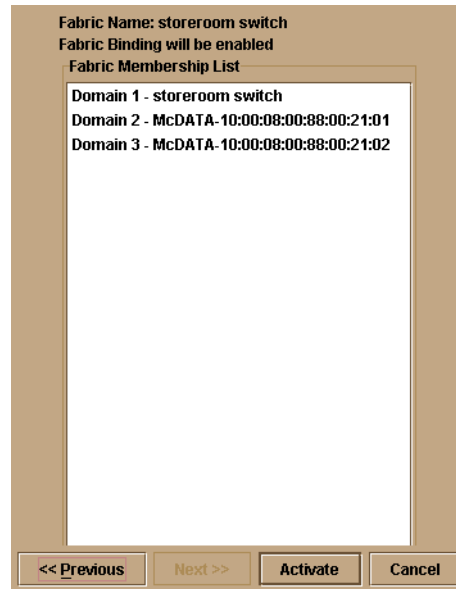


Figure 4-13 **Fabric Binding Summary**

You can click **Previous** at any time to move back through the Fabric Binding dialog boxes.

3. Click **Activate** in the Fabric Binding Summary dialog box. A Fabric Binding Activation Process dialog box displays fabric update status.

4. When the `fabric update complete` message appears, click **Close** to close the dialog box.
5. Click **Activate**.
6. When the Fabric Binding Activation Process dialog box displays a completion message, click **Close**.

Enterprise Fabric Mode

Enterprise Fabric Mode is an option available on the Fabrics menu if the Enterprise Fabric Extensions feature key is installed. Enterprise Fabric Mode automatically enables features and operating parameters that are necessary in multiswitch Enterprise Fabric environments. (Refer to *Features and Parameters Enabled* on page 4-26.)

Note that there are specific requirements for disabling these parameters and features depending on whether the director/switch is off line or on line.

Features and Parameters Enabled

Enterprise Fabric Mode enables the following:

- ◆ Fabric Binding — Allows or prohibits switches/directors from merging with a selected fabric. Refer to *Fabric Binding* on page 4-21.
- ◆ Switch Binding — Allows you to regulate which connected switches and devices can access the switch's E_Ports and F_Ports. Refer to *Configuring Switch Binding* in the switch-specific user guides.
- ◆ Rerouting Delay — Ensures that frames are delivered through the fabric in order to their destination. Refer to *Configuring Operating Parameters* in the switch-specific user guides.

If Enterprise Fabric Mode is enabled, the Rerouting Delay is enabled automatically, and cannot be disabled unless the director/switch is off line. (In this case, disabling Rerouting Delay also disables Enterprise Fabric Mode.)

- ◆ Domain RSCNs — Allows the director/switch to transmit Domain RSCNs (Register for State Change Notifications) between end devices in a fabric to provide additional connection information to host bus adapters and storage devices. Refer to *Configuring Operating Parameters* in the switch-specific user guides.

If Enterprise Fabric Mode is enabled, Domain RSCNs are enabled automatically, and cannot be disabled unless the director/switch is off line. (In this case, disabling Domain RSCNs also disables Enterprise Fabric Mode.)

- ◆ **Insistent Domain ID** — Sets the configured Preferred Domain ID as the active domain ID when the fabric initializes. Refer to *Configuring Operating Parameters* in the switch-specific user guides.

If Enterprise Fabric Mode or Fabric Binding is enabled, the Domain ID is made insistent automatically, and the option cannot be disabled unless the director/switch is off line. (In this case, disabling the option also disables Enterprise Fabric Mode and Fabric Binding.)

Domain RSCNs and Insistent Domain ID do not require the Enterprise Fabric Mode feature key to be installed and enabled for their use.

Enabling/Disabling Enterprise Fabric Mode

To enable or disable Enterprise Fabric Mode:

1. Click the **Fabrics** tab to display the Fabrics view.
2. Select a fabric for which you want to enable Enterprise Fabric Mode by clicking the fabric name in the Fabric Tree (left panel of the view).
3. Select **Enterprise Fabric Mode** from the Fabrics menu on the menu bar.

This displays the Enterprise Fabric Mode dialog box (Figure 4-14), which indicates whether Enterprise Fabric Mode is inactive or active for the fabric.

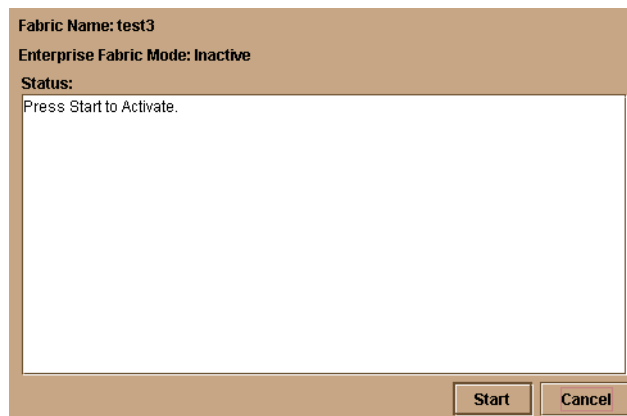


Figure 4-14

Enterprise Fabric Mode Dialog Box

4. Click **Start** to activate/deactivate Enterprise Fabric Mode.

Status and error messages appear in the dialog box as the status changes.

5. When an update completion message appears, click **Close** to close the dialog box.

This chapter explains fabric zoning and contains instructions for using the features and dialog boxes associated with zoning. The chapter contains these sections:

- ◆ Zoning Concepts 5-2
- ◆ Merging Zoned Fabrics 5-8
- ◆ Configuring and Managing Zoning 5-10
- ◆ Configuring Nicknames 5-37

Zoning Concepts

Zoning is configured by authorizing or restricting access to Name Server information associated with device ports that attach to product ports.

A device port can belong to multiple zones.

A zone member is specified by one of these:

- ◆ The port number of the product port to which a device is attached
- ◆ The 8-byte World Wide Name (WWN) assigned to the host bus adapter or Fibre Channel interface installed in a device
- ◆ A nickname assigned to the N_Port's WWN.

Zoning concepts include:

- ◆ Zone — A defined set of ports and/or devices that can access each other. Refer to *Zones* on page 5-4.
- ◆ Default zone — A set of all ports/devices that are not part of the active zone set (described later in this list). Eefer to *Default Zone* on page 5-6.
- ◆ Zone set — A defined group of zones. Refer to *Zone Sets* on page 5-7.
- ◆ Active zone set — The zone set currently enabled. Refer to *Active Zone Set* on page 5-7.
- ◆ Zoning Library — A collection of all defined zones and zone sets. Refer to *Zoning Library* on page 5-7.

Zoning strategies for EMC environments are developed in the *Connectrix Enterprise Storage Network System Planning Guide*.

Maximum Configurations

The following table shows some configuration limits:

Association	Parameter	Maximum
Fabric-wide	Switches in one fabric	16
	Physical hops in one fabric	3
	ISLs domain to domain	8
Connectrix Manager	Zone Sets per service processor	64
	Zones per service processor	2000
	Zones per Zone Set (Check switch constraints)	1024
DS-16M, DS-16M2, DS-24M2, DS-32M, DS-32M2, ED-64M, ED-140M	Unique Zone members per Zone Set	1024
	Zones per Zone Set when average zone name length = 16	1023
	Zones per Zone Set when average zone name length = 20	1023
	Zones per Zone Set when average zone name length = 32	1023
	Zones per Zone Set when average zone name length = 64	757
	ISLs on any one switch	50% of ports
ED-1032 with firmware 3.2 or earlier	Unique Zone members per Zone Set	255
	Zones per Zone Set when average zone name length = 16	255
	Zones per Zone Set when average zone name length = 20	255
	Zones per Zone Set when average zone name length = 32	255
	Zones per Zone Set when average zone name length = 64	239
	ISLs on any one switch	50% of ports
ED-1032 with firmware 4.0 or later	Unique Zone members per Zone Set	1024
	Zones per Zone Set when average zone name length = 16	511
	Zones per Zone Set when average zone name length = 20	497
	Zones per Zone Set when average zone name length = 32	384
	Zones per Zone Set when average zone name length = 64	239
	ISLs on any one switch	50% of ports

Refer to the release notes for the latest information relative to maximum configurations and zoning limits.

Zones

A zone consists of a set of zone *members* that can access each other. Each member is defined as a port or WWN of a managed product. Members of a zone can access each other; members in different zones cannot.

Ports and devices spread throughout multiple managed products in a multiswitch fabric can be grouped into a zone. Some zone members may be specified by port number and others by the WWN of the device. Each has advantages and disadvantages. (Refer to *Using WWNs* on page 5-4 and *Using Port Numbers* on page 5-5.)

The number of members you can configure for a zone depends on the number of zones in the zone set, the length of the zone names, and other factors, but essentially is bound by the available NVRAM in the managed product.

Naming Conventions for Zones and Zone Sets

Follow these rules when naming zones and zone sets:

- ◆ All names must be unique, and may not differ by case only. For example, *myzone* and *MyZone* are both valid individually, but the are not both valid together.
- ◆ A zone set name can have a maximum of 64 characters.
- ◆ The first character of a zone set name must be a letter (A–Z, a–z).
- ◆ Valid characters for zone and zone set names are A–Z, a–z, 0–9, ^, -, _, and \$.
- ◆ A zone or zone set name cannot contain spaces.

Using WWNs

To identify a zone member by WWN, use the 16-digit WWN of the device.

Example: **10:00:08:00:88:40:C0:D4**

In the Connectrix Manager and Product Manager, the WWN is preceded with the switch/director manufacturer's name. The WWN is assigned to the Fibre Channel interface or HBA installed in devices such as servers or storage devices. Although the device may also have a *node* WWN, this WWN is not used for zoning identification. If you have assigned a nickname to the WWN, that nickname appears when you point to the WWN. In this case, you will assign the nickname as the zone member. (Refer to *Configuring Nicknames* on page 5-37.)

The advantage of identifying a zone member as the WWN or nickname of the attached device is that the identification will not

change if fiber cable connections to ports are rearranged. This is especially important if you are using spare ports. You can simply move the fiber cable to a spare port from a failed port and still maintain the zoning configuration.

The disadvantage of identifying a zone member by the WWN or nickname is that removal and replacement of a device HBA or Fibre Channel interface (thereby changing the device WWN) disrupts zone operation and may incorrectly include or exclude a device from a zone. You can minimize any disruption, however, by replacing the removed WWN or nickname with the new one in all zones that contain it. (Refer to *Finding WWNs and Nicknames* on page 5-32.)

Using Port Numbers

To identify a zone member by port number, use the Domain ID of the managed product and the port number on that managed product; for example, **Domain 1, Port 1**.

Port number ranges depend on the switch:

Switch	Port Numbers
DS-16M, DS-16M2	0 through 15
DS-24M2	0 through 23
DS-32M, DS-32M2	0 through 31
ED-64M	0 through 63
ED-140M	0 through 139

When you define a zone member by a port number, any device attached through that port is included in the zone. A port number you assign as a zone member is automatically prefixed with the domain identification number of the managed product.

The advantage of identifying a zone member by port number is that if the HBA on an attached device fails, you don't have to worry about identifying the member with the WWN of the replacement HBA.

A disadvantage of port zoning is that someone might rearrange cable connections to ports (because of port failures or other reasons) and inadvertently allow devices to communicate that should not have access to each other.

EMC discourages the use of port zoning. The flexibility of WWN zoning to adapt with minimal management to a changing fabric

environment and the needs of diagnosing optics and links has proved to be advantageous in the majority of installations.

EMC recommends assigning unique Preferred Domain IDs to each switch in the fabric (using the Configure Operating Parameters dialog box in the Product Manager).

If you used port-based zoning and a managed product's Domain ID changes, you must reconfigure all zones that contained the managed product's port as a zone member.

Port-based zoning is not supported for Interop fabrics.

Default Zone

A *default* zone consists of all devices that have not been configured as members of a zone in a currently active zone set. Here are some important points to remember about zone sets:

- ◆ You can enable or disable the default zone separately from the active zone set using the **Advanced Zoning, Configure Default Zone** option on the Connectrix Manager Configure menu. Enabling the default zone allows all devices and ports not configured as members of the active zone set to communicate. If the default zone is disabled, these ports and devices cannot communicate.
- ◆ When no zone set is activated, all devices are considered to be in the default zone.
- ◆ If a zone set is active, then all connected devices that are not included as members of a zone in the active zone set are included in the default zone.

EMC recommends leaving the default zone disabled (which is the factory default setting). This insures that when a link from a new N_Port is inserted into the switch it will not be probed by any other N_Port, and in the case of a SCSI Initiator it will not see any other N_Ports. However, this N_Port's login will be available in the Node list, Port list, and in the screens for building new zones.

Zone Sets

A *zone set* is a group of zones that you can activate or deactivate as a single entity across all managed products in either a single switch or a multiswitch fabric. Only one zone set can be active at one time.

Devices that are members of zones in the zone set can only communicate with members of zones in the same zone set. However, devices can be included as members of more than one zone set. By activating a zone set, you are making all zones in the set active.

If you activate a zone set when there is already an active zone set, that set will replace the currently active zone set.

Active Zone Set

An *active zone set* is a zone set that is currently active on a single-switch fabric or across all managed products in a multiswitch fabric. When a zone set is active, all zones that are members of that zone set are active. Only one zone set can be active for the fabric at one time.

Zoning Library

The Zoning Library contains all zone sets configured through the Fabrics view. You can select any zone set in the library and activate it on a fabric.

To view this library (shown in Figure 5-8 on page 5-20), select **Zoning Library** on the Connectrix Manager Configure menu.

Merging Zoned Fabrics

Managed products are linked through ISLs to form multiswitch fabrics. In a multiswitch fabric, the active zoning configuration applies to the entire fabric. Any change to the configuration applies to all switches in the fabric.

When fabrics join through an ISL, adjacent managed products exchange active zone configurations and determine if the configurations are compatible and can merge. If the configurations can merge, the fabrics join. The resulting configuration will be a single zone set containing zone definitions from each fabric.

If configurations cannot merge, the expansion ports (E_Ports) on each product become segmented. Segmented E_Ports cannot carry traffic from attached devices (class 2 or 3 traffic), but can carry management and control traffic (class F traffic) between managed products.

Zoning configurations are compatible if the active zone names in each fabric are unique. If there are identical zone names in each fabric, then the zones must have identical members for the fabrics to join.

Rules for Merging Zoned Fabrics

Certain rules are enforced to ensure that zoning is consistent across the fabric. Table 5-1 on page 5-9 summarizes rules for joining two fabrics through an ISL. The following terms are used in the table:

- ◆ **Not zoned** — No zone set is active in the fabric and the default zone is enabled. In other words, all devices in the fabric are visible to all other devices in the fabric.
- ◆ **zoned** — A zone set is active in the fabric and/or the default zone is disabled. In this case, devices can discover other devices that are members of the same zone.
- ◆ **Zoning configuration** — Combination of the active zone set definition and the default zone state (enabled or disabled).

Table 5-1 Merging Fabrics — Results for zone Configurations

Fabric A	Fabric B	Result
Not zoned	Not zoned	Fabrics join successfully. The new fabric remains not zoned.
Not zoned	zoned	Fabrics join successfully and the active zone set will propagate across the fabric. Fabric A inherits zoning configuration from Fabric B.
zoned	Not zoned	Fabrics join successfully and the active zone set will propagate across the fabric. Fabric B inherits zoning configuration from Fabric A.
zoned	zoned	Fabrics can merge if the zone names in each fabric are unique. The resulting active zone set is a union of the zones from each fabric. Once you have merged the two zoned fabrics, click Save active zone set as in the Zone Set view to save the active zone set to the zone set library with a new name. If there is a zone name conflict (the same zone name in each fabric) then the zones must have identical members for the fabrics to join. If the two zones have the same name but contain different members, then the E_Ports will segment and the fabrics will not join.

If merging zones will result in segmented E_Ports and the fabrics will not join, you can join the fabrics by editing the respective zone sets in the library and then activating these modified zone sets. Once the active zone sets in the two fabrics are compatible and all other operating parameters are compatible, an on-line merge can be initiated by adding an ISL between the two fabrics. After the merge is successful, use the zone management system to save the active zone set. Create a name for this zone set that best reflects the merger.

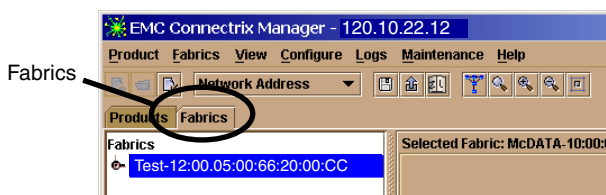
Configuring and Managing Zoning

This section contains detailed steps for establishing new zones and zone sets in a fabric. Steps are also provided for other zoning tasks.

You can configure and manage all zoning through the Connectrix Manager Fabrics and Configure menus.

1. Most zoning functions are available from the menus only in one of the Fabrics views (Topology view or Zone Set view).

Click the **Fabrics** tab to display the Topology view:



2. These zoning functions are now available:
 - Fabrics menu: **Show Zone Members** (Refer to *Viewing Zone Members* on page 5-23)
 - Configure menu:
 - **Activate Zone Set** (Refer to *Activating a Zone Set* on page 5-16)
 - **Zoning Library** (Refer to *Zoning Library* on page 5-7)
 - **Deactivate Zone Set** (Refer to *Deactivating a Zone Set* on page 5-29)
 - **Configure Default Zone** (Refer to *Default Zone* on page 5-6)

Configuring New Zoning for a Fabric

To configure one or more new zones and/or zone sets, follow these procedures:

1. *Creating Zones* on page 5-11
2. *Creating Zone Sets* on page 5-14
3. *Activating a Zone Set* on page 5-16

Other Zoning Tasks

Other tasks described in this section are:

- ◆ *Viewing Zones and Zone Sets* on page 5-20
- ◆ *Importing and Exporting Zone Sets* on page 5-24
- ◆ *Copying a Zone* on page 5-24
- ◆ *Modifying a Zone* on page 5-25
- ◆ *Renaming a Zone* on page 5-26
- ◆ *Deleting a Zone* on page 5-26
- ◆ *Copying a Zone Set* on page 5-27
- ◆ *Modifying a Zone Set* on page 5-27
- ◆ *Renaming a Zone Set* on page 5-29
- ◆ *Deactivating a Zone Set* on page 5-29
- ◆ *Deleting a Zone Set* on page 5-30
- ◆ *Finding Zones* on page 5-31
- ◆ *Finding WWNs and Nicknames* on page 5-32 (includes removing and replacing WWNs and nicknames)
- ◆ *Enabling/Disabling the Default Zone* on page 5-35
- ◆ *Adding a Nickname* on page 5-38
- ◆ *Deleting a Nickname* on page 5-38

Creating Zones

A zone is a set of physical ports on managed products in the fabric and/or devices attached to the ports. Ports are identified by the managed product domain and physical port member. Devices are identified by the WWN or Nickname of the device. Use this task to define and add up to 1024 zones in a zone set.

To create one or more zones:

1. From the Configure menu, select **Zoning Library**.
This displays the Zoning Library window (shown in Figure 5-8 on page 5-20).
2. If there are multiple zone sets in the library, click the zone set to which you want to add a zone.
3. Click the **Zones** tab to display a list of zones in the zone set.
4. From the File menu, select **New**.

This displays the New Zone window (Figure 5-1).

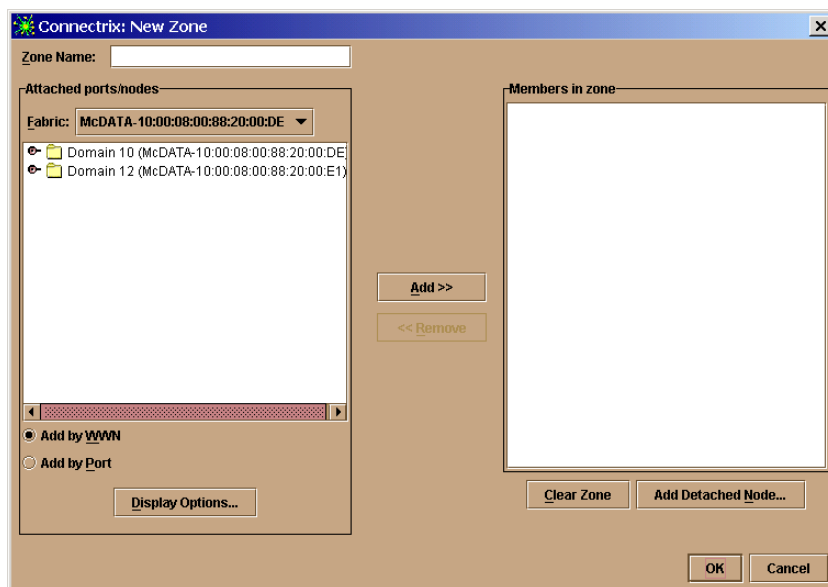


Figure 5-1 New Zone Window

You can specify whether the **Attached ports/nodes** field will display WWNs or (if configured) nicknames. Click **Display Options** at the lower left of the **New zone** window to display a selection window. Enable the desired option and click **OK**.

5. Type a name for the new zone into the **Zone Name** field. Uppercase and lowercase letters are allowed; however, spaces are *not* allowed.
6. Display ports in the **Attached ports/nodes** section by clicking on the magnifying glass icon next to a numbered domain. A list of ports expands under the selected domain.

The magnifying glass icon might not appear next to a domain if **Add by WWN** is selected and there are no nodes attached to ports on a product.

7. To add members to the zone:
 - a. Select (if necessary) the desired option for adding the zone members, between **Add by WWN** (default) and **Add by Port**.

If the operating mode of the switches/directors in the fabric is set to **Open Fabric Mode** and you select **Add by Port**, a message states: Zoning by port number is not supported in Open Fabric Mode. If you click **OK** to continue, the following message appears at the bottom of the Zone Set view after the zone is added to the zone set: XYZ Zones configured with port numbers are ignored in Open Fabric Mode. This message remains even after the zone set is activated.

- b. Select and drag members from the **Attached ports/nodes** area to the **Members in zone** area.

Figure 5-2 illustrates how members are added to the zone. The first two items in the **Members in zone** section were added with **Add by Port** selected. The next two items were added with **Add by World Wide Name** selected.

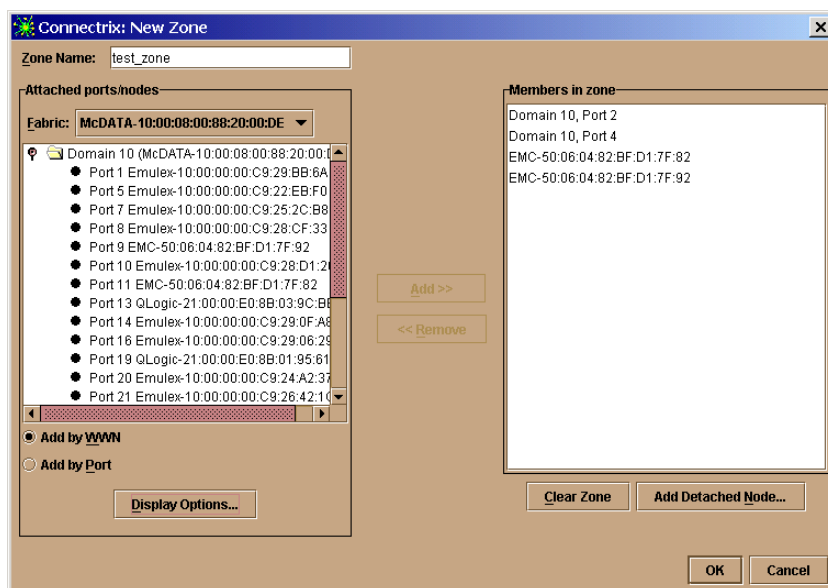


Figure 5-2 Ports and WWNs Added to Members in Zone Section

You can select multiple members individually (using CTRL) or in groups (using SHIFT). After the members are selected, press CTRL-C to copy and CTRL-V to paste the members into the **Members in zone** section.

Adding Detached Nodes

To add nodes that are not listed in the **Attached ports/nodes** section:

1. Click **Add Detached Node**.
2. In the Add Detached Node dialog box, enter the WWN or nickname of the node you want to add; then click **OK**. The WWN is added to the **Members in zone** area.

This option may be desirable for nodes that have not yet been connected to a product port in the fabric. Knowledge of the port where the node attaches is not necessary. When a node is later connected to a port, zoning is already complete.

3. Repeat steps 1 and 2 for each additional member you want to add.

Removing Zone Members

To clear members from the **Members in zone** section:

- ◆ To clear a single member, select the member and drag it out of the frame.
- ◆ To clear all members, click **Clear Zone**. When the warning appears asking if you want to remove all members in the zone, click **Yes**.

Saving the Zone

When you are finished creating the zone, click **OK** on the New Zone window. The zone is added to the Zoning Library and saved to the Connectrix service processor.

Creating Zone Sets

A *zone set* is a collection of zones that you can activate or deactivate as a single entity across all managed products in a multiswitch fabric or on one product in a single switch fabric. Devices in each zone are identified using the steps in *Creating Zones* on page 5-11.

To create a zone set:

1. From the Configure menu, select **Zoning Library**.

This displays the Zoning Library window (shown in Figure 5-8 on page 5-20), which contains all the defined zone sets.

2. From the File menu, select **New**.

This displays the New Zone Set window (Figure 5-3).

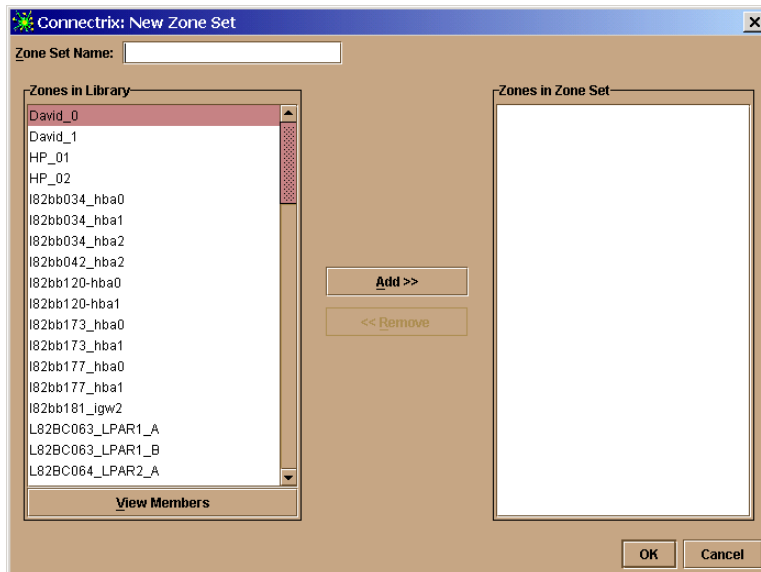


Figure 5-3 New Zone Set Window

3. Type a name into the **Zone Set Name** field. Uppercase and lowercase letters are allowed; however, spaces are *not* allowed.
4. The **Zones in Library** pane lists all defined zones. To add a zone from this library to the new zone set, select the zone and either click **Add** or drag the zone into the **Zones in Zone Set** pane. (Dragging a zone from the library does not remove the zone from the library.)

You can select multiple zones individually (using CTRL) or in groups (using SHIFT). After the zones are selected, click **Add**.

To clear a single zone from the **Zones in Zone Set** list, select the zone and either click **Remove** or drag the zone out of the **Zones in Zone Set** pane. (You do not have to drag it all the way to the **Zones in Library** pane.)

5. When the zone set is complete, click **OK** on the **New Zone Set** window.

Activating a Zone Set

To enable a zone set to control access between devices in a fabric, you must activate the zone set. Changing the configuration for an active zone set does not dynamically apply changes. For *any* change to a zone set (even modifying members in a zone that belongs to a zone set), activate the zone set using the following steps.

It is not necessary to deactivate the active zone set before activating a new zone set.

1. Select **Activate Zone Set** from the Connectrix Manager Configure menu.

This displays a window similar to the following.

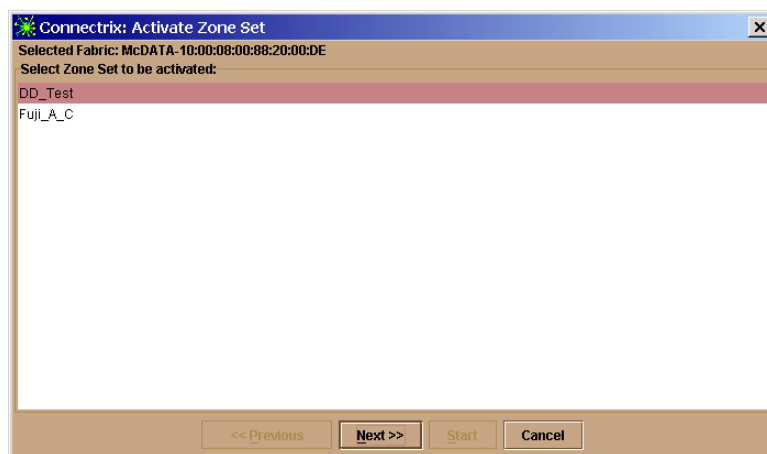


Figure 5-4 **Activate Zone Set Window**

2. Select a zone set, and click **Next**.

This displays a summary of the currently active zone set and the one you want to activate, and shows the differences between the zone sets.

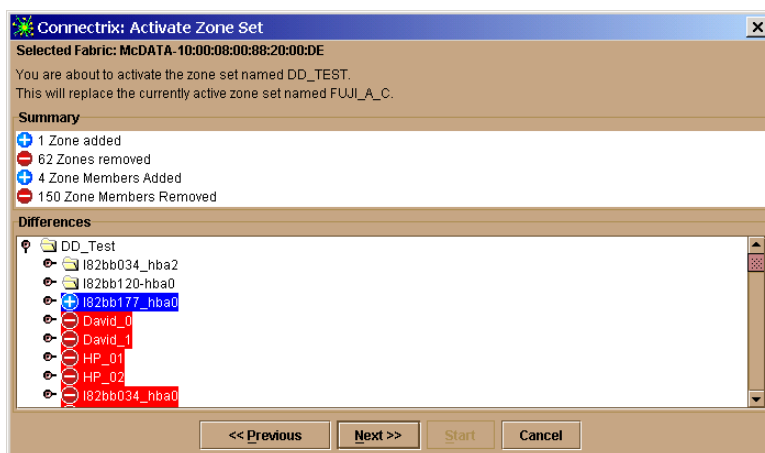


Figure 5-5 Activate Zone Set - Differences

This window is color-coded as follows:

- Plus sign (+) icons and names with blue backgrounds identify zones and zone members that are not part of the current active zone set but will be part of the new active zone set.
 - Minus sign (–) icons and names with red backgrounds identify zones and zone members that are part of the current active zone set but will not be part of the new active zone set.
3. If you want to proceed, click **Next**. (Otherwise, click **Cancel**.)
- If you click **Next**, a window similar to the following appears.

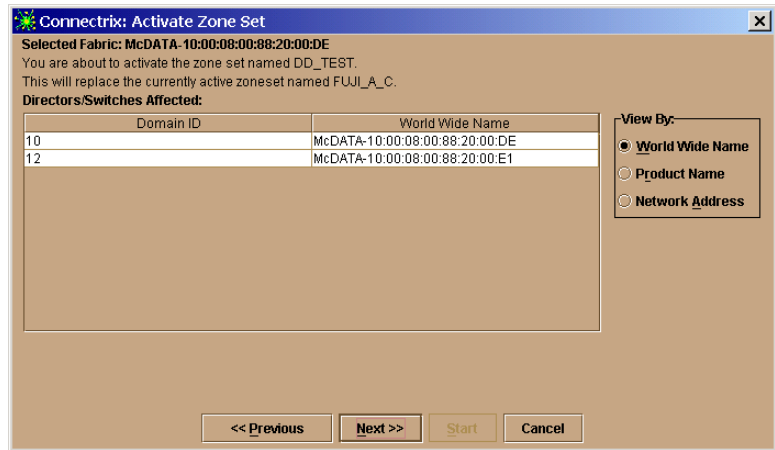


Figure 5-6 Zone Set to Be Activated Window

4. The window displays the directors or switches that will be affected by activating the zone set. You can view the directors' or switches' WWNs, product names, or network addresses, by changing the **View by** selection.

If the operating mode of the switches/directors in the fabric is set to **Open Fabric Mode** and you activate a zone set that was configured by port ID, a message states the following: XYZ contains zones configured by port number. Only WWN zoning is enforced in Open Fabric Mode.

5. Click **Next**. This displays the **Activate Zone Set** window (Figure 5-7).

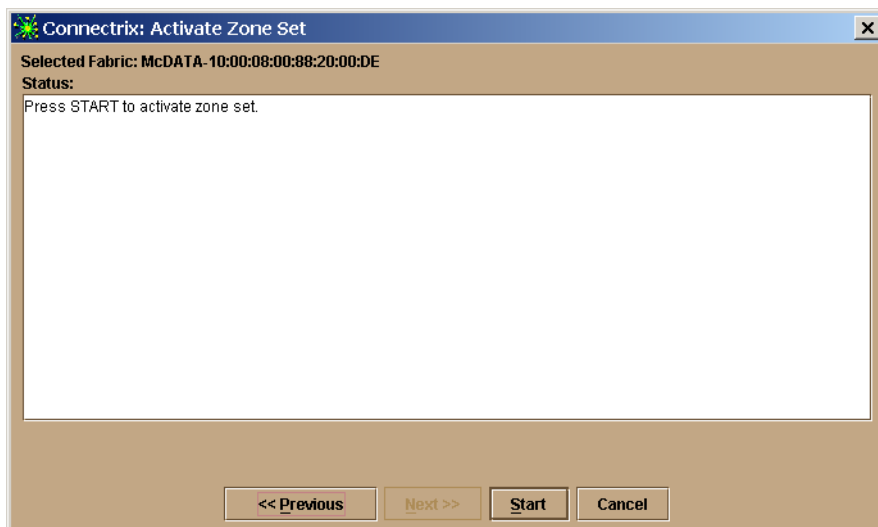


Figure 5-7 Activate Zone Set Window



CAUTION

Only one zone set at a time can be the active zone set for a fabric. Activating a new zone set replaces the currently active zone set. Take extreme care when making zoning changes and activating new/modified zone sets into a fabric.

6. Click **Start** to begin the activation.

Messages appear in the **Status** area indicating the progress of the command. Buttons on the dialog box disable until the process is complete.

When the process is complete, the **Start** button changes to a **Close** button.

7. Click **Close** to close the dialog box.

Viewing Zones and Zone Sets

To display defined zones and zone sets, select **Zoning Library** from the Connectrix Manager's Configure menu. This displays a window similar to Figure 5-8, which lists all defined zone sets.

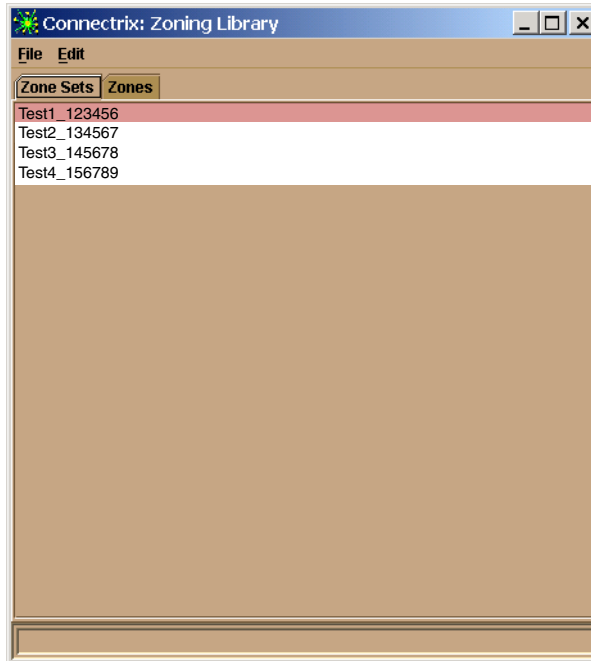


Figure 5-8 Zoning Library

Viewing Zone Set Properties

To display a Properties window for a zone set, right-click the zone set and select Properties on the pop-up menu.

This displays a window similar to the following:

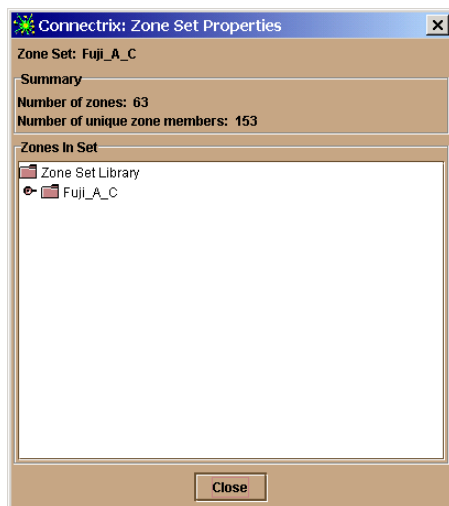


Figure 5-9 Zone Set Properties Window

To view the zones in the zone set, click the magnifying glass icon next to the zone set name. A list of zones expands under the zone set. Likewise, you can display members of a zone by clicking the associated magnifying glass icon.

Viewing Zones

You can display an alphabetized list of zones in a zone set in either of two ways:

- ◆ Click the **Zones** tab on the Zoning Library window.
- ◆ Expand the zone set as described under *Viewing Zone Set Properties*.

Viewing Zone Properties

To display a Properties window for a zone:

1. Display the list of zones as described under *Viewing Zones*.
2. Right-click the desired zone and select Properties on the pop-up menu.

This displays a window similar to the following:

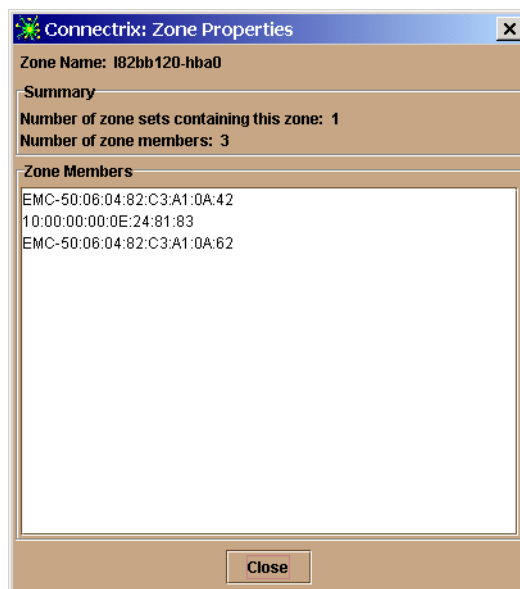


Figure 5-10 Zone Properties Window

Viewing Zone Members

To display a list of zones and zone members in the currently displayed fabric:

1. Click the Connectrix Manager **Fabrics** tab to display the Fabrics view.
2. Select **Show Zone Members** from the Fabrics menu.

This displays a window similar to Figure 5-11.

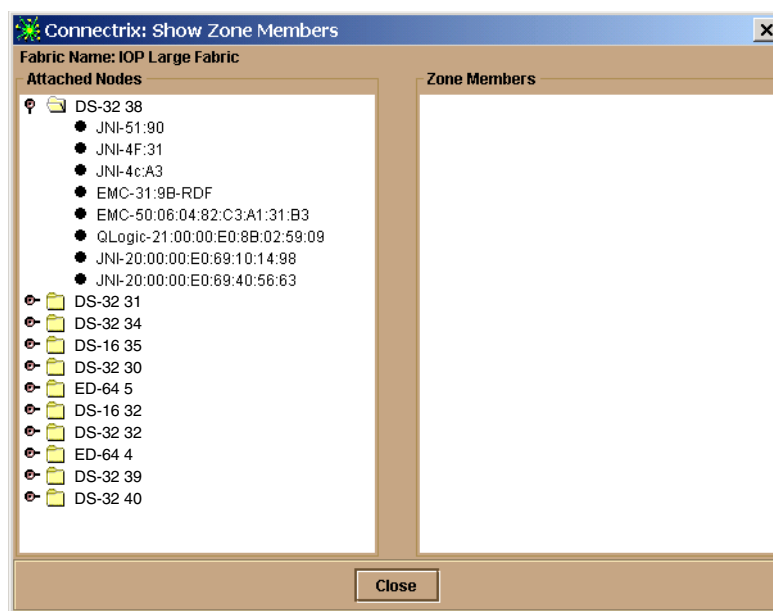


Figure 5-11 Show Zone Members Window

3. Click an icon by a product name to expand the list of attached nodes. Select a node, and the WWNs (or nicknames, if configured) of nodes that are members of the same zone as the node selected display in the right panel.

Importing and Exporting Zone Sets

You can import an existing zone set from a file, or export one to a file:

1. From the Configure menu, select **Zoning Library**.

This displays the Zoning Library window (shown in Figure 5-8 on page 5-20).

2. Select **Import Zone Set** or **Export Zone Set** from the File menu.

This displays a window similar to the **Import Zone Set** example in Figure 5-12.

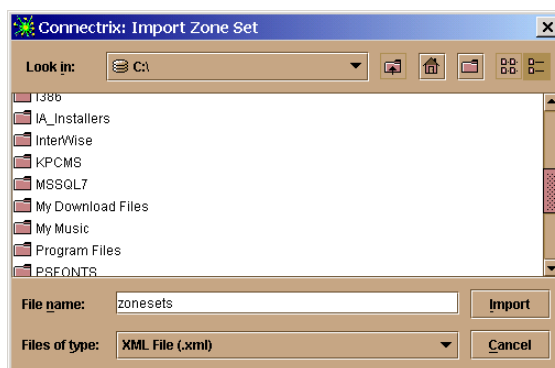


Figure 5-12 Import Zone Set Window

3. To import a zone set, select the file name and click **Import**.

To export a zone set, select a location; then enter a file name and click **Export**.

Copying a Zone

Use the **Copy Zone** option to create a new zone for the Zoning Library based on an existing zone:

1. From the Connectrix Manager's Configure menu, select **Zoning Library**.
2. On the Zoning Library window (shown in Figure 5-8 on page 5-20), click the **Zones** tab.
3. Click the zone you want to copy.
4. From the Edit menu, select **Copy Zone**.
5. In the **Copy Zone** dialog box, enter a zone name and click **OK**.

This creates a new zone containing the same members as the zone you selected from the Zoning Library.

Modifying a Zone

Use the **Modify zone** option to modify an existing zone:

1. From the Connectrix Manager's Configure menu, select **Zoning Library**.
2. On the Zoning Library window (shown in Figure 5-8 on page 5-20), click the **Zones** tab.
3. Double-click the zone you want to modify (or right-click the zone and select **Open** from the pop-up menu).

This displays the Modify Zone window (Figure 5-13).

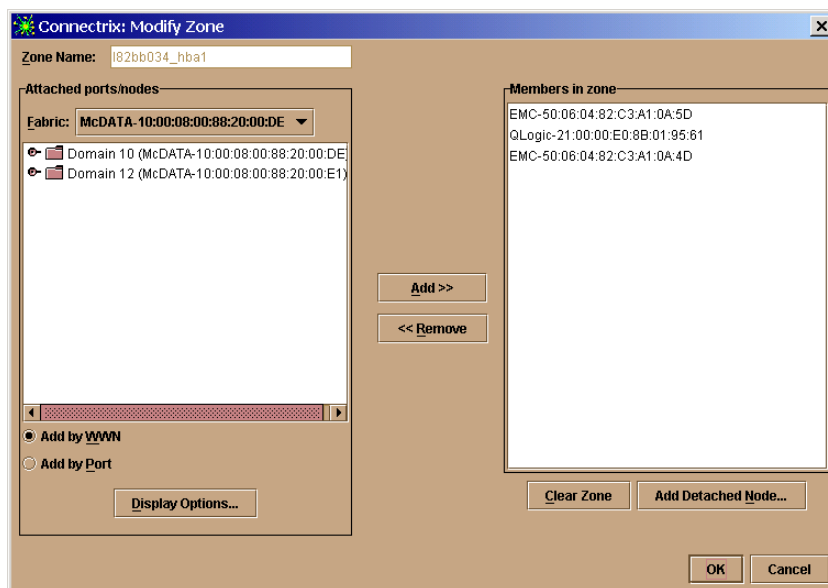


Figure 5-13 Modify Zone Window

You can specify whether the **Members in zone** field displays WWNs or (if configured) nicknames. Click **Display Options** at the lower left of the Modify Zone window to display a selection window. Enable the desired option and click **OK**.

4. Add or remove zone members using the procedures described in *Creating Zones* on page 5-11.

5. When finished making changes to the zone, click **OK**.

Changing the configuration for an active zone set does not apply the changes dynamically. For *any* change to an active zone set (even modifying members in a zone that belongs to a zone set), activate the zone set using steps under *Deactivating a Zone Set* on page 5-29.

It is not necessary to deactivate the active zone set before activating a new zone set.

Renaming a Zone

To rename a zone:

1. From the Connectrix Manager's Configure menu, select **Zoning Library**.
2. On the Zoning Library window (shown in Figure 5-8 on page 5-20), click the **Zones** tab.
3. Display a Rename Zone dialog box in either of these ways:
 - Right-click the zone you want to rename, and select **Rename** on the pop-up menu.
 - Click the zone you want to rename, and select **Rename** from the File menu.
4. Enter a new name for the zone In the Rename Zone dialog box; then click **OK**.

Deleting a Zone

To delete one or more zones from the Zoning Library:

1. From the Connectrix Manager's Configure menu, select **Zoning Library**.
2. On the Zoning Library window (shown in Figure 5-8 on page 5-20), click the **Zones** tab.
3. Initiate the deletion in either of these ways:
 - Right-click the zone you want to delete, and select **Delete** on the pop-up menu.
 - Click the zone you want to delete, and select **Delete** from the File menu.
4. On the window asking you to confirm the deletion, click **Yes**. The zone is removed from the Zoning Library and all zone sets.

If the zone you deleted was the only zone in a particular zone set, that zone set is also deleted.

Copying a Zone Set

Use the **Copy Zone Set** option to create a new zone set for the Zone Set Library based on an existing zone set:

1. From the Connectrix Manager's Configure menu, select **Zoning Library**.
2. On the Zoning Library window (shown in Figure 5-8 on page 5-20), click the zone set you want to copy.
3. From the Edit menu, select **Copy Zone Set**.
4. In the Copy Zone Set dialog box, enter a zone set name and click **OK**.

This creates a new zone set containing the same zones as the zone set you selected from the Zoning Library.

Modifying a Zone Set

Use the **Modify** option to modify a zone set:

1. From the Connectrix Manager's Configure menu, select **Zoning Library**.
2. On the Zoning Library window (shown in Figure 5-8 on page 5-20), display the **Modify zone set** window (Figure 5-14 on page 5-28) in either of these ways:
 - Right-click the zone set you want to modify, and select **Open** on the pop-up menu.
 - Click the zone set you want to modify, and select **Open** from the File menu.

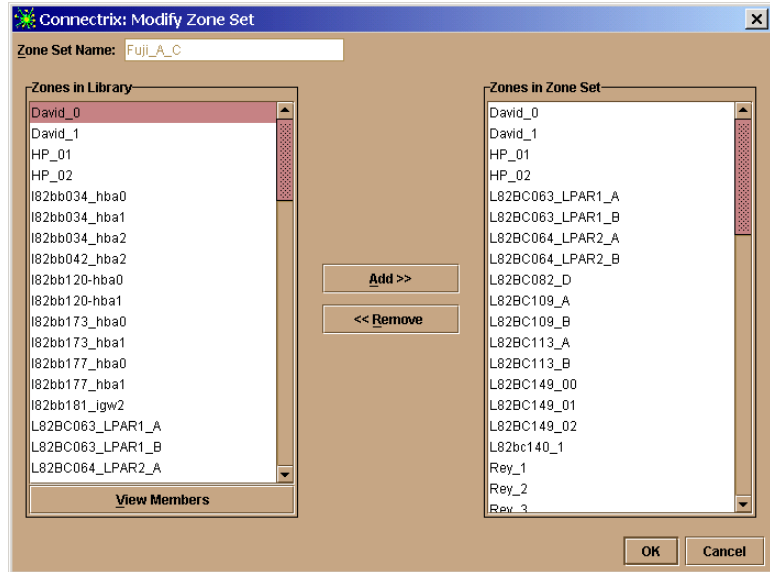


Figure 5-14 Modify Zone Set Window

3. The **Zones in Library** pane lists all defined zones and the **Zones in Zone Set** pane lists the zones currently in the zone set.

To add a zone from the library to the zone set, select the zone and either click **Add** or drag the zone into the **Zones in Zone Set** pane. (Dragging a zone from the library does not remove the zone from the library.)

You can select multiple zones individually (using CTRL) or in groups (using SHIFT). After the zones are selected, click **Add**.

To clear a single zone from the **Zones in Zone Set** list, select the zone and either click **Remove** or drag the zone out of the **Zones in Zone Set** pane. (You do not have to drag it all the way to the **Zones in Library** pane.)

Changing the configuration for an active zone set does not dynamically apply changes. For *any* change to an active zone set (even modifying members in a zone that belongs to a zone set), activate the zone set using steps in *Activating a Zone Set* on page 5-16.

It is not necessary to deactivate the active zone set before activating a new zone set.



CAUTION

Only one zone set at a time can be the active zone set for a fabric. Activating a new zone set replace the currently active zone set. Take extreme care when making zoning changes and activating new/modified zone sets into a fabric.

Renaming a Zone Set

To rename a zone set:

1. From the Connectrix Manager's Configure menu, select **Zoning Library**.
2. On the Zoning Library window (shown in Figure 5-8 on page 5-20), display a Rename Zone Set dialog box in either of these ways:
 - Right-click the zone set you want to rename, and select **Rename** on the pop-up menu.
 - Click the zone set you want to rename, and select **Rename** from the File menu.
3. Enter a new name for the zone in the Rename Zone Set dialog box; then click **OK**.

Deactivating a Zone Set

When you deactivate the active zone set, all attached devices become members of the default zone. If the default zone is enabled, the devices can access and communicate with each other. If the default zone is not enabled, devices cannot access and communicate with each other.

1. Select **Advanced Zoning**, then **Deactivate Zone Set** from the Connectrix Manager Configure menu.

This displays a window similar to the following.

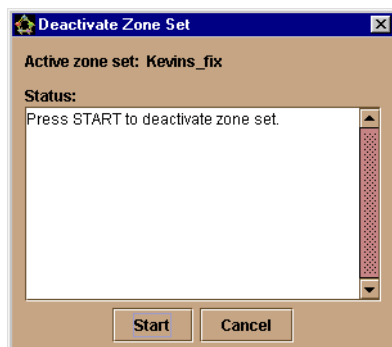


Figure 5-15 Deactivate Zone Set Window

2. Click **Start**.

Messages appear in the **Status** area indicating the progress of the command. Buttons on the window are disabled until the process completes.

When the process finishes, the **Start** button changes to a **Close** button.

3. Click **Close** to close the window.

Deleting a Zone Set

To delete a zone set:

1. From the Connectrix Manager's Configure menu, select **Zoning Library**.

This displays the Zoning Library window (shown in Figure 5-8 on page 5-20).

2. Initiate the deletion in either of these ways:
 - Right-click the zone set you want to delete, and select **Delete** on the pop-up menu.
 - Click the zone set you want to delete, and select **Delete** from the File menu.
3. On the window asking you to confirm the deletion, click **Yes**. The zone set is removed from the Zoning Library.

Finding Zones

To identify the zone set(s) to which a zone belongs:

1. From the Connectrix Manager's Configure menu, select **Zoning Library**.
2. On the Zoning Library window (shown in Figure 5-8 on page 5-20), click the **Zones** tab.
3. Click the zone, then select **Find Zone** from the Edit menu.

This displays a window similar to Figure 5-16, listing all zone sets that contain the selected zone.

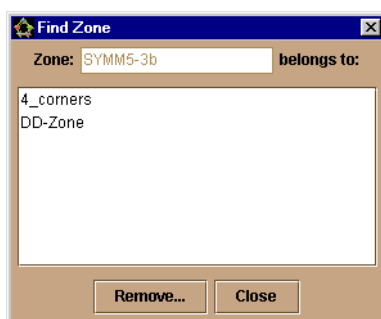


Figure 5-16 Find Zone Window

4. If you want to remove the zone from one or one or more zones, click **Remove** at the bottom of the window.

This displays a Remove Zone window (Figure 5-17).

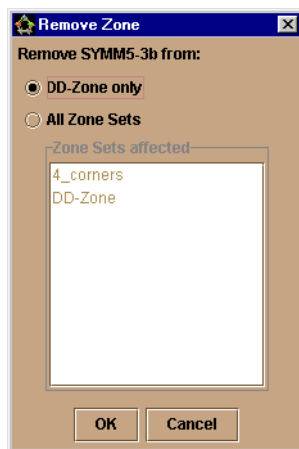


Figure 5-17 Remove Zone Window

5. Perform one of the following steps:
 - Click the selected zone set option to remove the zone from that zone set only.
 - Click **All zone sets** to remove the zone from all configured zone sets.
6. Click **OK** to remove the zone(s) and close the Remove zone window.

Finding WWNs and Nicknames

Use the **Find Member** option to find zones or zone sets in which a specific WWN or nickname is located. Once located, you can remove or replace the WWN/nickname from one or more zones/zone sets:

1. From the Connectrix Manager's Configure menu, select **Zoning Library**.
2. On the Zoning Library window (shown in Figure 5-8 on page 5-20), select **Find Member** from the Edit menu. (It does not matter whether the **Zone Sets** or **Zones** tab is selected.)
3. This displays a Find WWN/Nickname dialog box (Figure 5-18).



Figure 5-18 Find WWN/Nickname Dialog Box

4. Enter a WWN or nickname and click **OK**.
5. This displays a window similar to the following, listing all zones and zone sets that contain the WWN or nickname.

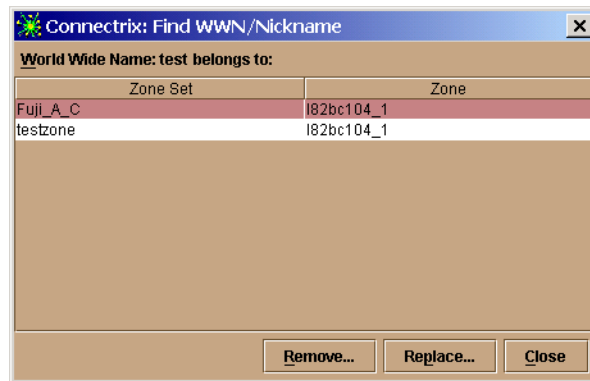


Figure 5-19 Find WWN/Nickname Results

If you do not want to change anything, click **Close**. Otherwise:

- If you want to remove the WWN/nickname from one or more zones, go to step 7.
- If If you want to replace the WWN/nickname with another in all the zones that contain it, go to step 6.

6. If you want to replace the WWN/nickname with another in all the zones that contain it, click **Replace**.

This displays a window similar to the following.

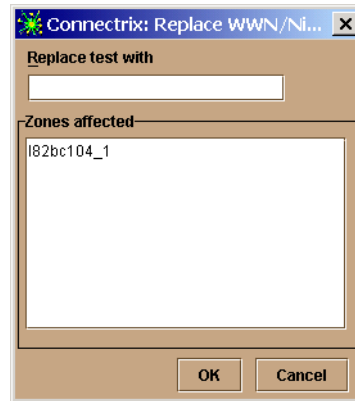


Figure 5-20 Replace WWN/Nickname Window

Enter the name of the replacement WWN/nickname; then click **OK**.

7. If you want to remove the WWN/nickname from one or more zones, click **Remove**.

This displays the Remove WWN/Nickname window (Figure 5-21).

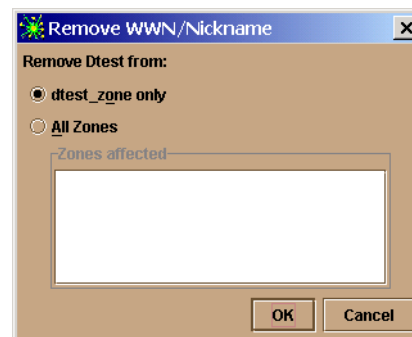


Figure 5-21 Remove WWN/Nickname Window

- a. Perform one of the following steps to remove a WWN/nickname:
 - Click a zone to remove the WWN/nickname from that zone only.
 - Click **All zones** to remove the WWN/nickname from all zones in the Zoning Library.
- b. Click **OK**.

Enabling/Disabling the Default Zone

A default zone consists of all devices that have not been configured as members of a zone in a currently active zone set. When no zone set is active, then all devices are considered to be in the default zone. If a zone set is active, then all connected devices that are not included in at least one of the zones in the active zone set are included in the default zone.

Enabling the default zone allows any device in the default zone to see any other device in the default zone. If the default zone is disabled and no zone set is active, then devices connected to the product cannot communicate.

In the initial configuration, the default zone is disabled.

To disable or enable the default zone:

1. From the Connectrix Manager menu bar, select Configure, Advanced Zoning, Configure Default Zone.

This displays a window similar to Figure 5-22.

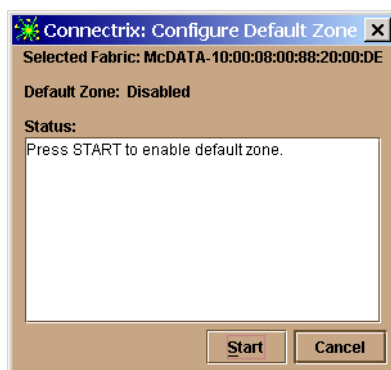


Figure 5-22

Configure Default Zone Window

2. To enable or disable the default zone, click **Start**.

Messages appear in the **Status** area indicating the progress of the operation. Buttons on the window are disabled until the process is complete.

3. When the process finishes, the **Start** button changes to a **Close** button. Click **Close** to close the window.

Backing Up Zoning Configurations

As long as a Zip disk is kept in the Zip drive on the Connectrix service processor, configuration data and other critical information will be backed up to the disk automatically when the data directory contents change or the Connectrix service processor is rebooted. This function is handled through the Iomega QuikSync application and is described in more detail in *Automatic Data Backup* on page 2-17.

Configuring Nicknames

Nicknames are names assigned to World Wide Names of devices. Nicknames enable you to assign more meaningful names to managed devices than the standard 8-byte World Wide Names. When you assign a nickname to a product, the nickname appears in Connectrix Manager views instead of the World Wide Name.

Refer to the chapter on *Zoning and Naming* in the *Connectrix Enterprise Storage Network System Planning Guide*.

To configure nicknames, select **Nicknames** from the Connectrix Manager Configure menu (or right-click anywhere in the fabric tree and select **Nicknames** from the pop-up menu).

This displays the dialog box shown in Figure 5-23, which lists any existing nicknames and their associated World Wide Names.

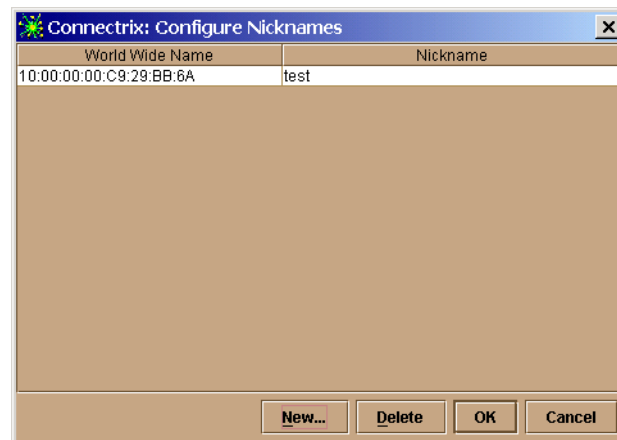


Figure 5-23 Configure Nicknames Dialog Box

Do not modify the WWN in the Configure Nicknames dialog box. To change a WWN, add a new entry; then delete the old one.

Adding a Nickname

To add a Nickname:

1. Click **New** on the Configure Nicknames dialog box. This displays a window similar to Figure 5-24.

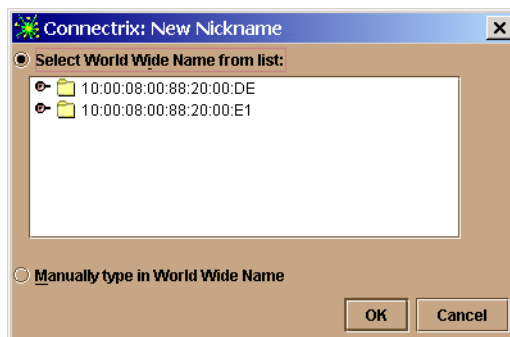


Figure 5-24 **New Nickname Window**

2. Select a WWN by expanding the zone(s) to display the members, or select **Manually type in World Wide Name**; then click **OK**.

A window similar to Figure 5-23 appears, with the **Nickname** field blank for the WWN you selected, or both fields blank if you are manually entering the WWN.

3. Enter the WWN and/or nickname; then click **OK**.

Deleting a Nickname

To delete a nickname:

1. In the Configure Nicknames dialog box, click the nickname you want to delete.
2. Click **Delete**.
3. Click **OK** to confirm that you want to delete the nickname.

Product Administration and Status

This chapter includes information on administration of products through the Connectrix Manager, including managing products, and configuring call-home, e-mail and Ethernet event notification.

Be sure to back up configurations each time you make changes through dialog boxes and menu options in the Connectrix Manager. Use the procedure under *Automatic Data Backup* on page 2-17.

This chapter contains the following sections:

- ◆ Managing Products.....6-2
- ◆ Configuring Notification6-6
- ◆ Configuring Ethernet Events.....6-10
- ◆ Viewing Routes.....6-11
- ◆ Configuring Threshold Alerts.....6-15

Managing Products

Information entered into dialog boxes during product administration provides the Connectrix service processor with information to communicate with the Fibre Channel connectivity products over the LAN.

Adding a Product

To identify a product to the Connectrix Manager and add its icon to the Products view, use the following steps:

1. Open the New Product dialog box using either of these methods:
 - Right-click in a blank area of the Products view (away from any product icons); then click **New** on the pop-up menu that appears.
 - From the Product menu, select **New**.

Either method displays the New Product dialog box (Figure 6-1).

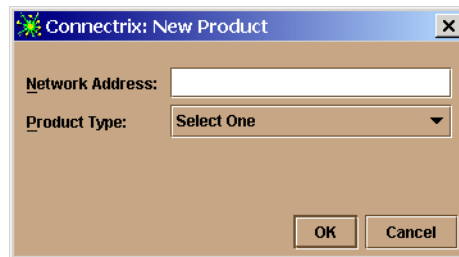


Figure 6-1 New Product Dialog Box

2. Enter a valid IP address or domain Name Server (DNS) host name in the Network Address field. A valid IP address is in the form *nnn.nnn.nnn.nnn*, where each *nnn* is a decimal in the range 0 through 255.
3. Select the product type from the Product Type list.
4. Click **OK**.

A new icon for the product appears in the Products view.

Modifying a Product

This option allows you to change the network address that appears under a product icon (assuming the display options is set to **Network Address**). (Refer to *Display Options* on page 3-13.)

1. Display the Modify Network Address dialog box (Figure 6-2) in either of these ways:
 - Right-click the product's icon, and select **Modify** on the pop-up menu.
 - Click the product's icon; then click **Product** on the menu bar and select **Modify** on the drop-down menu.

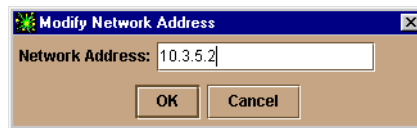


Figure 6-2 Modify Network Address Dialog Box

2. The Network Address field displays the existing network address of the product. Change the address as desired; then click **OK**.

Deleting a Product



CAUTION

Deleting a product from the Products view removes all information about the product from the system. This includes configuration information, event logs, diagnostic information, and any other data maintained by the corresponding Product Manager.

To delete a product from the Products view:

1. Select the **Delete** option in either of these ways:
 - Right-click the product's icon, and select **Delete** on the pop-up menu.
 - Click the product's icon; then click **Product** on the menu bar and select **Delete** on the drop-down menu.
2. A warning dialog box displays asking if you want to remove the item from the system.

Click **Yes**. The product icon is deleted from the Products view.

Determining Product Status

You can determine a product's operating status by the alert symbol that appears behind the product's icon. These symbols are the same as those that appear in the Connectrix Manager status bar, and are defined *Using the Connectrix Manager Status Bar* on page 3-19. If no alert symbol displays behind the icon, the product is not managed by the Connectrix service processor.

Displaying Product Properties

You can display product properties through the Products view. To display information about a managed product:

1. Right-click a product's icon in the Products view and click **Properties** on the pop-up menu.

Figure 6-3 is an example of a Properties window for an ED-64M.

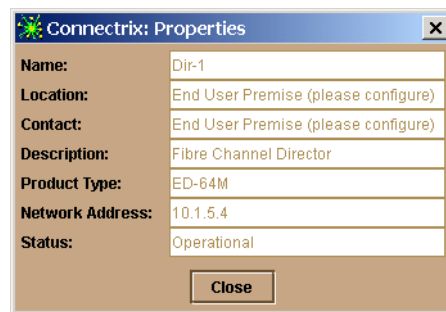


Figure 6-3 Product Properties Window

The Properties window displays information about a product managed by the Connectrix Manager. For example, for a director, the following information displays:

- ◆ Name of the product as configured through the Product Manager.
- ◆ Location of the product as configured through the Product Manager.
- ◆ Contact person for the product as configured through the Product Manager.
- ◆ Description of the product as configured through the Product Manager.
- ◆ Product type (ED-64M, for example) as configured through the Connectrix Manager's New Product dialog box.

- ◆ Network address as configured through the Connectrix Manager's New Product dialog box.
- ◆ Current product operational status:
 - **Operational** — Product is fully operational.
 - **Degraded** — Product needs attention. Typically, this appears when a redundant FRU fails, but the product is still performing as designed.
 - **Failed** — Product needs immediate attention.
 - **Unknown** — The Connectrix Manager cannot determine product status because of a network communication failure between the product and the Connectrix service processor, or because the managed product is not responding.

Configuring Notification

The Event Notification feature is configured at multiple levels. Each Product Manager has an option to enable call-home and e-mail notification. A Connectrix Manager window allows you to enable/disable call-home and/or e-mail notification for all managed products.

These options are selectable from the Connectrix Manager Maintenance menu and the individual Product Manager windows. The procedures to enable/disable are identical for either window, but in order for Event Notification to work for any managed product you must enable the call-home and/or e-mail feature at the main Connectrix Manager window, even if you enabled the option at the Product Manager level.

Enabling Call-Home Event Notification

Enabling call-home allows the Connectrix service processor to automatically dial out to the EMC support center to report system problems. The support center server accepts calls from the Connectrix service processor, logs reported events, and can notify one or more support center representatives.

To enable and disable call-home notification for system problems, select, **Configure Call Home Event Notification** from the Maintenance menu.

This displays the following window:

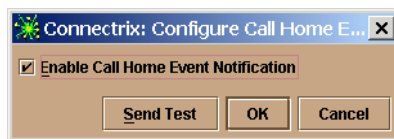


Figure 6-4 **Configure Call Home Event Notification Window**

A check mark indicates that call-home notification is enabled.

Do not make any alterations to the Connectrix Manager call-home setup without first contacting your local EMC Customer Service Representative.

Configuring E-mail Notification for Events

Configure up to five e-mail addresses for administrators or others who should be notified of significant product events. The events that initiate e-mail notification are specific to each managed product. Some examples of events that initiate e-mail notification are:

- ◆ Change in system operational status.
- ◆ Problem detection, such as a failed field-replaceable unit (FRU).
- ◆ Problem correction.
- ◆ State change that requires user attention or a report to product administrator or service representative.

To display and modify e-mail notification:

1. From the Maintenance menu, select **Configure E-Mail**. This displays the Configure E-Mail dialog box (Figure 6-5).

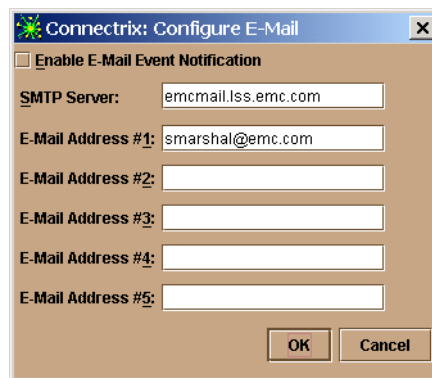


Figure 6-5 Configure E-Mail Dialog Box

2. Enter an IP address or DNS host name for your SMTP server.
3. Enter up to five e-mail addresses for personnel who should be notified automatically of system events.
4. E-mail notification is enabled if the box to the left of **Enable E-Mail Event Notification** is checked. Click the box to add or remove a checkmark.

Enabling e-mail notification enables notification for all Product Managers that have e-mail notification enabled through their **Enable E-Mail Notification** option. If the **Enable E-Mail Event Notification** check box is not checked, e-mail notification is disabled for all Product Managers.

5. Click **Activate** to confirm the information you entered.

The SMTP server address and e-mail addresses can be up to 64 characters.

Managing Return E-Mail Addresses

To configure the return address that accompanies e-mail sent from the service processor, follow these steps on the service processor:

1. From the Windows taskbar, click **Start, Control Panel, Network, Protocols, TCP/IP Protocol, Properties**.

This displays the Microsoft TCP/IP Properties window (Figure 6-6).

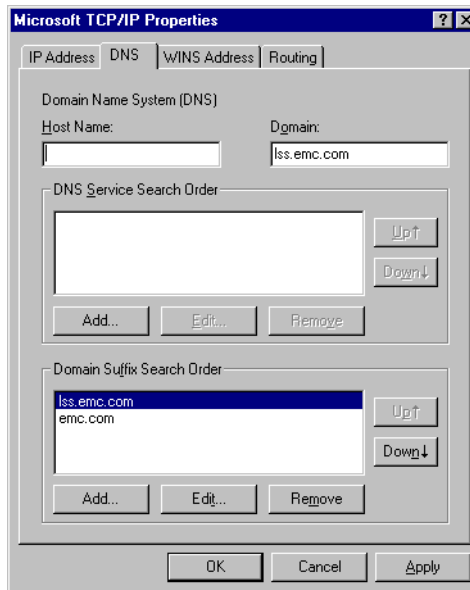


Figure 6-6 Microsoft TCP/IP Properties Window

2. Click the **DNS** tab.

3. In the **Domain** field, enter the network domain designation for the domain that will appear in the source address of Connectrix Manager e-mail notifications.
4. Click **Apply**.
5. Click **OK** to close the Microsoft TCP/IP Properties window.
6. Click **OK** to close the Network dialog box.
7. Reboot the service processor to make the changes take effect.

Testing Remote Notification

Use the **Test Remote Notification** function to test the call-home feature and/or the configuration parameters for e-mail notification.

To use this feature, you must configure and enable the call-home feature through the appropriate Product Manager and configure the e-mail notification feature. (Refer to *Configuring E-mail Notification for Events* on page 6-7.)

When using this feature to test your e-mail notification setup, select the E-Mail test only. The Call Home test is for EMC Customer Service Personnel.

To run the test:

1. From the Maintenance menu on the main Connectrix Manager window, select **Test Remote Notification**.

This displays the Test Remote Notification window (Figure 6-7).

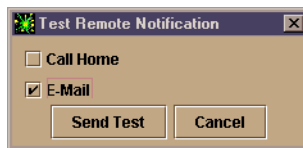


Figure 6-7 Test Remote Notification Window

2. If a checkbox is checked, the associated test is enabled. Click a box to add or remove a checkmark.
3. Click **Send Test**.

A message box displays indicating that the test was initiated. Click **OK** to close the message box.

4. Contact the e-mail recipient to confirm that a message was received.

Configuring Ethernet Events

To configure Ethernet events for all managed products, you can enable notification and configure the Ethernet event timeout period through the Connectrix Manager. An Ethernet event is when the Ethernet link between the Connectrix service processor and the managed product is dropped. You can set a specific time interval for an event to be generated after the communication drops.

To configure Ethernet events:

1. From the Maintenance menu, select **Configure Ethernet Events**.

This displays the Configure Ethernet Events window (Figure 6-8).

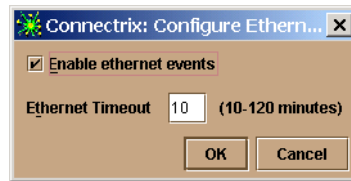


Figure 6-8

Configure Ethernet Events Window

2. To enable Ethernet events, click the **Enable ethernet events** check box.
3. To change the default timeout of 30 minutes, enter a new value in the **Ethernet Timeout** box. The value must be between 10 and 120.
4. Click **Activate** to accept and activate the data.

If e-mail notification is also enabled, an e-mail will be sent if the Connectrix Manager cannot communicate with a product.

If call-home notification is also enabled, a call home will be generated if the Connectrix Manager cannot communicate with a product.

Viewing Routes

The **Show Routes** option allows you to view the path Fibre Channel frames must take between two end devices in a multiswitch fabric.

To view the route between two devices, the following must be true:

- ◆ All switches/directors in the route must be managed by Connectrix Manager and attached to the same Connectrix Service Processor.
- ◆ All switches/directors in the currently active route must be Connectrix models DS-16M, DS-16M2, DS-24M2, DS-32M, DS-32M2, ED-64M, or ED-140M, and be running firmware version 1.4 or higher.
- ◆ All switches/directors in the route must be in the same fabric, and the end points (HBA and Symmetrix Fibre Channel port) must be in the same zone.

To view the route between two end devices, follow these steps:

1. Click the Connectrix Manager **Fabrics** tab.
2. Select **Show Route** from the Fabrics menu (or right-click anywhere in the fabric tree and select **Show Route** from the pop-up menu).

This displays the **Show Route** window (Figure 6-9).

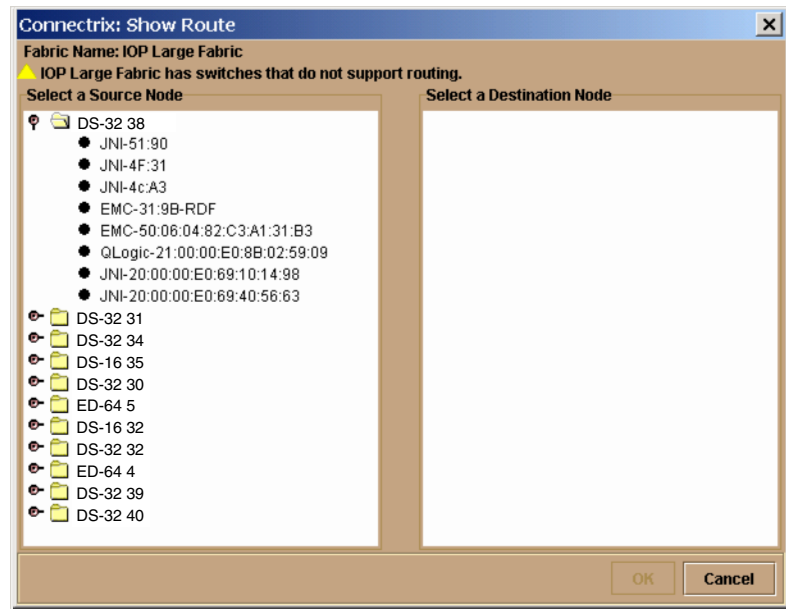


Figure 6-9 Show Route Window

Switches/directors that support route reporting and that are managed by the same Connectrix service processor appear in the left column of the window.

If the fabric contains a switch/director that does not support route reporting, the window displays the message shown in the example (near the top, following the yellow triangle).

The switches/directors are listed by their WWNs or nicknames (if configured), depending on display options set through the Fabrics view. (To view/set display options, right-click in the Fabrics view, away from any icons.)

3. In the **Select Source Node** field, expand a list of attached nodes by clicking on the magnifying glass next to the appropriate switch/director.
4. Select the appropriate source node.

A list of switches/directors appears in the **Select Destination Node** field.

5. In the **Select Destination Node** field, expand the list of nodes by clicking the magnifying glass next to the appropriate switch/director.
6. Select the appropriate destination node.
7. Click **OK**. If all the switches/directors in the path are managed by the same Connectrix service processor, a window (Figure 6-10) displays the routes between the two devices in blue.

If all switches/directors in the route are not managed by the Connectrix Manager, error messages might appear when you press **OK**.

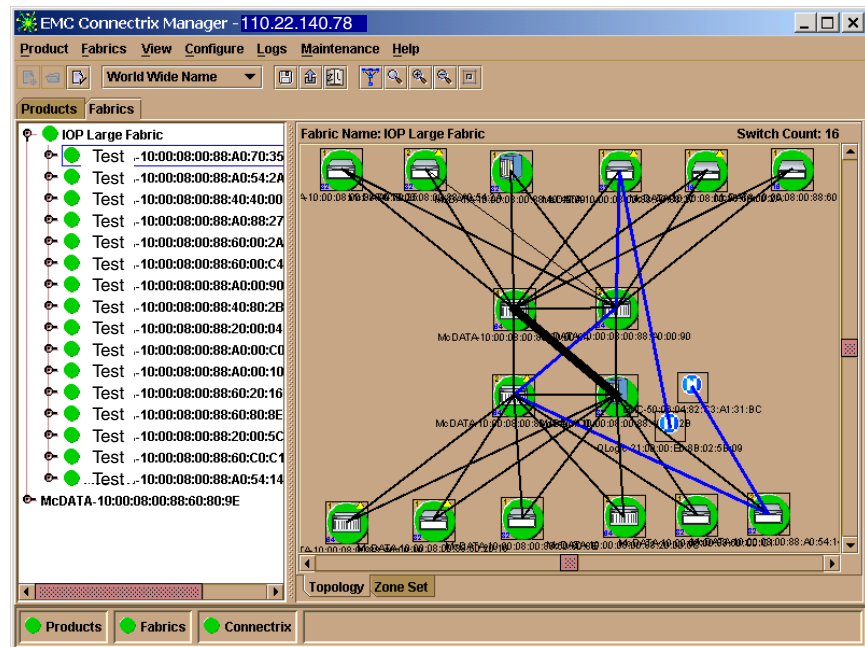


Figure 6-10 Show Route Window, Showing Routes

8. To display a list of incoming and outgoing ports on each switch/director in the route between the two nodes., double-click a blue line.

This displays a window similar to the following.

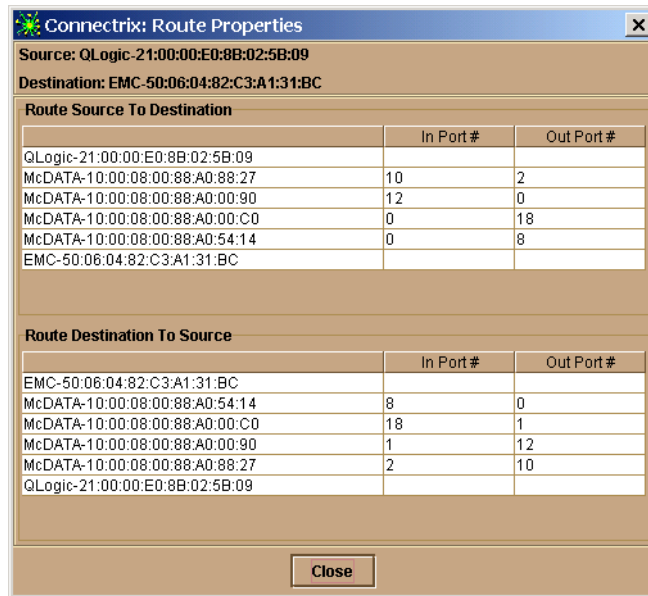


Figure 6-11 Route Properties Window

Configuring Threshold Alerts

A threshold alert notifies users when the transmit (Tx) or receive (Rx) throughput reaches specified values for specific director ports or port types, (E_Ports or F_Ports, as well as FL_Ports on the DS-24M2).

You are notified of a threshold alert in five ways:

- ◆ An attention indicator (yellow triangle) that appears on the port in the Port Card View.
- ◆ An attention indicator (yellow triangle) that appears on the port card in the Hardware View.
- ◆ An attention indicator (yellow triangle) that appears in the **Alert** column of the Port List View.
- ◆ An attention indicator (yellow triangle) that appears by the **Threshold Alerts** field in the Port Properties window.
- ◆ Detailed threshold alert data is recorded in the Threshold Alert Log.

For detailed information on configuring threshold alerts, refer to the chapter on configuring the switch/director in the product-specific user guide.

Connectrix Manager Logs

This chapter contains information on the Connectrix Manager's logs. The chapter contains the following sections:

◆ Using Logs	7-2
◆ Audit Log	7-3
◆ Event Log	7-5
◆ Session Log.....	7-7
◆ Product Status Log.....	7-8
◆ Fabric Log.....	7-10
◆ Exporting Log Files.....	7-11

Using Logs

The Audit, Session, Product Status, and Fabric Logs store up to 1000 entries each, and the Event Log stores up to 500 entries. Additional entries overwrite the oldest entries.

The most recent entry appears at the top of a log.

Button Function

Button function is the same for all logs:

- ◆ **Export** — Allows you to save the log to a folder in your home directory. Refer to *Exporting Log Files* on page 7-11.
- ◆ **Clear** — Clears all entries for all users. A *Warning* dialog box displays requesting confirmation that you want to clear all entries in the log.
- ◆ **Refresh** — Updates the display.
- ◆ **Close** — Closes the log.

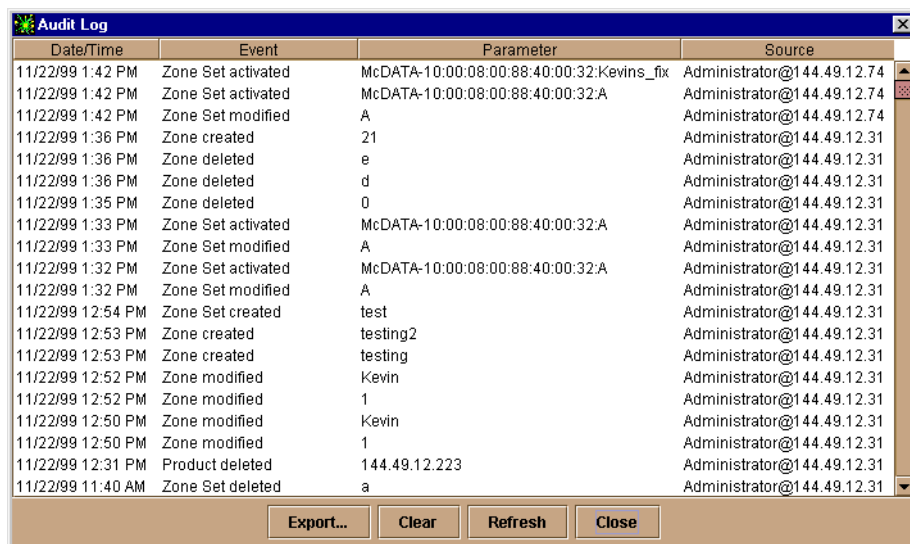
Expanding Columns

Expand columns in logs by placing the pointer over the line separating column headings until a double arrow appears; then drag the line to widen the column as necessary.

Audit Log

The Audit Log displays a history of user actions performed through the Connectrix Manager.

To display the Audit Log (Figure 7-1), select **Audit Log** from the Logs menu.



Date/Time	Event	Parameter	Source
11/22/99 1:42 PM	Zone Set activated	McDATA-10:00:08:00:88:40:00:32:Kevins_fix	Administrator@144.49.12.74
11/22/99 1:42 PM	Zone Set activated	McDATA-10:00:08:00:88:40:00:32:A	Administrator@144.49.12.74
11/22/99 1:42 PM	Zone Set modified	A	Administrator@144.49.12.74
11/22/99 1:36 PM	Zone created	21	Administrator@144.49.12.31
11/22/99 1:36 PM	Zone deleted	e	Administrator@144.49.12.31
11/22/99 1:36 PM	Zone deleted	d	Administrator@144.49.12.31
11/22/99 1:35 PM	Zone deleted	0	Administrator@144.49.12.31
11/22/99 1:33 PM	Zone Set activated	McDATA-10:00:08:00:88:40:00:32:A	Administrator@144.49.12.31
11/22/99 1:33 PM	Zone Set modified	A	Administrator@144.49.12.31
11/22/99 1:32 PM	Zone Set activated	McDATA-10:00:08:00:88:40:00:32:A	Administrator@144.49.12.31
11/22/99 1:32 PM	Zone Set modified	A	Administrator@144.49.12.31
11/22/99 12:54 PM	Zone Set created	test	Administrator@144.49.12.31
11/22/99 12:53 PM	Zone created	testing2	Administrator@144.49.12.31
11/22/99 12:53 PM	Zone created	testing	Administrator@144.49.12.31
11/22/99 12:52 PM	Zone modified	Kevin	Administrator@144.49.12.31
11/22/99 12:52 PM	Zone modified	1	Administrator@144.49.12.31
11/22/99 12:50 PM	Zone modified	Kevin	Administrator@144.49.12.31
11/22/99 12:50 PM	Zone modified	1	Administrator@144.49.12.31
11/22/99 12:31 PM	Product deleted	144.49.12.223	Administrator@144.49.12.31
11/22/99 11:40 AM	Zone Set deleted	a	Administrator@144.49.12.31

Figure 7-1 Connectrix Manager Audit Log

- ◆ The **Date/Time** column logs the date and time of the event.
- ◆ The **Event** column describes the action that took place. Logged actions could include:
 - Defining a new product
 - Modifying product attributes
 - Deleting product definitions
 - Defining a new user
 - Modifying user administration
 - Deleting user administration
 - Creating a zone set
 - Modifying a zone set
 - Modifying SNMP options

- ◆ The **Parameter** column describes the parameter affected by the event. For example, if a product is added or deleted, the product's network address displays as shown in Figure 7-1.

Note that the type of network address that displays—such as network IP address or host name—is determined on a product-by-product basis according to how the product is identified in the **New Product** dialog box.

- ◆ The **Source** column identifies the workstation from which the user performed the logged action. If the change was made locally from the Connectrix service processor, the Connectrix service processor address appears.

If the **Source** column contains **EmcBridge@<IP address>**, that means the action was initiated by either EMC Fibrezone or EMC ESN Manager software.

Event Log

The Event Log displays events or error conditions recorded by the Connectrix Management Services application. Entries reflect the status of the application and managed products.

Information associated with a call-home failure is intended for use by maintenance personnel to fault isolate the problem (for example: modem failure, or no dial tone), while information provided in all other entries is generally intended for use by third-level support personnel to fault isolate more significant problems.

To display the Event Log (Figure 7-2), select **Event Log** from the Logs menu, or double-click the **Connectrix** status icon in the status bar at the bottom of the Connectrix Manager window (shown in Figure 3-5 on page 3-19).

Date/Time	Event	Product	Qualifier	Data
11/24/99 4:32 PM	15-Firmware IO Error	ED-1032	901	c:\EfcData\EmsData\mk\Software\02.00.00_rpd
11/4/99 9:32 AM	11-Dump File IO Error	ED-1032 , mksw3	803	c:\EfcData\EmsData\mk\Network\1\service
10/21/99 9:56 AM	11-Dump File IO Error	ED-1032 , mksw5	803	c:\EfcData\EmsData\mk\Network\3\service
10/15/99 10:35 AM	11-Dump File IO Error	ED-1032 , mksw5	803	c:\EfcData\EmsData\mk\Network\3\service
9/30/99 4:50 PM	15-Firmware IO Error	ED-1032	901	c:\EfcData\EmsData\mk\Software\02.00.00_kah
9/22/99 1:04 PM	19-Link Incident Log corrupted	ED-1032 , mksw1	5	64
9/22/99 1:04 PM	19-Link Incident Log corrupted	ED-1032 , mksw5	5	64
9/22/99 1:04 PM	19-Link Incident Log corrupted	ED-1032 , mksw4	5	64
9/22/99 1:04 PM	19-Link Incident Log corrupted	ED-1032 , mksw3	5	64
9/22/99 1:04 PM	19-Link Incident Log corrupted	ED-1032 , mksw2	5	64
9/16/99 12:47 AM	11-Dump File IO Error	ED-1032 , mksw4	803	c:\EfcData\EmsData\mk\Network\2\service
9/9/99 4:17 PM	7-Internal Error	ED-1032 , mksw2	302	
9/9/99 4:16 PM	7-Internal Error	ED-1032 , mksw2	302	
9/9/99 4:11 PM	7-Internal Error	ED-1032 , mksw2	302	
9/9/99 4:07 PM	7-Internal Error	ED-1032 , mksw2	302	

Figure 7-2 Connectrix Manager Event Log

- ◆ The **Date/Time** column logs the date and time the event was reported to the Connectrix service processor.
- ◆ The **Event** column lists an event number and brief description of the event. Includes both the event number and description when reporting an event to third-level customer support.
- ◆ The **Product** column lists the product associated with the event. Some events are associated with the Connectrix Management Services application, while others are associated with a specific

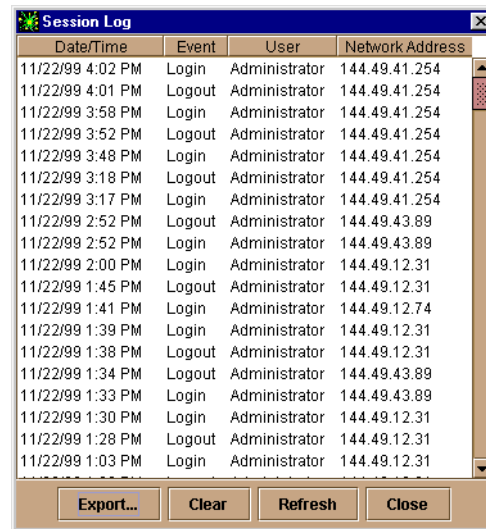
instance of the Product Manager application. In the latter case, the product and configured name (or IP address) associated with the instance are displayed.

- ◆ The **Qualifier** column provides an event qualifier for use by engineering personnel. Include this number when reporting an event to third-level customer support.
- ◆ The **Data** column includes additional event data for use in fault isolating a problem. Use the information when fault isolating a call-home problem, or include the information when reporting an event to third-level customer support.

Session Log

The Session Log displays the date/time, user name, and network address of each login and logout on the Connectrix service processor.

To display the Session Log (Figure 7-3), select **Session Log** from the Logs menu.



Date/Time	Event	User	Network Address
11/22/99 4:02 PM	Login	Administrator	144.49.41.254
11/22/99 4:01 PM	Logout	Administrator	144.49.41.254
11/22/99 3:58 PM	Login	Administrator	144.49.41.254
11/22/99 3:52 PM	Logout	Administrator	144.49.41.254
11/22/99 3:48 PM	Login	Administrator	144.49.41.254
11/22/99 3:18 PM	Logout	Administrator	144.49.41.254
11/22/99 3:17 PM	Login	Administrator	144.49.41.254
11/22/99 2:52 PM	Logout	Administrator	144.49.43.89
11/22/99 2:52 PM	Login	Administrator	144.49.43.89
11/22/99 2:00 PM	Login	Administrator	144.49.12.31
11/22/99 1:45 PM	Logout	Administrator	144.49.12.31
11/22/99 1:41 PM	Login	Administrator	144.49.12.74
11/22/99 1:39 PM	Login	Administrator	144.49.12.31
11/22/99 1:38 PM	Logout	Administrator	144.49.12.31
11/22/99 1:34 PM	Logout	Administrator	144.49.43.89
11/22/99 1:33 PM	Login	Administrator	144.49.43.89
11/22/99 1:30 PM	Login	Administrator	144.49.12.31
11/22/99 1:28 PM	Logout	Administrator	144.49.12.31
11/22/99 1:03 PM	Login	Administrator	144.49.12.31

Figure 7-3 Connectrix Manager Session Log

- ◆ The **Date/Time** column displays the date and time of the event.
- ◆ The **Event** column displays either login or logout.
- ◆ The **User** column displays the user name.
- ◆ The **Network Address** column displays the IP address of the remote workstation or Connectrix service processor where the user logged in.

Product Status Log

The Product Status Log displays the time and nature of significant events on all managed products, and indicates which specific Product Manager applications should be opened to further investigate product status changes.

To display the Product Status Log (Figure 7-4), select **Product Status Log** from the Logs menu, or double-click the **Products** status icon in the status bar at the bottom of the Connectrix Manager window (shown in Figure 3-5 on page 3-19).



Date/Time	Network Address	Previous Status	New Status
11/22/99 4:00 PM	10.64.0.224	Operational	Degraded
11/22/99 3:58 PM	10.64.0.224	Degraded	Operational
11/22/99 3:53 PM	10.64.0.224	Operational	Degraded
11/22/99 3:41 PM	10.64.0.224	Degraded	Operational
11/22/99 3:36 PM	10.64.0.224	Operational	Degraded
11/22/99 3:30 PM	10.64.0.224	Degraded	Operational
11/22/99 3:24 PM	10.64.0.224	Operational	Degraded
11/22/99 3:23 PM	10.64.0.224	Degraded	Operational
11/22/99 3:18 PM	10.64.0.224	Operational	Degraded
11/22/99 3:04 PM	10.64.0.224	Degraded	Operational
11/22/99 3:03 PM	10.64.0.224	Unknown	Degraded
11/22/99 3:02 PM	10.64.0.224	Degraded	Unknown
11/22/99 3:02 PM	10.64.0.224	Operational	Degraded
11/22/99 3:02 PM	10.64.0.224	Degraded	Operational
11/22/99 3:00 PM	10.64.0.224	Unknown	Degraded
11/22/99 3:00 PM	10.64.0.224	Degraded	Unknown
11/22/99 2:57 PM	10.64.0.224	Operational	Degraded
11/22/99 2:12 PM	10.64.0.224	Degraded	Operational
11/22/99 2:09 PM	10.64.0.224	Unknown	Degraded
11/22/99 2:09 PM	10.64.0.224	Operational	Unknown
11/22/99 2:08 PM	10.64.0.224	Unknown	Operational
11/22/99 2:07 PM	10.64.0.224	Degraded	Unknown

Export... Clear Refresh Close

Figure 7-4 Connectrix Manager Product Status Log

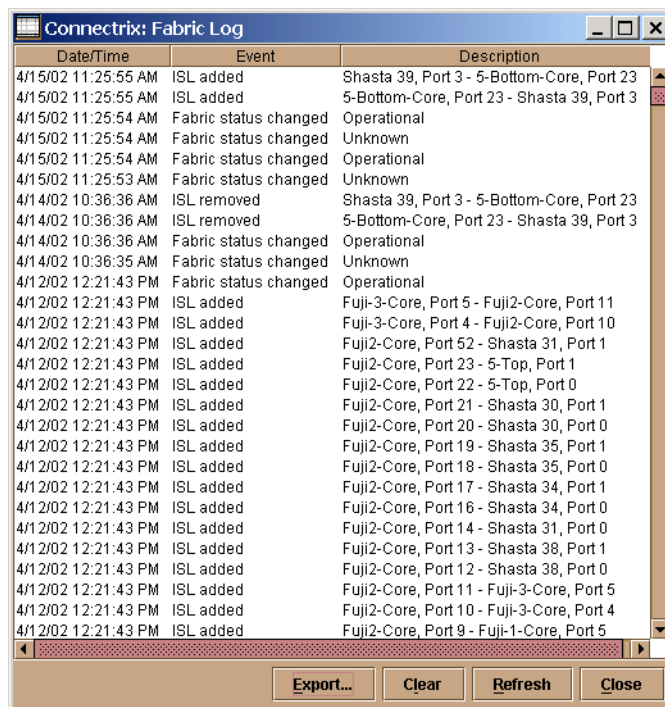
The Product Status Log contains this information:

- ◆ The **Date/Time** column displays the date and time of the change in the product's operational status.
- ◆ The **Network Address** column displays the IP address or host name of the product.
- ◆ The **Previous Status** column displays the product's previous operational status (**Unknown**, **Operational**, **Degraded**, or **Failed**). An **Unknown** status indicates that the Connectrix Manager has lost contact with the product and has initiated a call-home and/or e-mail (if notification is configured and enabled).
- ◆ The **New Status** column displays the product's current operational status.

Fabric Log

The Fabric Log reflects the time and nature of significant changes in a persisted fabric.

To display the Fabric Log (Figure 7-5), select **Fabric Log** from the Logs menu, or double-click the **Fabrics** status icon in the status bar at the bottom of the Connectrix Manager window (shown in Figure 3-5 on page 3-19).



Date/Time	Event	Description
4/15/02 11:25:55 AM	ISL added	Shasta 39, Port 3 - 5-Bottom-Core, Port 23
4/15/02 11:25:55 AM	ISL added	5-Bottom-Core, Port 23 - Shasta 39, Port 3
4/15/02 11:25:54 AM	Fabric status changed	Operational
4/15/02 11:25:54 AM	Fabric status changed	Unknown
4/15/02 11:25:54 AM	Fabric status changed	Operational
4/15/02 11:25:53 AM	Fabric status changed	Unknown
4/14/02 10:36:36 AM	ISL removed	Shasta 39, Port 3 - 5-Bottom-Core, Port 23
4/14/02 10:36:36 AM	ISL removed	5-Bottom-Core, Port 23 - Shasta 39, Port 3
4/14/02 10:36:36 AM	Fabric status changed	Operational
4/14/02 10:36:35 AM	Fabric status changed	Unknown
4/12/02 12:21:43 PM	Fabric status changed	Operational
4/12/02 12:21:43 PM	ISL added	Fuji-3-Core, Port 5 - Fuji2-Core, Port 11
4/12/02 12:21:43 PM	ISL added	Fuji-3-Core, Port 4 - Fuji2-Core, Port 10
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 52 - Shasta 31, Port 1
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 23 - 5-Top, Port 1
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 22 - 5-Top, Port 0
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 21 - Shasta 30, Port 1
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 20 - Shasta 30, Port 0
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 19 - Shasta 35, Port 1
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 18 - Shasta 35, Port 0
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 17 - Shasta 34, Port 1
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 16 - Shasta 34, Port 0
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 14 - Shasta 31, Port 0
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 13 - Shasta 38, Port 1
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 12 - Shasta 38, Port 0
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 11 - Fuji-3-Core, Port 5
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 10 - Fuji-3-Core, Port 4
4/12/02 12:21:43 PM	ISL added	Fuji2-Core, Port 9 - Fuji-1-Core, Port 5

Figure 7-5 Connectrix Manager Fabric Log

The Fabric Log displays:

- ◆ **Date/Time** — Date and time of the change in the fabric.
- ◆ **Fabric Status Changed** — Type of change in the fabric (for example: a switch or ISL was added or removed, or the fabric was renamed or persisted, or a zone set became active).
- ◆ **Description** — Description of the change in the fabric.

Exporting Log Files

Click the **Export** button on a log window to display a dialog box similar to that shown in Figure 7-6. The folders listed in the display area of this dialog box are the ones stored in your home directory.

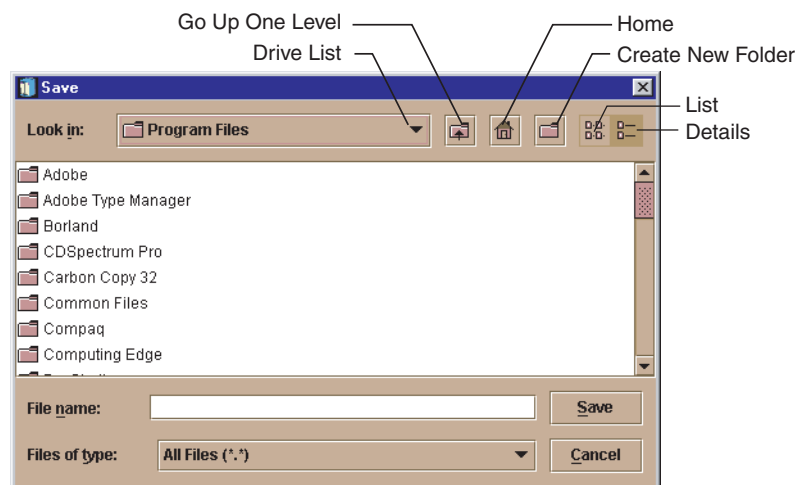


Figure 7-6 Export Log Files Dialog Box

To save a log file in ASCII format to a location on your system's hard drive or to a diskette use the following steps. You can open this file in any desktop publisher for viewing or printing.

1. To select a folder where you want to save the file, use the appropriate option(s):
 - **Details** — Displays the folder and file names, date modified, file size, file type, and attributes.
 - **List** — Displays the folder and directory names only.
 - **Create New Folder** — Allows you to create a new folder for the file in the folder that is displayed in the **Look in** field at the top of the dialog box.
 - **Home** — Returns to the files in your home directory.

- **Go Up One Level** — Displays folders and files in the next highest directory.
 - **Drive List** — Allows you to save to another drive. Click the arrow to display a drop-down list of local and network drives. Select the desired drive. A list of all directories on the drive you chose are displayed in the display area of the dialog box.
2. Double-click a folder in the display area to display files in that folder. This folder is where the file will be saved.
 3. Type a file name into the **File name** field.
 4. Click **Save**. The file is saved to the specified folder as an ASCII text file.

Configuring Remote Workstations

This appendix describes the procedures for installing the Connectrix Manager Client onto a remote workstation. To run the Client on a remote workstation, you must first download and install the Connectrix Manager Client application from the Connectrix service processor.

This appendix contains the following sections:

- Windows SystemsA-2
- Solaris SystemsA-14
- HP-UX, AIX, and Linux Systems.....A-23

Windows Systems

This section describes the procedures for installing the Connectrix Manager onto a remote workstation running one of the Windows operating systems listed under *Requirements*.

Requirements

The download and installation process requires a PC with the following minimum system requirements:

- ◆ Operating system (one of the following):
 - Windows 95
 - Windows 98
 - Windows NT
 - Windows 2000
 - Windows XP
- ◆ 200 MHz Pentium processor
- ◆ 32 MB RAM
- ◆ 15 MB available disk space
- ◆ Video card supporting 256 colors at 800 x 600 resolution
- ◆ Ethernet network adapter
- ◆ Java-enabled Internet browser, such as Microsoft Internet Explorer (version 3.0 or later) or Netscape Navigator (version 3.0 or later)

Newer versions of the Connectrix Manager or Product Managers installed on the Connectrix service processor will automatically download when the remote clients log in to the server.

Procedure

The procedures described here are based on Internet Explorer 5.00 and Netscape 6.

To download and install the Connectrix Manager onto a Windows workstation:

- 1. Open a Web browser.
- 2. Type the address of the Connectrix service processor into the **Location** (or **Address**) field on the browser; then press ENTER.

Obtain the address from your network administrator.

This displays the Connectrix Management page (Figure A-1).

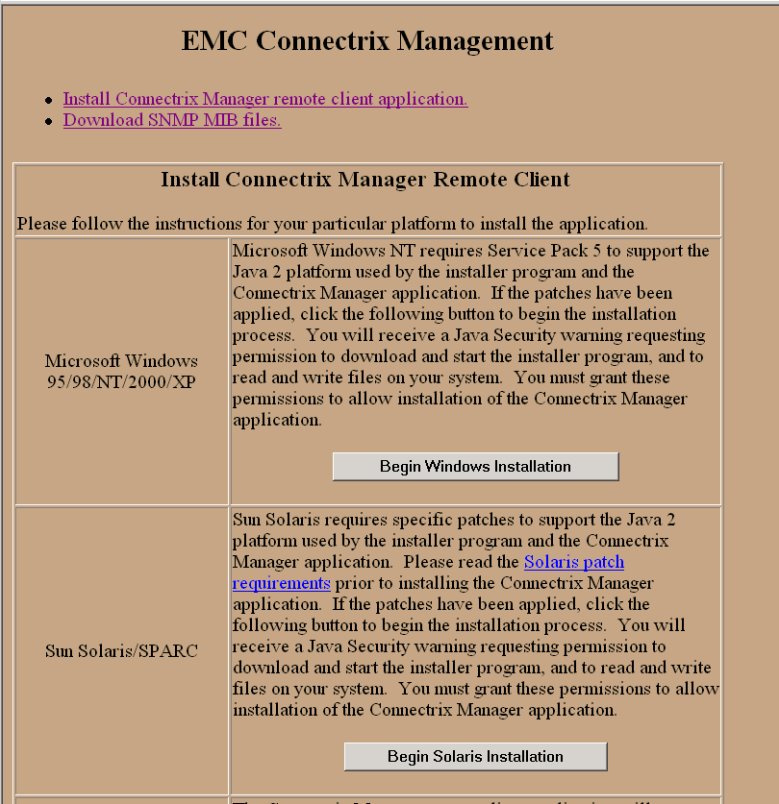


Figure A-1 Connectrix Management Web Page

3. Click **Begin Windows Installation**.

A Security Warning appears. The warning differs between Internet Explorer (Figure A-2) and Netscape (Figure A-3).

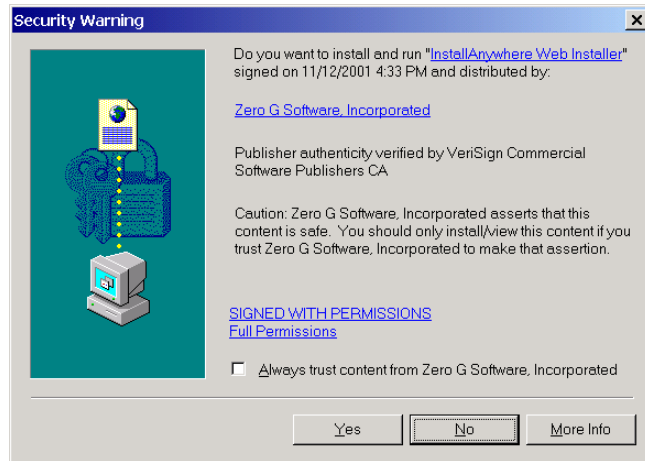


Figure A-2 Internet Explorer Security Warning

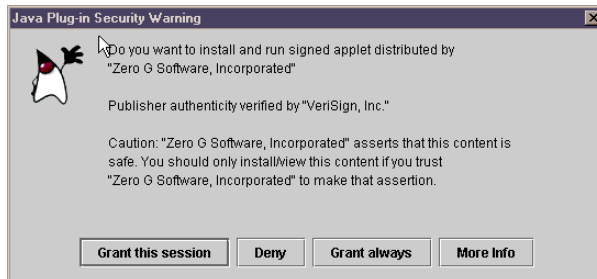


Figure A-3 Netscape Security Warning

4. Click **Yes** on the Internet Explorer window or **Grant this session** on the Netscape window.

5. On the Connectrix Manager download page (Figure A-4):
- To install the Connectrix Manager from the Web site, click **Start Installer for Windows**.
 - To save the installer to a local folder and install from there, click the Windows **Download** link in the list of operating systems.



EMC Connectrix Manager

Recommended Installation for Your Platform:

Start Installer for Windows...

Available Installers

	Platform	includes Java VM	Instructions
>	Windows	Download (11.1M)	View
	AIX	Download (28.4M)	View
	Solaris	Download (26.8M)	View
	Linux	Download (26.1M)	View
	HP-UX	Download (31.4M)	View

Figure A-4 **Connectrix Manager Download Page**

You can view the instructions specific to Windows systems; however, this procedure also includes those instructions.

6. The next step depends on how you are installing:
 - If you are installing from the Web, the Connectrix Manager installation file downloads to the PC. When the download is complete, the **Introduction** window in Figure A-7 on page A-7 appears. Go to step 11.
 - If you are saving to a file from Internet Explorer, go to step 7.
 - If you are saving to a file from Netscape, the dialog box in Figure A-5 on page A-6 appears.

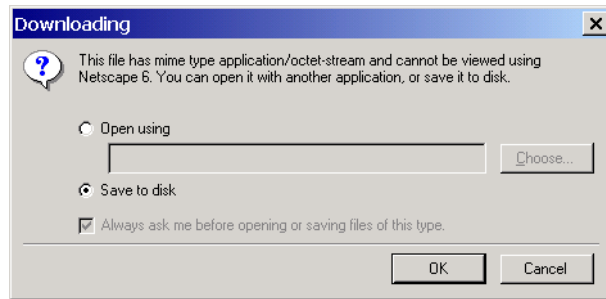


Figure A-5 Netscape Mime Notification

Select **Save to disk**, and click **OK**.

7. In the Save dialog box (Figure A-6), select a folder and click **Save**. *Do not change the file name or type.*

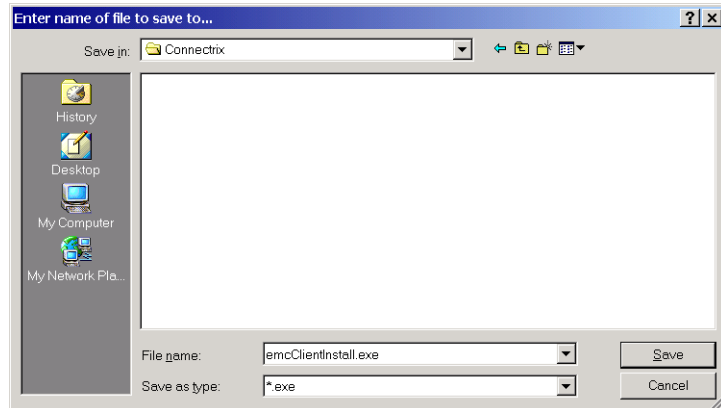


Figure A-6 File Save Dialog Box

8. Close the browser.
9. From the Windows taskbar, click **Start, Run**.
10. In the Run dialog box, enter the following (or click **Browse** and locate the file) and click **OK**:

`<directory path>\emcClientInstall.exe`

You do not have to enter the name in the combination of uppercase and lowercase shown above. You can use all uppercase or all lowercase.

11. On the Connectrix Manager **Introduction** window (Figure A-7), click **Next**.

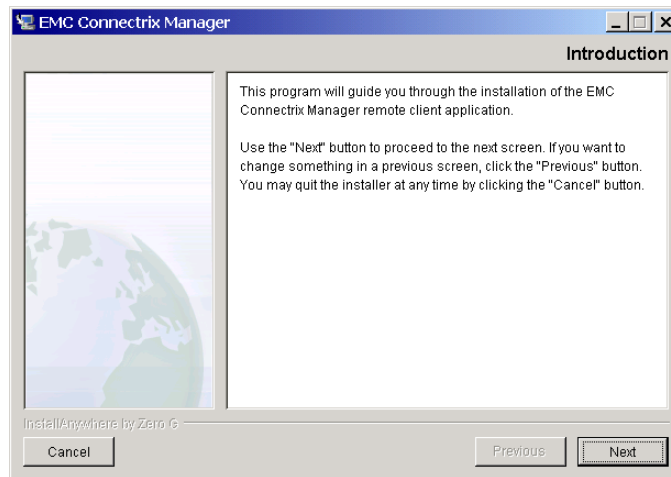


Figure A-7

Connectrix Manager Installer — Introduction Window

At any time, you can return to the previous page (if there is one) by clicking **Previous**. You can also quit the installer by clicking **Exit**.

This displays the **License Agreement** window (Figure A-8).

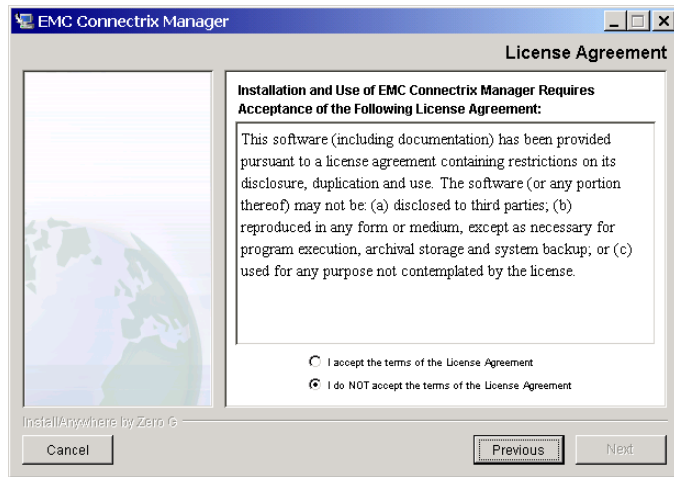


Figure A-8 Connectrix Manager Installer — License Agreement

12. Read the license agreement; then make sure the **Yes** button is selected and click **Next**.

This displays the window shown in Figure A-9.

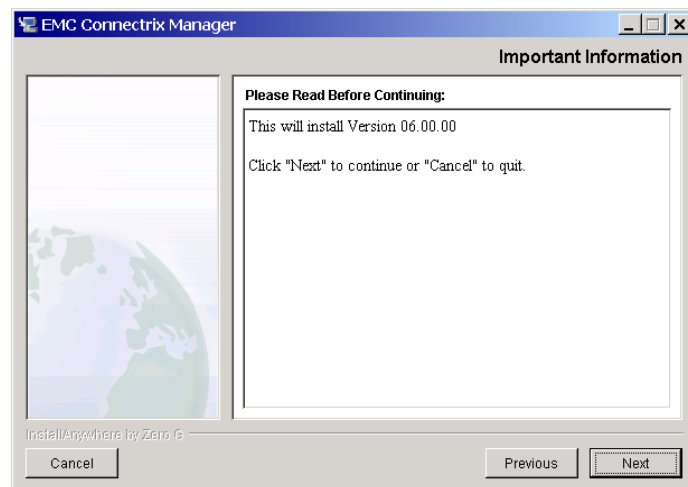


Figure A-9 Connectrix Manager Installer — Important Information

13. Click **Next**. This displays the window shown in Figure A-10.

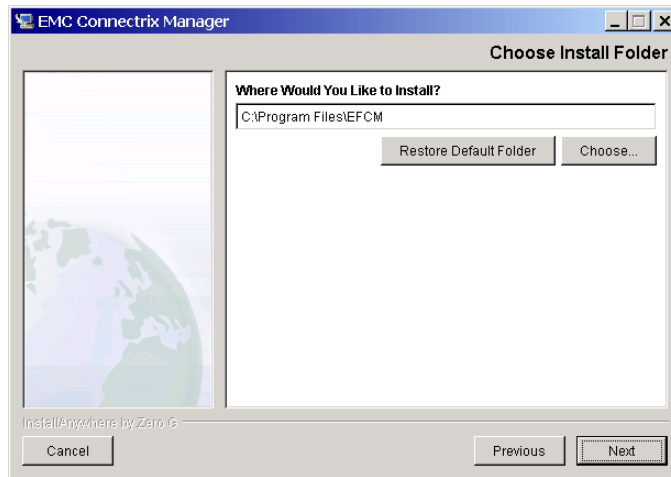


Figure A-10 Connectrix Manager Installer — Select Install Folder

14. Select a folder on the remote workstation in which to store the Connectrix Manager. You can accept the default location, type in the path to a new location, or click **Choose** to browse the local computer for an appropriate location. Click **Restore Default Location** if you want to change the location back to the default.

Once the install folder is defined, click **Next**.

15. If no previous version of Connectrix Manager is installed, go to step 18.

If a previous version *is* installed, the following window appears:

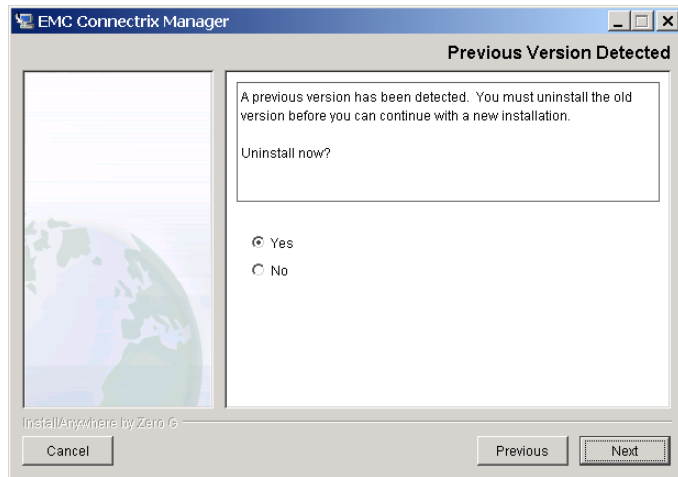


Figure A-11 Previous Version Detected Window

Select **Yes** and click **Next**.

16. The following window appears:



Figure A-12 Uninstall Connectrix Manager Window

Click **Uninstall**.

17. The previous version is uninstalled. When the process is finished, the following window appears:

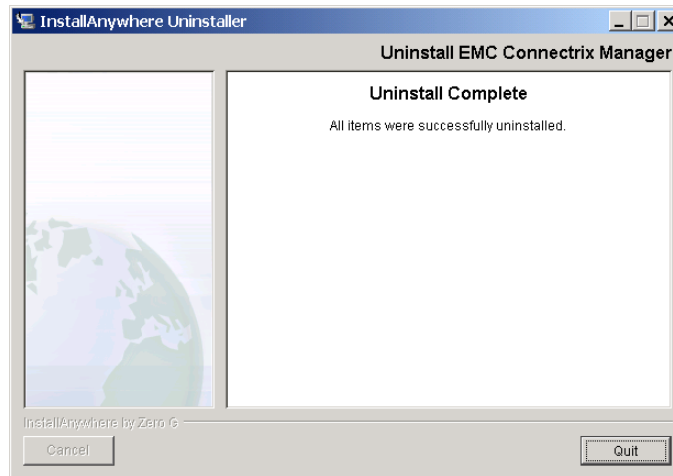


Figure A-13 Uninstall Complete Window

Click **Quit**, to quit the uninstaller.

18. The following window appears:

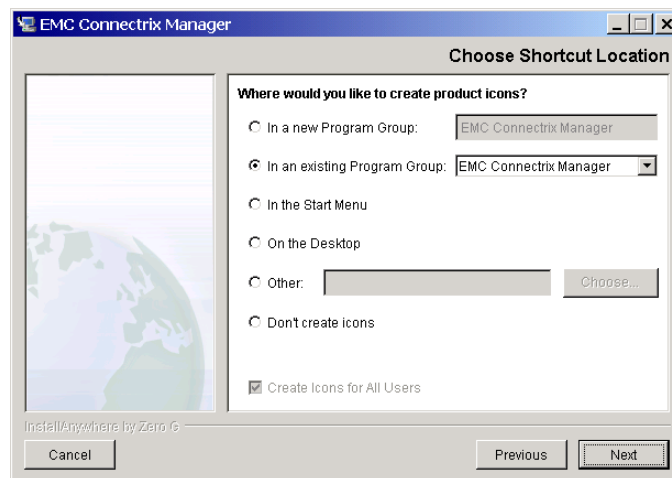


Figure A-14 Shortcut Selection Window

19. If you want to create a shortcut icon for Connectrix Manager, select an option; otherwise, select **Don't create shortcut icons**. When done, click **Install**.
20. The installation process continues; when installation is complete, the window in Figure A-15 appears:
 - If you want to start the Connectrix Manager now, click **Done**.
 - If you do not want to start the Connectrix Manager now, click the box next to **Start the Connectrix Manager?** to remove the checkmark; then click **Done**.

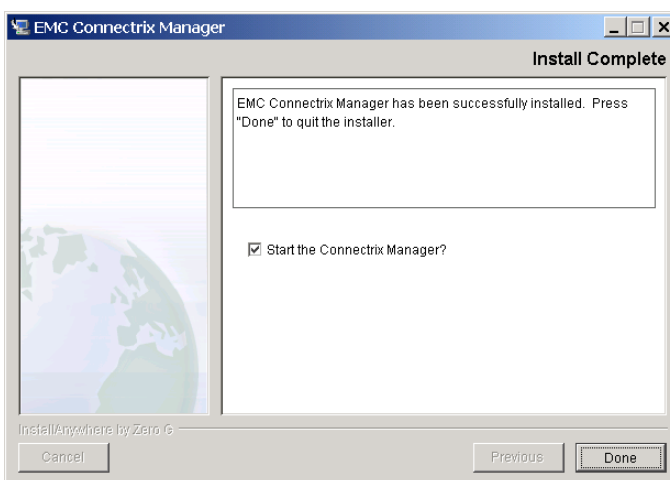


Figure A-15 **Connectrix Manager Installer - End Screen**

To launch the Client application from the Windows desktop, double-click the **Connectrix Manager** icon.

Multi-Home Clients

Connectrix Manager supports Microsoft Windows clients that have more than one Ethernet adapter (also known as multi-home).

This feature does not require a specific revision of microcode in any of the switch products.

To support multi-homed clients in Connectrix Manager, create a text file named `config.properties` in the Connectrix Manager install directory (`C:\Program Files\EFCM`) on the Client workstation. This file should contain the following line:

```
ClientRmiIpAddress = xxxxxxxxxx
```

where `xxxxxxxxxx` is either the raw IP address (in dotted decimal notation) or the DNS hostname (for example: **mydesktop.emc.com**).

10.x.x.x Public Network Support

The default network configuration for Connectrix products and the Connectrix service processor allows communication with each other on a private 10.x.x.x network inside the Connectrix cabinet.

For those customers who want to configure the Connectrix service processor to be on the same network as a customer's 10.x.x.x network (to enable remote management with Connectrix Manager clients over the 10.x.x.x), the following steps should be taken to ensure that the Connectrix service processor will listen for client connection over the 10.x network:

The server reserves IP addresses **10.1.1.10** and **10.1.1.11** for debug support, so these address cannot be assigned on the customer network.

21. On the service processor, open Windows Explorer.

22. Run **Notepad**, and open this file:

```
C:\Program Files\EFCM\config.properties
```

23. Add the following line:

```
ServerRmiIpAddress = 10.x.x.x
```

where **10.x.x.x** is the IP address assigned to one of the Ethernet LAN adapters in the service processor.

24. Save and close the file.

25. Reboot the service processor.

Solaris Systems

This section describes the procedures for installing the Connectrix Manager on a remote Solaris workstation.

Requirements

The download and installation process requires the use of a workstation with the following minimum system requirements:

- ◆ Operating systems (one of the following):
 - SunOS version 5.5.1 or higher
 - Solaris version 2.5.1 or higher
- ◆ 300 MHz UltraSPARC-II processor
- ◆ 32 MB RAM
- ◆ 15 MB available disk space
- ◆ Video card supporting 256 colors at 800 x 600 resolution
- ◆ Network connection
- ◆ Internet browser, such as Microsoft Internet Explorer (version 3.0 or later) or Netscape Navigator (version 3.0 or later)

Newer versions of the Connectrix Manager or Product Managers installed on the Connectrix service processor will automatically download when the remote clients log in to the Server.

Installation Procedure

The procedures described here are based on Internet Explorer 5.00 and Netscape 6.

To download and install the Connectrix Manager onto a Solaris workstation:

1. Open a Web browser.
2. Type the address of the Connectrix service processor into the **Location** (or **Address**) field on the browser; then press ENTER.

Obtain the address from your network administrator.

This displays the Connectrix Management page (Figure A-16).

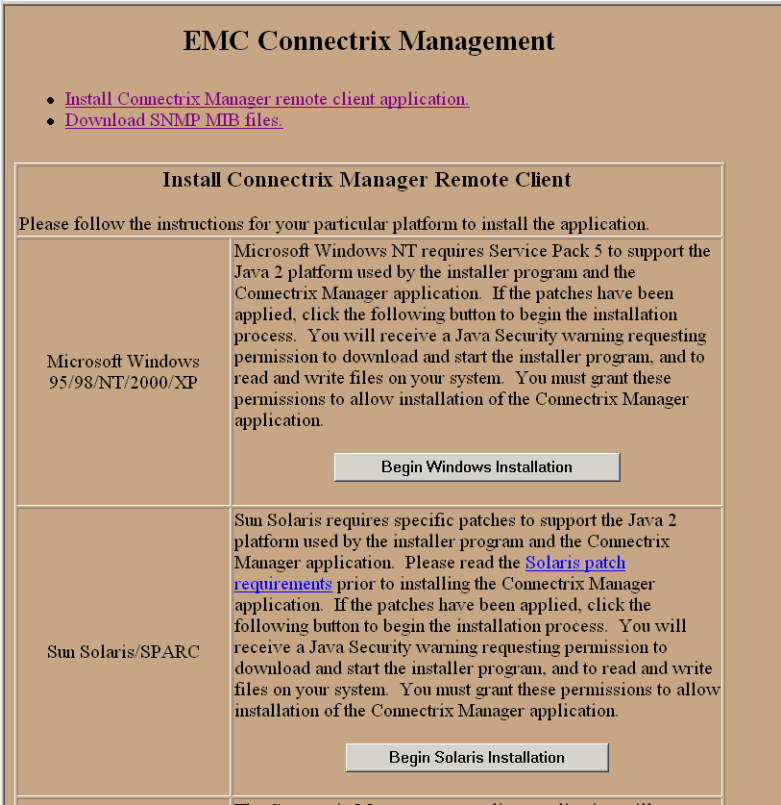


Figure A-16 Connectrix Management Web Page

3. Click **Begin Solaris Installation**.

A Security Warning appears. The warning differs between Internet Explorer (Figure A-17) and Netscape (Figure A-18).

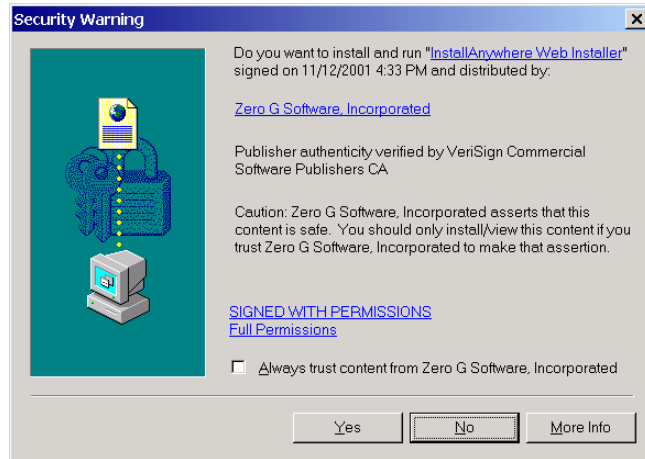


Figure A-17 Internet Explorer Security Warning

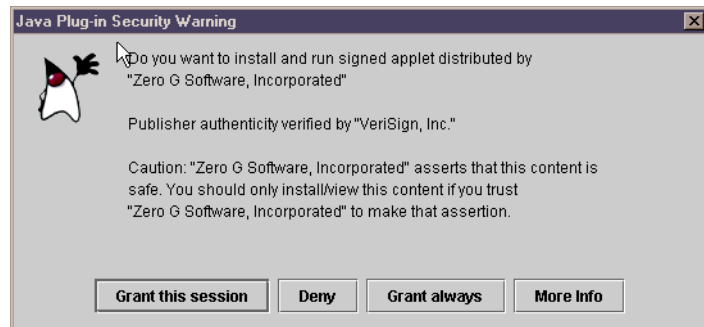


Figure A-18 Netscape Security Warning

4. Click **Yes** on the Internet Explorer window or **Grant this session** on the Netscape window.
5. Click **Grant this session**.
6. The Connectrix Manager download page (Figure A-19) appears. Click the Solaris **Download** link.



EMC Connectrix Manager

Recommended Installation for Your Platform:

Start Installer for Solaris

Available Installers

Platform	includes Java VM	Instructions
> Windows	Download (11.1M)	View
AIX	Download (28.4M)	View
Solaris	Download (26.8M)	View
Linux	Download (26.1M)	View
HP-UX	Download (31.4M)	View

Figure A-19

Connectrix Manager Download Page

When the download is complete, the Connectrix Manager Introduction window (Figure A-20) appears.

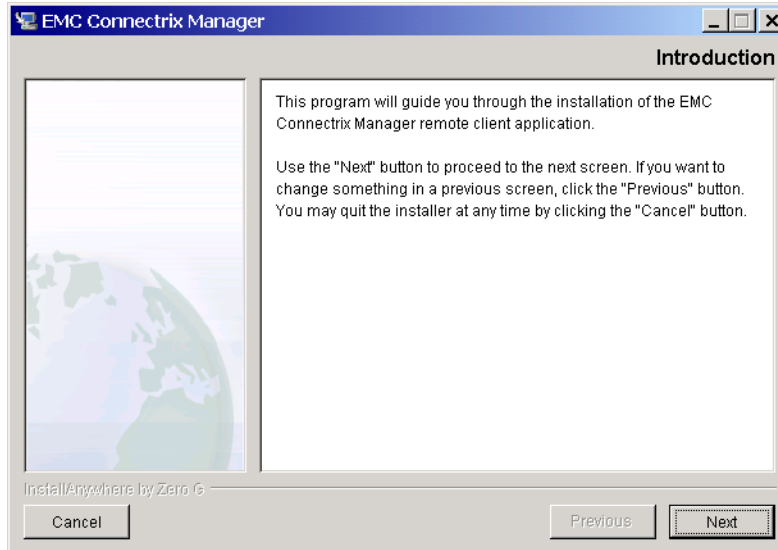


Figure A-20

Connectrix Manager Installer — Introduction Window

At any time, you can return to the previous page (if there is one) by clicking **Previous**. You can also quit the Installer by clicking **Exit**.

7. Click **Next** on the Introduction window. This displays a License Agreement window (Figure A-21).

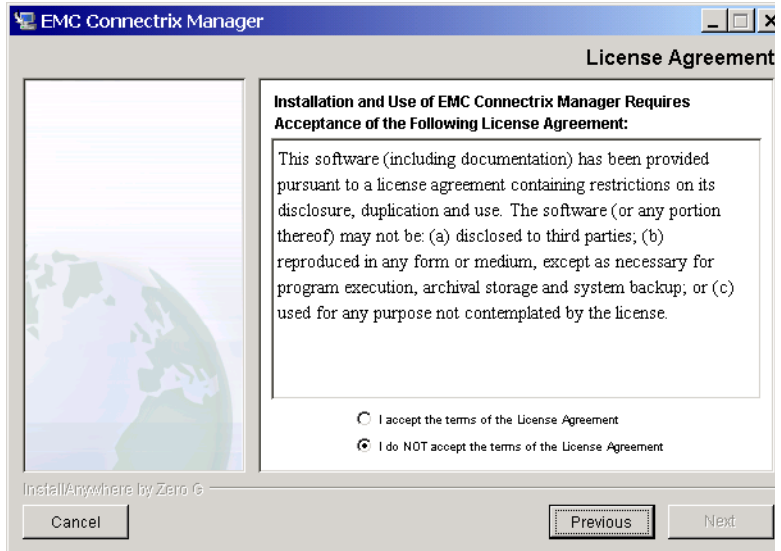


Figure A-21 Connectrix Manager Installer — License Agreement

8. Read the license agreement; then make sure the **Yes** button is selected and click **Next**.

This displays the window shown in Figure A-22.

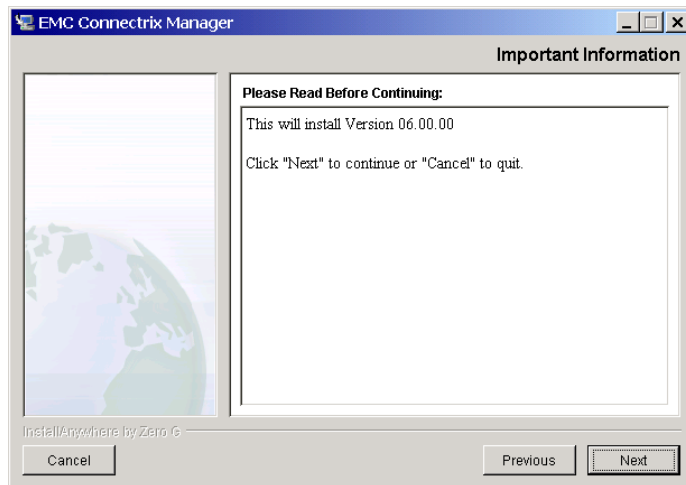


Figure A-22 Connectrix Manager Installer — Important Information

9. Click **Next**. This displays the window shown in Figure A-23.

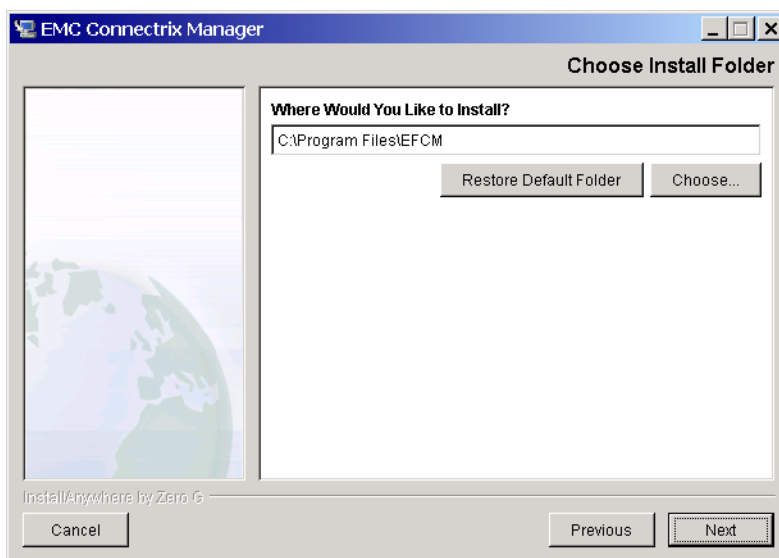


Figure A-23 **Connectrix Manager Installer — Select Install Folder**

For UNIX versions of the client, the destination path will most likely be simply `/EFCM`.

10. Select a folder on the remote workstation in which to store the Connectrix Manager. You can accept the default location, type in the path to a new location, or click **Choose** to browse the local computer for an appropriate location. Click **Restore Default Location** if you want to change the location back to the default. Once the install folder is defined, click **Install**. This displays the window shown in Figure A-24.



Figure A-24 **Shortcut Selection Window**

11. If you want to create a shortcut icon for Connectrix Manager, select an option; otherwise, select **Don't create shortcut icons**. When done, click **Install**.

The installation process continues; when installation is complete,

12. When complete, the window in Figure A-25 appears. Click **Done** to close the window.

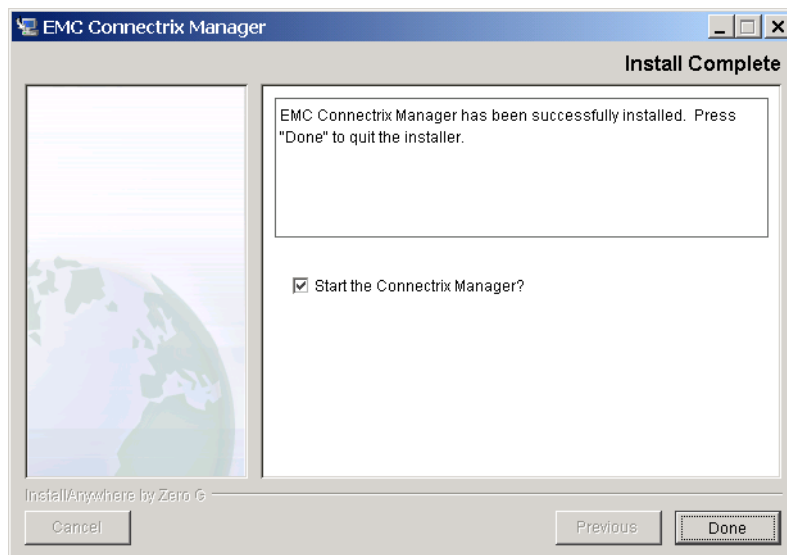


Figure A-25 Connectrix Manager Installer — End Screen

Launching the Connectrix Manager

To launch the client application from your *home* directory (specified as the install path in step 10 of the installation procedure):

1. In the Terminal window, type the following and press ENTER:
`[root@evtcom2 /root]# cd /home`
2. Type the following and press ENTER:
`[root@evtcom2 /root]# cd EFCM`
3. Type the following and press ENTER:
`[root@evtcom2 /root]# ./ConnectrixManager`

HP-UX, AIX, and Linux Systems

This section describes the procedures for installing the Connectrix Manager on a remote HP-UX, AIX, or Linux workstation.

Requirements

The download and installation process requires the use of a PC with the following minimum system requirements:

- ◆ Operating system:
 - HP-UX 11
 - AIX minimum version 4.3.3
 - Linux minimum version 6.2
- ◆ 360 MHz HA PA-RISC processor
- ◆ 32 MB RAM
- ◆ 15 MB available disk space
- ◆ Video card supporting 256 colors at 800 x 600 resolution
- ◆ Ethernet network adapter
- ◆ Java-enabled Internet browser, such as Microsoft Internet Explorer (version 3.0 or later) or Netscape Navigator (version 3.0 or later).

Newer versions of the Connectrix Manager or Product Managers installed on the Connectrix service processor will automatically download when the remote clients log in to the Connectrix service processor.

Procedure

The procedures described here are based on Internet Explorer 5.00 and Netscape 6.

To download and install the Connectrix Manager onto a remote workstation:

1. Open a Web browser.
2. Type the address of the Connectrix service processor into the **Location** (or **Address**) field on the browser; then press ENTER.

Obtain the address from your network administrator.

This displays the **Connectrix Management** page (Figure A-26).

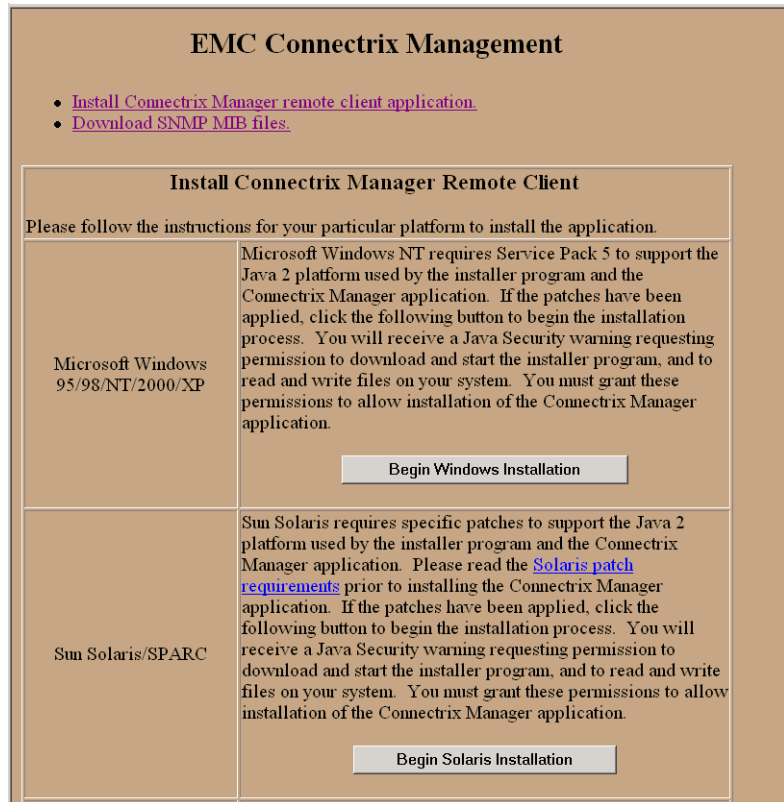


Figure A-26 Connectrix Management Web Page

3. Scroll down to the appropriate section (Figure A-27); then read the instructions for your operating system.

HP-UX	The Connectrix Manager remote client application will run on HP-UX version 11.x or later. HP-UX requires specific patches to support the Java 2 platform used by the installer program and the Connectrix Manager application. Please read the HP-UX patch requirements prior to installing the Connectrix Manager application. If the patches have been applied, click the following button to begin the installation process. You will receive a Java Security warning requesting permission to download and start the installer program, and to read and write files on your system. You must grant these permissions to allow installation of the Connectrix Manager application. Begin HP-UX Installation
IBM AIX	The Connectrix Manager remote client application will run on either AIX 4.3.3 plus AIX 4330-09 Recommended Maintenance Level or AIX 5L plus AIX 5100-01 Recommended Maintenance Level. Click the following button to begin the installation process. You will receive a Java Security warning requesting permission to download and start the installer program, and to read and write files on your system. You must grant these permissions to allow installation of the Connectrix Manager application. Begin AIX Installation
Linux	The Connectrix Manager remote client application is supported on Intel Pentium platforms running the Linux kernel v 2.2.12 and glibc v2.1.2-11 or later. Check your version of glibc using the following command: "ls /lib/libc-*" Click the following button to begin the installation process. You will receive a Java Security warning requesting permission to download and start the installer program, and to read and write files on your system. You must grant these permissions to allow installation of the Connectrix Manager application. Begin Linux Installation

Figure A-27 HP-UX, AIX, and Linux Download Links

If you are downloading to AIX, click the **AIX fixes** hyperlink and verify that your system is up to date.

- Click the appropriate **Download** box to begin the installation process.
- A **Save As** dialog box appears automatically with the default filename **EMCClientInstall.bin**. Change the filename to **/home/EMCClientInstall.bin**. Click **OK**.

Software download begins.

6. Close the browser window.
7. In the Terminal window, type `cd home` and press ENTER. Then type `sh EMCClientInstall.bin` and press ENTER.

The Connectrix Manager Introduction window (Figure A-28) appears.

Be aware that there may be a considerable delay.

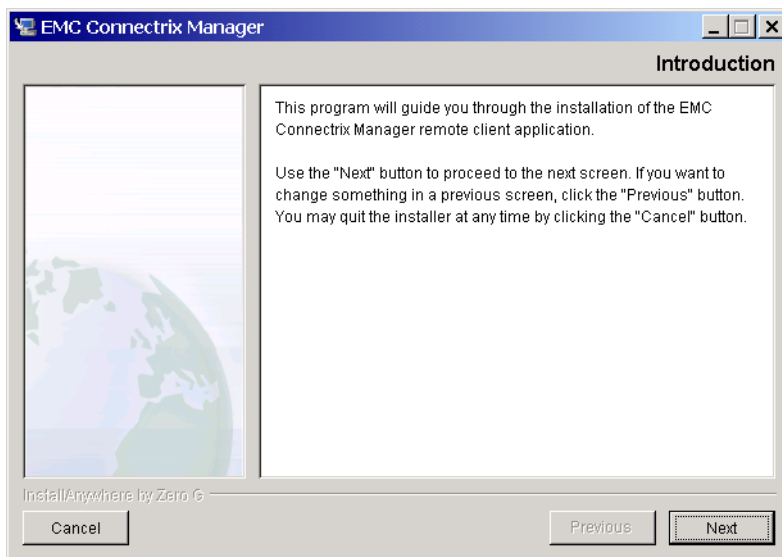


Figure A-28

Connectrix Manager Installer — Introduction Window

At any time, you can return to the previous page (if there is one) by clicking **Previous** or quit the Installer by clicking **Exit**.

8. Click **Next**.

This displays the License Agreement window (Figure A-29).

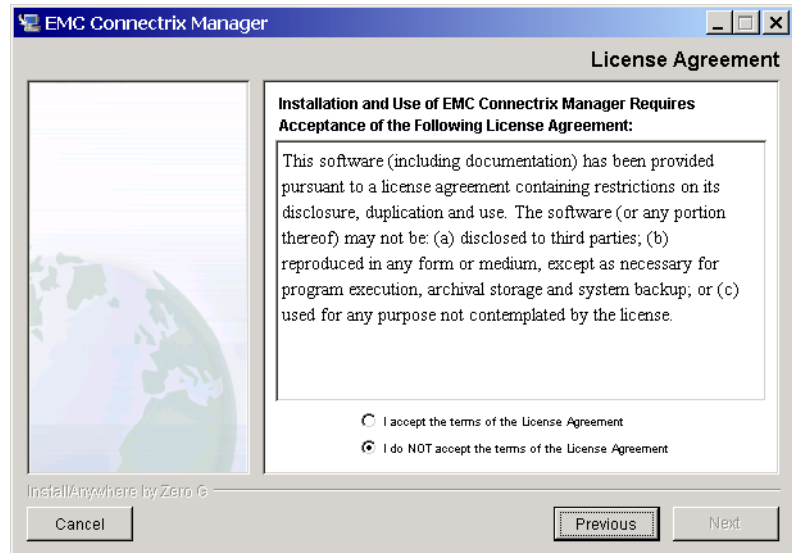


Figure A-29 Connectrix Manager Installer — License Agreement

9. Read the license agreement; then make sure the **Yes** button is selected and click **Next**.

This displays the window shown in Figure A-30.

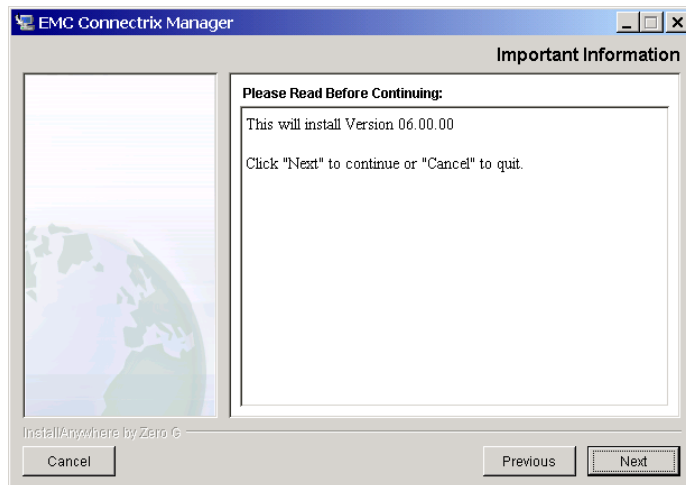


Figure A-30 Connectrix Manager Installer — Important Information

10. Click **Next**. This displays the window shown in Figure A-31.

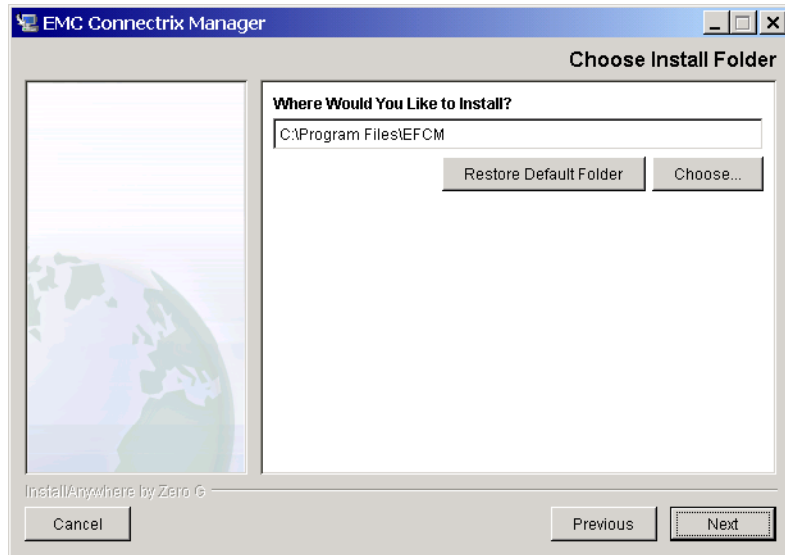


Figure A-31 **Connectrix Manager Installer — Select Install Folder**

For UNIX versions of the client, the destination path will most likely be simply `/EFCM`.

11. Select a folder on the remote workstation in which to store the Connectrix Manager. You can accept the default location, type in the path to a new location, or click **Choose** to browse the local computer for an appropriate location. Click **Restore Default Location** if you want to change the location back to the default.

Once the install folder is defined, click **Install**.

This displays the window shown in Figure A-32.



Figure A-32 **Shortcut Selection Window**

12. If you want to create a shortcut icon for Connectrix Manager, select an option; otherwise, select **Don't create shortcut icons**. When done, click **Install**.

The installation process continues; when installation is complete,

13. When complete, an Install Complete window (Figure A-33) appears. Click **Done** to close the window.

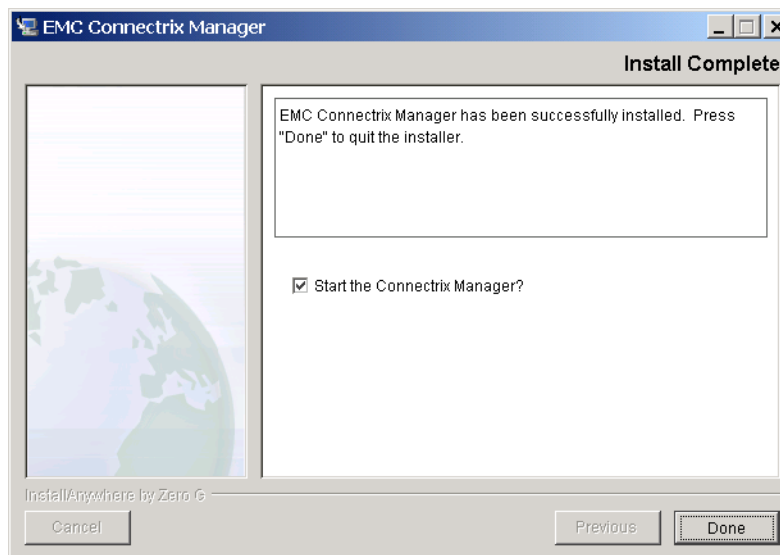


Figure A-33 Connectrix Manager Installer — End Screen

Launching the Connectrix Manager

To launch the Client application from the directory in which you saved it:

1. In the Terminal window, type the following and press ENTER:
`[root@evtcom2 /root]# cd /home`
2. Type the following and press ENTER:
`[root@evtcom2 /root]# cd EFCM`
3. Type the following and press ENTER:
`[root@evtcom2 /root]# ConnectrixManager`

Connectrix Service Processor SNMP Agent

This appendix describes the SNMP agent component in the Connectrix service processor. The Connectrix Manager SNMP agent implements the objects defined in the Fibre Channel Management (fcmgmt) MIB Version 3.1 and a small number of objects defined in MIB II. Through implementation of these MIB objects, the agent acts as a translator of information stored on the Connectrix service processor and attached directors into a form usable by SNMP management stations such as HP OpenView.

This appendix contains the following sections:

- ◆ Downloading MIB Information B-2
- ◆ Fibre Channel Management MIB Support B-4
- ◆ MIB-II Support B-62

Downloading MIB Information

To access SNMP variables, download the necessary MIBs (listed in Figure B-2 on page B-3) to SNMP management stations from the Connectrix service processor’s Web page using any standard Web browser. The URL for the Web page depends on the Connectrix service processor’s host name on your network.

1. Open a Web browser.
2. Type the address of the Connectrix service processor in the **Location** field of the browser; then press ENTER. (Obtain the address from your network administrator.)

This displays the **Connectrix Management** page (Figure B-1).

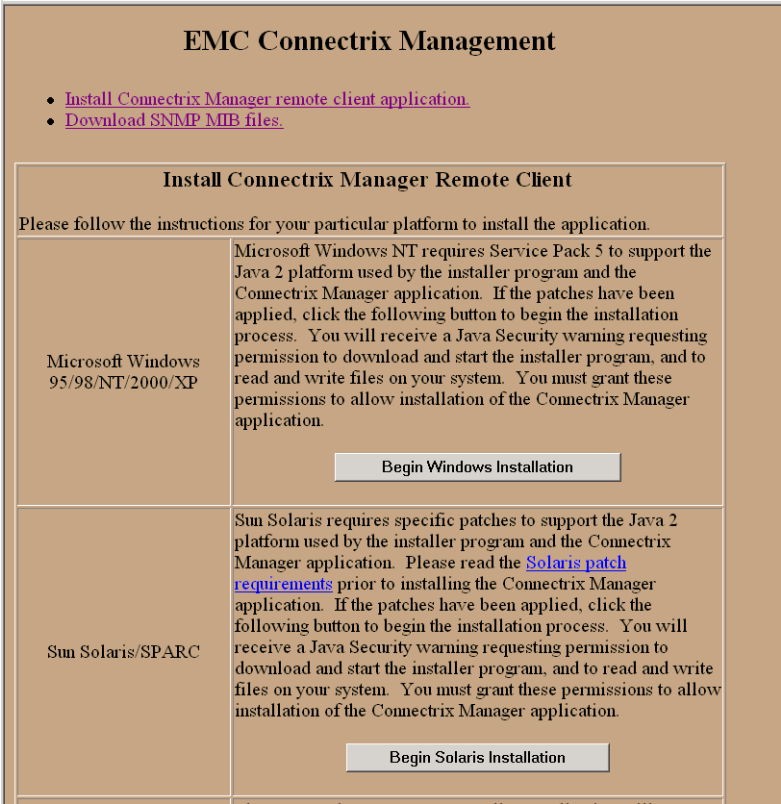


Figure B-1 Connectrix Management Web Page

- 3. Click the **Download SNMP MIB files** link. This displays the MIB download area (Figure B-2).

Download SNMP MIB Files	
These MIB files are provided in standard ASN.1 syntax and may be installed into the MIB database of any SNMPv2 compliant Network Management Station.	
FibreAlliance MIB fcmgmt.mib	This MIB is implemented by the SNMP agent that runs on the Service Processor PC. Use the Configure option in the Connectrix Manager application to configure access to this MIB from authorized SNMP Network Management Stations.
SNMP Framework MIB snmp-framework.mib	This MIB is needed to successfully compile and install the FibreAlliance MIB on the Network Management Station.
Fibre Channel Fabric Element MIB fcfe.mib	These two MIB's are implemented by the SNMP agent that runs on the switch. Use the Configure option in the corresponding Connectrix Product Manager to configure access to these MIB's from authorized SNMP Network Management Stations. Configuration must be done separately for each individual switch requiring SNMP access.
The standard TCP/IP MIB-II rfc1213.mib	
ED-1032 Enterprise Specific MIB ed-1032.mib	This MIB is implemented by the SNMP agent that runs on the ED-1032 Fibre Channel Director.
ED-64 Enterprise Specific MIB DS-32M Enterprise Specific MIB DS-16M Enterprise Specific MIB ef-6000.mib	This MIB is implemented by the SNMP agent that runs on a family of EMC Fibre Channel switch products including the ED-64 Director and the DS-32M and DS-16M switches.
ES-1000 Enterprise Specific MIB es-1000.mib	
ES-1000 Enterprise Specific MIB es-1000.mib	This MIB is implemented by the SNMP agent that runs on the ES-1000 Fibre Channel Switch.

Figure B-2 SNMP MIB Files Download Area

- 4. Click a MIB to display it.
To download a MIB, click **File, Save As** from the browser's menu bar, and save the file to a local directory.

Fibre Channel Management MIB Support

Notes on Current Support

FibreAlliance MIB (FA-MIB) revision 200105080000Z is implemented in the Connectrix Manager and is embedded in the Connectrix M-series microcode. (FA-MIB support is not embedded into the ED-1032 microcode.) The MIB can be downloaded from the HTTP server of the Connectrix service processor.

The FA-MIB conforms to SMIv2 rules.

The Fibre Channel Management (FCMGMT) MIB defines nine groups of objects:

- ◆ Connectivity Unit Group
- ◆ Firmware Revisions
- ◆ Sensor Table
- ◆ Port Table
- ◆ Event Table
- ◆ Link Table
- ◆ Trap Registration Table
- ◆ Port Statistics
- ◆ SNS (nameserver) table

A single scalar object, revisionNumber, is defined under the FCMGMT MIB base.

Table B-1 Scalar FCMGMT Objects

Object	Provides
revisionNumber	A constant Display String value representing the revision number of the FCMGMT MIB that is supported by the Connectrix service processor SNMP agent is returned.

Connectrix Service Processor Agent MIB Objects

The following sections define the FCMGMT MIB objects and how they are implemented in the Connectrix service processor SNMP agent. Unless otherwise noted, all MIB objects are read-only.

The Connectivity Unit Group contains information about the director switches that are configured in the Connectrix service processor. The group contains five simple objects and four tables; Connectivity Unit, Firmware, Port, Sensor, and Event.

Connectivity Unit Group Objects

Table B-2 **Connectrix Service Processor Connectivity Group Table**

Object Type Name	Type	Product Mapping	Access	Description
fcConnUnitNumber	INTEGER	The number of managed EMC units defined to the Connectrix service processor.	R	The number of connectivity units present on this system. May be a count of the boards in a chassis or the number of full boxes in a rack.
fcConnURL	DisplayString	http://[Connectrix Manager addr]/launch/start where [Connectrix Manager addr] is the network address of the Connectrix service processor. Loading this URL using a web browser will launch the Connectrix Manager application.	R	The top-level URL of the system. If it does not exist the value is an empty string. The URL format is implementation dependent and can have keywords embedded that are preceded by a percent sign (e.g., %USER). The following are the defined keywords that will be recognized and replaced with data during a launch: USER — Replace with username PASSWORD — Replace with password GLOBALID — Replace with globalid SERIALNO — Replace with serial number A management application will read this object from the MIB, provide values for any of the keywords listed above that are present in the string, and then use the URL to invoke or launch the program referenced.

Connectivity Unit Table

The connectivity unit table contains general information on the connectivity units. Each row in the table contains information for a particular switch/director.

Table B-3 Connectrix Service Processor ConnUnit Table

FA MIB Object Name	Type	Implementation	Access	Return on Linkdown
*fcConnUnitIndex	OCTET STRING(16)	An index (16-byte array) that identifies a particular EMC unit that is managed by the given Connectrix service processor.	R	Same
fcConnUnitGlobalId	FcGlobalId	The unit's WWN is contained in the first 8 bytes of the array. If the link between the Connectrix service processor and the switch is down, the array element values will be all zeros.	R	Zero
fcConnUnitType	FcUnitType	ED-1032, ED-140M, ED-64M: return switch(4) ES-1000: return other(2)	R	Same
fcConnUnitNumPorts		ED-1032: 32 ED-140M: 140 ED-64M: 64 DS-32M, DS-32M2: 32 DS-24M2: 24 DS-16M, DS-16M2: 16 ES-1000: 9 Note: the object does not count the inaccessible ports	R	Zero
fcConnUnitState	INTEGER	<u>Connectrix Manager</u> <u>MIB</u> online online state(2) going-offline offline state(3) offline offline state(3) coming-online online state(2)	R	unknown(1)
fcConnUnitStatus	INTEGER	<u>Connectrix Manager</u> <u>MIB</u> operational ok(3) degraded warning(4) failed ailed(5)	R	unknown(1)
fcConnUnitProduct	SnmpAdminString	The switch product name.	R	Same
fcConnUnitSerialNo	SnmpAdminString	OEM serial number.	R	Empty string
fcConnUnitUpTime	TimeTicks	The total time the link between the Connectrix service processor and the managed unit has been up.	R	Zero

Table B-3 Connectrix Service Processor ConnUnit Table (continued)

FA MIB Object Name	Type	Implementation	Access	Return on Linkdown
fcConnUnitUrl	DisplayString	http://[Connectrix Manager addr]/launch/start?[product netaddr] where [Connectrix Manager addr] is the network address of the Connectrix service processor and [product netaddr] is the network address of the switch. The form of the switch address depends upon how it was added in the Connectrix Manager. If it was added by Name then the name must be used otherwise the IP address must be used. Loading this URL from a web browser will launch the corresponding Product Manager.	R	Same
fcConnUnitDomainId	OCTET STRING(3)	Switch Fibre Channel Address.	R	FF.FF.FF
fcConnUnitProxyMaster	INTEGER	yes(3)	R	Yes
fcConnUnitPrincipal	INTEGER	yes(3)	R	Yes
fcConnUnitNumSensors		Returns the total number of fans and power supplies listed in the sensor table.	R	Zero
fcConnUnitNumRevs		Always return 1.	R	Zero
fcConnUnitModuleId	OCTET STRING(16)	Not supported, returns 16 zeros.	R	Not supported
fcConnUnitName	A textual string (up to 24 characters) of the name of the switch.		R/W	Empty string when reading and not settable when setting.
fcConnUnitInfo	SnmpAdminString	A textual string of the description of the switch.	R/W	Empty string when reading and not settable when setting.
fcConnUnitControl	INTEGER	1. return unknown(1) on read operation. 2. Support: resetConnUnitWarmStart(2) offlineConnUnit(3) onlineConnUnit(4)	R/W	Not settable when setting; Unknown when reading.
fcConnUnitContact	SnmpAdminString	A textual string of the contact info of the switch.	R/W	Empty string when reading; not settable when setting.

Table B-3 Connectrix Service Processor ConnUnit Table (*continued*)

FA MIB Object Name	Type	Implementation	Access	Return on Linkdown
fcConnUnitLocation	SnmpAdminString	A textual string of the location of the switch.	R/W	Empty string when reading; not settable when setting.
fcConnUnitEventFilter	FcEventSeverity	Default to info(8). Settable only when the new value is within 1 to 10	R/W	Not settable. Info(8) when reading.
fcConnUnitNumEvents		Current number of events whose event severities are equal or less than the event filter value	R	Same as when the link is up.
fcConnUnitMaxEvents	Gauge(32bits)	Always 50	R	50
fcConnUnitEventCurrID	Gauge(32bits)	The current event index is used as the last used event id. It is wrapped to a higher number when new event occurred and restart from 1 when Connectrix Manager resets.	R	Same as when the link is up.

Firmware Table The firmware table contains information on the firmware revisions supported by a particular connectivity unit.

Table B-4 Connectrix Service Processor Firmware Table

FA MIB Object Name	Type	Product Mapping	Access
fcConnUnitRevsIndex	Gauge(32 bits)	Throw exception when querying this object.	Not accessible
fcConnUnitRevsRevision	SnmpAdminString	Revision of the switch. When link is down, return NULL.	R
fcConnUnitRevsDescription	SnmpAdminString	Return "Switch Firmware Level." When link is down, return NULL.	R

Sensor Table The sensor table contains information on the status of the fan and power supply components on a given director.

Table B-5 Connectrix Service Processor Sensor Table

FA MIB Object Name	Type	Product Mapping	Access
*fcConnUnitSensorIndex	Gauge(32 bits)	Throw exception when querying this object.	Not accessible
FcConnUnitSensorName	SnmpAdminString	The textual name of the FRU.	R
fcConnUnitSensorStatus	INTEGER	This value is evaluated from FRU status. The active, backup and update-busy states are mapped to ok(3). And the failed state is mapped to failed(5).	R
fcConnUnitSensorInfo	SnmpAdminString	The serial number of the FRUs. It's not supported if the module is failed.	R
cConnUnitSensorMessage	SnmpAdminString	The textual description of the FRU status.	R
fcConnUnitSensorType	INTEGER	ED-1032: fan(4), power-supply(5) ED-64M: Power(5), fan(4), fan(2) ED-140M: Power(5), fan(4) ES-1000: fan(4), power-supply(5), thermal(8)	R
fcConnUnitSensorcharacteristic	INTEGER	Not supported and other(2) is returned	R

Port Table The port table contains information on the physical ports on a given director.

Table B-6 Connectrix Service Processor Port Table

FA MIB Object Name	Type	Product Mapping	Access
*fcConnUnitPortIndex	Gauge(32 bits)	A number starting from 1 for each switch. It should be continuous within that switch.	R
fcConnUnitPortType	INTEGER	If the port is Not installed notPresent(3) else if the Port State is online (i.e., STAT_AVAILABLE) use the <u>operating</u> Port Type: F_Port = fPort(8) FL_Port = flPort(7) E_Port = ePort(9) H_Port = hubPort(4) B_Port = ePort(9) else use the <u>configured</u> Port Type: Gx_Port = gPort(10) G_Port = gPort(10) Fx_Port = flPort(7) F_Port = fPort(8) E_Port = ePort(9)	R
fcConnUnitPortFCClassCap	FcPortFCClass	If the port is Not installed fcConnUnitPortFCClassCap = unsupported(0x00) else if ES-1000 H_Port 0x18 = class2(0x10) + class3(0x08) B_Port 0x58 = classF(0x40) + class2(0x10) + lass3(0x08) else it depends on the <u>configured</u> Port Type: Gx_Port 0x58 = classF(0x40) + class2(0x10) + class3(0x08) Fx_Port 0x18 = class2(0x10) + class3(0x08) G_Port 0x58 = classF(0x40) + class2(0x10) + class3(0x08) F_Port 0x18 = class2(0x10) + class3(0x08) E_Port 0x58 = classF(0x40) + class2(0x10) + class3(0x08)	R

Table B-6 Connectrix Service Processor Port Table (continued)

FA MIB Object Name	Type	Product Mapping	Access
fcConnUnitPortFCClassOp	FcPortFCClass	If the port is Not installed fcConnUnitPortFCClassOp = unsupported(0x00) else if the Port State is offline fcConnUnitPortFCClassOp = unsupported(0x00) else it depends on the <u>operating</u> Port Type: • FL_Port Use Class of Service specified in one or more Fabric Login's (OR'd together) • F_Port Use Class of Service specified in Fabric Login • E_Port 0x58 = classF(0x40) + class2(0x10) + class3(0x08) • H_Port Use Class of Service specified in one or more Fabric Login's (OR'd together) • B_Port 0x58 = classF(0x40) + class2(0x10) + class3(0x08)	R
fcConnUnitPortState	INTEGER	<u>Connectrix Mgr. MIB</u> If port has InvalidAttachment, the port state is online. If the port not installed, the port state is unknown. If the port has a link failure, the port state is offline. If the port is available, the port state is online. If the port state is blocked, the prt state is offline. If the port is unavailable, the port state is online. If the port is running internal diagnostics, the port state is diagnostics. If the port is running external loops, the port state is diagnostics. If the port experiences link reset, the port state is online. If the port experiences link failure, the port state is online. If the port shows service required, the port state is online. If the port experiences port failure, the port state is online If the port is inactive, the port state is offline. In any other cases, the port state is online (should not happen). The above mappings apply to ED-1032, ED-140M, ED-64M and the B_Port in ES-1000. The H_Port in ES-1000 is undetermined. When link is down: return unknown(1)	R

Table B-6 Connectrix Service Processor Port Table (continued)

FA MIB Object Name	Type	Product Mapping	Access
fcConnUnitPortStatus	INTEGER	<u>Connectrix Mgr. MIB</u> If port has InvalidAttachment, the port state is online. If the port not installed, the port state is unknown. If the port has a link failure, the port state is offline. If the port is available, the port state is online. If the port state is blocked, the port state is offline. If the port is unavailable, the port state is online. If the port is running internal diagnostics, the port state is diagnostics. If the port is running external loops, the port state is diagnostics. If the port experiences link reset, the port state is online. If the port experiences link failure, the port state is online. If the port shows service required, the port state is online. If the port experiences port failure, the port state is online. If the port is inactive, the port state is offline. In any other cases, the port state is online (should not happen). The above mappings apply to ED-1032, ED-140M, ED-64M and the B_Port in ES-1000. The H_Port in ES-1000 is undetermined. When link is down: return unknown(1).	R
fcConnUnitPortTransmitterType	INTEGER	This is mapped from the port technology as follow: not present and serial indicate unknown(1), optical sw1g and optical sw2g indicate shortwave(4), optical lw1g and optical lw2g indicate longwave(5), copper db9 and copper amp indicate copper(6), When link is down: return unknown(1)	R
fcConnUnitPortModuleType	INTEGER	ED-1032 : return glm(5), i.e.. oneXnine. ED-140M, ED-64M: return smallFormFactor(9) ES-1000: return gbic(3), If not installed, return gbicNotInstalled(8) When link is down: return unknown(1)	R
fcConnUnitPortWwn	FcNameId	Return the World Wide Name of the port. When link is down: return NULL	R

Table B-6 Connectrix Service Processor Port Table (continued)

FA MIB Object Name	Type	Product Mapping	Access
fcConnUnitPortFCId	OCTET STRING (SIZE(3))	- F_Port in ED-1032, ED-140M, and ED-64M: Fabric address of the node containing the port, in form of [domain, area, node] is returned. - B_Port in ES-1000 and E_Port in ED-1032 and ED-64M: Right-adjusted domain returned. - H_Port in ES-1000: zeros If no fcAddress, return FF.FF.FF. When link is down: return 0F.0F.0F (hex).	R
fcConnUnitPortSerialNoSn	SnmpAdminString	Not supported (empty string). When link is down: return NULL.	R
fcConnUnitPortRevision	SnmpAdminString	Not supported (empty string). When link is down: return NULL.	R
fcConnUnitPortVendor	SnmpAdminString	Not supported (empty string). When link is down: return NULL.	R
fcConnUnitPortSpeed	Gauge(32 bits)	ED-1032 and ES-1000: return constant of 100000 kilobytes. ED-140M, ED-64M: 100000 for one Gb, 200000 for two Gb, and zero for not established. When link is down: return NULL.	R
fcConnUnitPortControl	INTEGER	1. Always return unknown(1) on read. 2. Supports: Reset() GoOffline GoOnline 3. Linkdown: cannot be set. When link is down: return NULL	R/W
fcConnUnitPortName	SnmpAdminString	Cannot be set when LD and empty string in reading. When link is down: return NULL.	R/W
fcConnUnitPortPhysicalNumber	Gauge(32 bits)	The internal port number starting from zero. There may be gaps between these objects for the same switch, i.e., inaccessible ports are skipped. When link is down: return NULL	R

Table B-6 Connectrix Service Processor Port Table (*continued*)

FA MIB Object Name	Type	Product Mapping	Access
fcConnUnitPortProtocolCap (added from Mib3.0)	OCTET STRING (2)	If the port is Not installed fcConnUnitPortProtocolCap = unsupport(0x00) else if ES-1000: H_Port 1 = Loop(1) B_Port 2 = Fabric(2) else it depends on the <u>configured</u> Port Type: Gx_Port 3 = Loop(1) + Fabric(2) (available later) Fx_Port 3 = Loop(1) + Fabric(2) (available later) G_Port 2 = Fabric(2) F_Port 2 = Fabric(2) E_Port 2 = Fabric(2)	R
fcConnUnitPortProtocolOp (added from Mib3.0)	OCTET STRING (2)	If the port is Not installed fcConnUnitPortProtocolOp = unsupport(0x00) else if the Port State is offline fcConnUnitPortProtocolOp = unsupport(0x00) else it depends on the <u>operating</u> Port Type: FL_Port 1 = Loop(1) (available later) F_Port 2 = Fabric(2) E_Port 2 = Fabric(2) H_Port 1 = Loop(1) B_Port 1 = Fabric(2)	R

Table B-6 Connectrix Service Processor Port Table (continued)

FA MIB Object Name	Type	Product Mapping	Access
fcConnUnitPortNodeWwn (added from Mib3.0)	FcNameId	return switch WWN.	R
fcConnUnitPortHWState (added from Mib3.0)	INTEGER	<u>Connectrix Mgr. MIB</u> If port has InvalidAttachment, the port state is online. If the port not installed, the port state is unknown. If the port has a link failure, the port state is offline. If the port is available, the port state is online. If the port state is blocked, the prt state is offline. If the port is unavailable, the port state is online. If the port is running internal diagnostics, the port state is diagnostics. If the port is running external loops, the port state is diagnostics. If the port experiences link reset, the port state is online. If the port experiences link failure, the port state is online. If the port shows service required, the port state is online. If the port experiences port failure, the port state is online If the port is inactive, the port state is offline. In any other cases, the port state is online (should not happen). The above mappings apply to ED-1032,ED-140M, ED-64M, and the B_Port in ES-1000. The H_Port in ES-1000 is undetermined. When link is down: return unknown(1)	R

Event Table The table of connectivity unit events. Errors, warnings, and information should be reported in this table.

Table B-7 Connectrix Service Processor Event Table

FA MIB Object Name	Type	Product Mapping	Access	Description
*fcConnUnitEventIndex	Gauge(32 bits)	Return the event index defined by MIB provider which follows the definition described in the connUnitEventIndex description.	R	Each connectivity unit has its own event buffer. As it wraps, it may write over previous events. This object is an index into the buffer. It is recommended that this table be read using 'getNext's to retrieve the initial table. The management application should read the event table at periodic intervals and then determine if any new entries were added by comparing the last known index value with the current highest index value. The management application should then update its copy of the event table. If the read interval is too long, it is possible that there may be events that may not be contained in the agent's internal event buffer. For example, an agent may read events 50-75. At the next read interval, fcConnUnitEventCurrID is 189. If the management app tries to read event index 76, and the agent's internal buffer is 100 entries max, event index 76 will no longer be available. The index value is an incrementing integer starting from one every time there is a table reset. On table reset, all contents are emptied and all indices are set to zero. When an event is added to the table, the event is assigned the next higher integer value than the last item entered into the table. If the index value reaches its maximum value, the next item entered will cause the index value to roll over and start at one again.

Table B-7 Connectrix Service Processor Event Table (*continued*)

FA MIB Object Name	Type	Product Mapping	Access	Description
fcConnUnitREventTime	DisplayString (0..15)	Return the time when the event occurred. When link is down: return NULL	R	This is the real time when the event occurred. It has the following format. DDMMYYYY HHMMSS DD = day number, MM = month number, YYYY = year number, HH = hour number, MM= minute number, SS = seconds number If not applicable, return either a NULL string
fcConnUnitSEventTime	TimeTicks	Can be translated from connUnitREventTime. When link is down: return NULL	R	This is the sysuptime timestamp when the event occurred.
fcConnUnitEventSeverity	FcEventSeverity	info(8) error(5) critical(4) emergency(2) When link is down: return NULL	R	The event severity level.
fcConnUnitEventType	INTEGER	Always return status(3). When link is down: return NULL	R	The type of this event. The values are defined as follow: unknown(1), other(2), status(3), configuration(4), topology(5).
fcConnUnitEventObject	OBJECT IDENTIFIER	Only the OID of a conUnit is returned. Other information is not supported. When link is down: return NULL	R	This is used with the fcConnUnitEventType to identify which object the event refers to. It can be the OID of a connectivity unit or of another object like fcConnUnitPortStatus[...]
fcConnUnitEventDescr	SnmpAdminString	Return the event reason code description. When link is down: return NULL	R	The description of the event.

Link Table The link table contains information on the Fibre Channel links that exist between a particular director and a Fibre Channel device or another switch.

Table B-8 Connectrix Service Processor Link Table

FA MIB Object Name	Type	Product Mapping	Access	Description
*fcConnUnitLinkIndex	Gauge(32 bits)	Agent maintains this counter for all switches.	R	This index is used to create a unique value for each entry in the link table with the same connUnitLinkId. The value can only be reused if it is not currently in use and the value is the next candidate to be used. This value wraps at the highest value represented by the size of the INTEGER. This value is reset to zero when the system is Reset and the first value to be used is one.
fcConnUnitLinkIdX	OCTET STRING (16)	The WWN of this switch or device X.	R	The node WWN of the unit at one end of the link. If the node WWN is unknown and the node is a connUnit in the responding agent then the value of this object MUST BE equal to its connUnitID.
fcConnUnitLinkPortNumberX	Integer32	The port number of device X.	R	The port number on the unit specified by connUnitLinkIdX if known, otherwise -1. If the value is nonnegative then it will be equal to connUnitPortPhysicalNumber.
fcConnUnitLinkPortWwnX	OCTET STRING	The port WWN of device X. Available when the attached device to this port is in LOGIN state. Otherwise all zeroes.	R	The port WWN of the unit specified by connUnitLinkIdX if known, otherwise 16 octets of binary 0.
fcConnUnitLinkIdY	OCTET STRING (16)	The node WWN of device Y. Available when the attached device is in LOGIN state. Otherwise all zeroes.	R	The node WWN of the unit at the other end of the link. If the node WWN is unknown and the node is a connUnit in the responding SNMP agency then the value of this object MUST BE equal to its connUnitID.

Table B-8 Connectrix Service Processor Link Table (*continued*)

FA MIB Object Name	Type	Product Mapping	Access	Description
fcConnUnitLinkPortNumberY	Integer32	The port number of device Y. Available for E/B ports. Unavailable for F/H ports (-1 is returned).	R	The port number on the unit specified by connUnitLinkNodeIDY if known, otherwise -1. If the value is nonnegative then it will be equal to connUnitPortPhysicalNumber.
fcConnUnitLinkPortWwnY	OCTET STRING	The port WWN of device Y when Y is an EMC M-series switch. RC- not supported (all zeroes.)	R	The port WWN on the unit specified by connUnitLinkNodeIDY if known, otherwise 16 octets of binary 0.
fcConnUnitLinkAgentAddressY	OCTET STRING (16)	16 octets of binary 0. (not supported)	R	The address of an FCMGMT MIB agent for the node identified by connUnitLinkNodeIDY, if known; otherwise 16 octets of binary 0.
fcConnUnitLinkAgentAddressTypeY	Unsigned32	Zero (not supported)	R	If connUnitLinkAgentAddressY is nonzero, it is a protocol address. ConnUnitLinkAgentAddressType Y is the 'address family number' assigned by IANA to identify the address format. (e.g., 1 is Ipv4, 2 is Ipv6). If connUnitLinkAgentAddressY is all zeros, then this value is ignored.
fcConnUnitLinkAgentPortY	Unsigned32	Zero (not supported)	R	The IP port number for the agent. This is provided in case the agent is at a non-standard SNMP port.

Table B-8 Connectrix Service Processor Link Table (*continued*)

FA MIB Object Name	Type	Product Mapping	Access	Description
fcConnUnitLinkUnitTypeY	FcUnitType	Switch(4) for E or B port. Otherwise return unknown(1).	R	Type of the FC connectivity unit as defined in connUnitType.
fcConnUnitLinkConnIdY	OCTET STRING (3)	F-port: [domainId][areaCode][portNumber] E/B port: [domainId] [0] [0] H port: [alpaNumber] [0] [0]	R	This is the Fibre Channel ID of this port. If the connectivity unit is a switch, this is expected to be a Big Endian value of 24 bits. If this is loop, then it is the ALPA that is connected. If this is an eport, then it will only contain the domain ID. If not any of those, unknown or cascaded loop, return all bits set to 1.

Port Statistics The port statistics table contains Fibre Channel port statistics for a given director.

Table B-9 Connectrix Service Processor Port Statistics Table

FA MIB Object Name	Description				
	Type	Supported?: Y, N, B_Port Only			Access
*fcConnUnitPortStatIndex	A unique value among all entries in this table, between 0 and fcConnUnitNumPort[fcConnUnitPortUnitId]				
	Gauge (32 bits)	ED-140M, ED-64M	ED-1032	ES-1000	R

Table B-9 Connectrix Service Processor Port Statistics Table (*continued*)

FA MIB Object Name	Description				
	Type	Supported?: Y, N, B_Port Only			Access
fcConnUnitPortStatCountError	A count of the errors that have occurred on this port.				
	Counter64	Y	Y	Y	R
		Y	Y	Y	
		Y	Y	B	
		N	Y	B	
		N	Y	B	
		N	Y	Y	
		N	Y	Y	
		N	Y	Y	
		Y	Y	Y	
		Y	Y	Y	
		Y	Y	Y	
		Y	Y	Y	
		Y	Y	Y	
fcConnUnitPortStatCountTxObjects	The number of frames/packets/IOs/etc that have been transmitted by this port. Note: A Fibre Channel frame starts with SOF and ends with EOF. FC loop devices should not count frames passed through. This value represents the sum total for all other Tx objects.				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountRxObjects	The number of frames/packets/IOs/etc that have been received by this port. Note: A Fibre Channel frame starts with SOF and ends with EOF. FC loop devices should not count frames passed through. This value represents the sum total for all other Rx objects.				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountTxElements	The number of octets or bytes that have been transmitted by this port. One second periodic polling of the port. This value is saved and compared with the next polled value to compute net throughput. Note, for Fibre Channel, ordered sets are not included in the count.				
	Counter64	Y	Y	Y	R

Table B-9 Connectrix Service Processor Port Statistics Table (*continued*)

FA MIB Object Name	Description				
	Type	Supported?: Y, N, B_Port Only			Access
fcConnUnitPortStatCountRxElements	The number of octets or bytes that have been received. by this port. One second periodic polling of the port. This value is saved and compared with the next polled value to compute net throughput. Note, for Fibre Channel, ordered sets are not included in the count.				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountBBCreditZero	Count of transitions in/out of BB_Credit zero state. The other side is not providing any credit. Note, this is a Fibre Channel stat only.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountInputBuffersFull	Count of occurrences when all input buffers of a port were full and outbound buffer-to-buffer credit transitioned to zero. There is no credit to provide to other side. Note, this is a Fibre Channel stat only.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountFBSYFrames	Count of times that FBSY was returned to this port as a result of a frame that could not be delivered to the other end of the link. This occurs if either the Fabric or the destination port is temporarily busy. Port can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat. This is the sum of all classes. If you cannot keep the by class counters, then keep the sum counters.				
	Counter64	N	N	Y	R
fcConnUnitPortStatCountPBSYFrames	Count of times that PBSY was returned to this port as a result of a frame that could not be delivered to the other end of the link. This occurs if the destination port is temporarily busy. PBSY can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat. This is the sum of all classes. If you cannot keep the by class counters, then keep the sum counters.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountFRJTFrames	Count of times that FRJT was returned to this port as a result of a Frame that was rejected by the fabric. Note, This is the total for all classes and is a Fibre Channel only stat.				
	Counter64	N	N	N	R

Table B-9 Connectrix Service Processor Port Statistics Table (*continued*)

FA MIB Object Name	Description				
	Type	Supported?: Y, N, B_Port Only			Access
fcConnUnitPortStatCountPRJTFrames	Count of times that FRJT was returned to this port as a result of a Frame that was rejected at the destination NxPort. Note, This is the total for all classes and is a Fibre Channel only stat.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountClass1RxFrames	Count of Class 1 Frames received at this port. Note, this is a Fibre Channel only stat.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountClass1TxFrames	Count of Class 1 Frames transmitted out this port. Note, this is a Fibre Channel only stat.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountClass1FBSYFrames	Count of times that FBSY was returned to this port as a result of a Class 1 Frame that could not be delivered to the other end of the link. This occurs if either the Fabric or the destination port is temporarily busy. FBSY can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountClass1PBSYFrames	Count of times that PBSY was returned to this port as a result of a Class 1 Frame that could not be delivered to the other end of the link. This occurs if the destination NxPort is temporarily busy. PBSY can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountClass1FRJTFrames	Count of times that FRJT was returned to this port as a result of a Class 1 Frame that was rejected by the fabric. Note, this is a Fibre Channel only stat.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountClass1PRJTFrames	Count of times that FRJT was returned to this port as a result of a Class 1 Frame that was rejected at the destination NxPort. Note, this is a Fibre Channel only stat.				
	Counter64	N	N	N	R

Table B-9 Connectrix Service Processor Port Statistics Table (*continued*)

FA MIB Object Name	Description				
	Type	Supported?: Y, N, B_Port Only			Access
fcConnUnitPortStatCountClass2RxFrames	Count of Class 2 Frames received at this port. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountClass2TxFrames	Count of Class 2 Frames transmitted out this port. Note, this is a Fibre Channel only stat.				
	Counter64	Y	N	N	R
fcConnUnitPortStatCountClass2FBSYFrames	Count of times that FBSY was returned to this port as a result of a Class 2 Frame that could not be delivered to the other end of the link. This occurs if either the Fabric or the destination port is temporarily busy. FBSY can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	N	R
fcConnUnitPortStatCountClass2PBSYFrames	Count of times that PBSY was returned to this port as a result of a Class 2 Frame that could not be delivered to the other end of the link. This occurs if the destination N_Port is temporarily busy. PBSY can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat.				
	Counter64	Y	N	N	R
fcConnUnitPortStatCountClass2FRJTFrames	Count of times that FRJT was returned to this port as a result of a Class 2 Frame that was rejected by the fabric. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	N	R
fcConnUnitPortStatCountClass2PRJTFrames	Count of times that FRJT was returned to this port as a result of a Class 2 Frame that was rejected at the destination N_Port. Note, this is a Fibre Channel only stat.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountClass3RxFrames	Count of Class 3 Frames received at this port. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountClass3TxFrames	Count of Class 3 Frames transmitted out this port. Note, this is a Fibre Channel only stat.				
	Counter64	Y	N	N	R

Table B-9 Connectrix Service Processor Port Statistics Table (*continued*)

FA MIB Object Name	Description				
	Type	Supported?: Y, N, B_Port Only			Access
fcConnUnitPortStatCountClass3Discards	Count of Class 3 Frames that were discarded upon reception at this port. There is no FBSY or FRJT generated for Class 3 Frames. They are simply discarded if they cannot be delivered. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	B	R
fcConnUnitPortStatCountRxMulticastObjects	Count of Multicast Frames or Packets received at this port.				
	Counter64	N	Y	N	R
fcConnUnitPortStatCountTxMulticastObjects	Count of Multicast Frames or Packets transmitted out this port.				
	Counter64	N	Y	N	R
fcConnUnitPortStatCountRxBroadcastObjects	Count of Broadcast Frames or Packets received at this port.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountTxBroadcastObjects	Count of Broadcast Frames or Packets transmitted out this port. On a Fibre Channel loop, count only OPNr frames generated.				
	Counter64	N	N	N	R
fcConnUnitPortStatCountRxLinkResets	Count of Link resets. This is the number of LRs received. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	B	R
fcConnUnitPortStatCountTxLinkResets	Count of Link resets. This is the number LRs transmitted. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	B	R
fcConnUnitPortStatCountNumberLinkResets	Count of Link resets and LIPs detected at this port. The number times the reset link protocol is initiated. These are the count of the logical resets, a count of the number of primitives. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	B	R
fcConnUnitPortStatCountRxOfflineSequences	Count of Offline Primitive OLS received at this port. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	B	R

Table B-9 Connectrix Service Processor Port Statistics Table (*continued*)

FA MIB Object Name	Description				
	Type	Supported?: Y, N, B_Port Only			Access
fcConnUnitPortStatCountTxOfflineSequences	Count of Offline Primitive OLS transmitted by this port. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	B	R
fcConnUnitPortStatCountNumberOfflineSequences	Count of Offline Primitive sequence received at this port. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	B	R
fcConnUnitPortStatCountLinkFailures	Count of link failures. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountInvalidCRC	Count of frames received with invalid CRC. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Loop ports should not count CRC errors passing through when monitoring. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountInvalidTxWords	Count of invalid transmission words received at this port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountPrimitiveSequenceProtocolErrors	Count of primitive sequence protocol errors detected at this port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	B	R
fcConnUnitPortStatCountLossofSignal	Count of instances of signal loss detected at port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountLossofSynchronization	Count of instances of synchronization loss detected at port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	Y	R

Table B-9 Connectrix Service Processor Port Statistics Table (*continued*)

FA MIB Object Name	Description				
	Type	Supported?: Y, N, B_Port Only			Access
fcConnUnitPortStatCountInvalidOrderedSets	Count of invalid ordered sets received at port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.				
	Counter64	N	Y	Y	R
fcConnUnitPortStatCountFramesTooLong	Count of frames received at this port where the frame length was greater than what was agreed to in FLOGI/PLOGI. This could be caused by losing the end of frame delimiter. Note, this is a Fibre Channel only stat.				
	Counter64	N	Y	Y	R
fcConnUnitPortStatCountFramesTruncated	Count of frames received at this port where the frame length was less than the minimum indicated by the frame header - normally 24 bytes, but it could be more if the DFCTL field indicates an optional header should have been present. Note, this is a Fibre Channel only stat				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountAddressErrors	Count of frames received with unknown addressing. e.g. unknown SID or DID. the SID or DID is not known to the routing algorithm. Note. this is a Fibre Channel only stat.				
	Counter64	Y	Y	Y	R
fcConnUnitPortStatCountDelimiterErrors	Count of invalid frame delimiters received at this port. An example is a frame with a class 2 start and a class 3 at the end. Note, this is a Fibre Channel only stat.				
	Counter64	Y	Y	N	R
fcConnUnitPortStatCountEncodingDisparityErrors	Count of disparity errors received at this port. Note, this is a Fibre Channel only stat.				
	Counter64	N	Y	N	R

Name Server Table

This table is accessed either directly if the management software has an index value or via GetNexts. The value of the indexes is not required to be contiguous. Each entry created in this table will be assigned an index. This relationship is kept persistent until the entry is removed from the table or the system is reset. The total number of entries is defined by the size of the table.

Table B-10 Name Server Table

	Description		
FA MIB Object Name	Type	Access	Description
*fcConnUnitSnsPortIndex	Counter64 INTEGER	R	The physical port number of this SNS table entry. Each physical port has an SNS table with 1-n entries indexed by fcConnUnitSnsPortIdentifier (port address)
*fcConnUnitSnsPortIdentifier	FcAddressId	R	The Port Identifier for this entry in the SNS table.
fcConnUnitSnsPortName	FcNameId	R	The Port WWN Name for this entry in the SNS table.
fcConnUnitSnsNodeName	FcNameId	R	The Node Name for this entry in the SNS table.
fcConnUnitSnsClassOfSvc	OCTET STRING (SIZE (1))	R	The Classes of Service offered by this entry in the SNS table.
fcConnUnitSnsNodeIPAddress	OCTET STRING (SIZE(16))	R	The IPv6 formatted address of the Node for this entry in the SNS table.
fcConnUnitSnsProcAssoc	OCTET STRING (SIZE (8))	R	The Process Associator for this entry in the SNS table.
fcConnUnitSnsFC4Type	OCTET STRING (SIZE (32))	R	The FC-4 Types supported by this entry in the SNS table.
fcConnUnitSnsPortType	OCTET STRING (SIZE (1))	R	The Port Type of this entry in the SNS table.
fcConnUnitSnsPortIPAddress	OCTET STRING (SIZE(16))	R	The IPv6 formatted address of this entry in the SNS table.
fcConnUnitSnsFabricPortName	FcNameId	R	The Fabric Port name of this entry in the SNS table.
fcConnUnitSnsHardAddress	FcGlobalId	R	The Hard ALPA of this entry in the SNS table.
fcConnUnitSnsSymbolicPortName	DisplayString (SIZE (0..79))	R	The Symbolic Port Name of this entry in the SNS table.
fcConnUnitSnsSymbolicNodeName	DisplayString (SIZE (0..79))	R	The Symbolic Node Name of this entry in the SNS table.

SNMP Trap Registration Group

The trap registration group allows for the control of trap generation on the Connectrix service processor SNMP agent. The group consists of two scalar objects and a trap registration table.

Table B-11 SNMP Trap Registration Group

EMC MIB Object Name	Type	Access	Description
fcTrapMaxClients	Unsigned32	R	The maximum number of SNMP trap recipients supported by the connectivity unit.
fcTrapClientCount	Unsigned32	R	The current number of rows in the trap table.

Trap Registration Table

This table contains a row for each trap recipient. When the SNMP agent generates a trap a copy is sent to each of the recipients in the table depending upon the severity of the trap and the setting of the trapRegFilter object.

Table B-12 Trap Registration Table

EMC MIB Object Name	Type	Operation	Access	Description
*fcTrapRegIpAddress	IpAddress	Read: return the trap receiver's IP Write: <i>not writable</i> Create: create a new row. Its value is encoded in the request OID. See createAndGo for the limits of this object.	R/C	The IP address of a client registered for traps.
*fcTrapRegPort	Unsigned32	Read: return the trap receiver's port number Write: <i>not writable</i> Create: create a new row. Its value is encoded in the request OID. See createAndGo for the limits of this object.	R/C	The UDP port to send traps to for this host. Normally this would be the standard trap port (162).

Table B-12 Trap Registration Table (*continued*)

EMC MIB Object Name	Type	Operation	Access	Description
fcTrapRegFilter	FcEventSeverity	Read: return the filter value (1-10) Write: overwrite the old value with a new value. Only 1 – 10 is allowed. Range: (1-10) unknown(1); emergency(2); alert(3); critical(4);error(5); warning(6); notify(7); info(8); debug(9); mark(10). Create: create a new row and its value is defaulted to info(8)	R/W/C	This value defines the trap severity filter for this trap host. The connUnit will send traps to this host that have a severity level less than or equal to this value.

Table B-12 Trap Registration Table (*continued*)

EMC MIB Object Name	Type	Operation	Access	Description
fcTrapRegRowState	RowStatus	When read: (1) active if the row state is not being set to notInService(2) (2) notInService if management station set to this value (3) notReady : Based on our implementation, no entry will be missed, so this state should never happen. When write: (1) active; always settable (2) notInService; always settable (3) notReady; not allowed and a generic error will be returned. (4) CreateAndGo. A new row is created and the rowState is set to active(1) only when all of the following conditions hold. Otherwise, no row is created and a generic error will be returned. (a) the maximum number of entries (12) has not been reached.	R/W/C	Specifies the operational status of the row. A RowStatus object may take any of six defined values: • active: traps may be sent as specified in this row; a management application may change the value of any objects in the row when the status is active. • notInService: traps will not be sent using this row. • notReady: the conceptual row exists in the agent, but is missing information necessary to send traps (i.e., if any of the other objects in the row are not present or contain invalid values); this value may not be supplied by a management application. • createAndGo: supplied by a management application wishing to create a new instance of a conceptual row, supplying valid values for the all the other objects in the row, and have its status automatically set to active, making it available for use in sending traps. • createAndWait: supplied by a management application wishing to create a new instance of a conceptual row but not make it available for use in sending traps at that time; and, • destroy: supplied by a management application wishing to delete an existing conceptual row.

Fibre Channel Management Traps

The following FCMGMT MIB traps are generated from the Connectrix service processor when the SNMP agent is active and when one or more trap recipients have been configured in the Connectrix Manager.

Table B-13 Trap Type Table

EMC MIB Object Name	Type No.	Product Mapping	OID and Value	Description
fcConnUnitStatusChange	1	Generated when the switch's online status or operational status changes	".1.3.6.1.2.1.8888.1.1.3.1.6" + unitId fcConnUnitStatus, ".1.3.6.1.2.1.8888.1.1.3.1.5" + unitId fcConnUnitState	The overall status of the connectivity unit has changed. Recommended severity level (for filtering): alert
fcConnUnitDeletedTrap	2	Not supported on the connUnit.	N/A	An fcConnUnit has been deleted from this agent. Recommended severity level (for filtering): warning
fcConnUnitEventTrap	3	Generated when a new event is generated.	".1.3.6.1.2.1.8888.1.1.7.1.1" + unitId fcConnUnitEventIndex, ".1.3.6.1.2.1.8888.1.1.7.1.5" + unitId fcConnUnitEventType, ".1.3.6.1.2.1.8888.1.1.7.1.6" + unitId fcConnUnitEventObject, ".1.3.6.1.2.1.8888.1.1.7.1.7" + unitId fcConnUnitEventDescr	An event has been generated by the connectivity unit. Recommended severity level (for filtering): info
fcConnUnitSensorStatusChange	4	Generated when one of fans/powers status is changed.	".1.3.6.1.2.1.8888.1.1.5.1.3" + unitId + sensor_nbr fcConnUnitSensorState	The overall status of the connectivity unit has changed. Recommended severity level (for filtering): alert
fcConnUnitPortStatusChange	5	Generated when a port state/status is changed.	".1.3.6.1.2.1.8888.1.1.6.1.6" + unitId + port_nbr fcConnUnitPortStatus, ".1.3.6.1.2.1.8888.1.1.6.1.5" + unitId + port_nbr fcConnUnitPortState	The overall status of the connectivity unit has changed. Recommended severity level (for filtering): alert

Director/Switch Agent MIB Objects

The following sections define the director/switch MIB objects and how they are implemented in the product SNMP agent.

Table B-14 Director/Switch Type Definition Table

Type	Syntax	Description
FcNameId	OCTET STRING (SIZE(8))	Represents the Worldwide Name (WWN; IEEE 60-bit variety; standard part of T11 definitions for fibre channel) associated with a Fibre Channel (FC) entity.
FcGlobalId	OCTET STRING (SIZE(16))	Represents the Worldwide Name (WWN; IEEE 124-bit variety) associated with a Fibre Channel (FC) entity.
FcEventSeverity	INTEGER	The set of values which define the event severity that will be logged by this connectivity unit. Values unknown (1) through debug (9) are essentially self-explanatory; mark (10) means that all messages are logged. The values are defined as follow: unknown (1), emergency (2), alert (3), critical (4), error (5), warning (6), notify (7), info (8), debug (9), mark (10).
FcUnitType	INTEGER	The values are defined as follow: unknown (1) - cannot be determined, other (2) -- none of the following, hub (3) -- passive connectivity unit supporting loop protocol, switch (4) -- active connectivity unit supporting multiple protocols, gateway (5) -- unit that converts not only the interface but also the frame into another protocol. The assumption is that there is always two gateways connected together. For example, FC <-> ATM, converter (6) -- unit that converts from one interface to another, For example, FC <-> SCSI, hba(7) -- host bus adapter, proxyAgent (8) -- software proxy-agent, storageDevice (9) -- disk, cd, tape, etc, host (10) -- host computer, storageSubsystem (11) -- raid, library, etc, module (12) -- subcomponent of a system, swDriver (13) -- software driver, storageAccessDevice (14) -- Provides storage management and access for heterogeneous hosts and heterogeneous devices.
FcPortFCClass	BITS	Represents the class(es) of service represented on a given port, in a given operational context. The values are defined as follow: unknown (0), classF (1), class1(2), class2 (3), class3 (4), class4 (5), class5 (6), class6 (7).

Connectivity Unit Group Objects

The Connectivity Unit Group contains information about the director switches that are configured in the Connectrix service processor. The group contains five simple objects and four tables; Connectivity Unit, Firmware, Port, Sensor, and Event.

Table B-15 Connectivity Unit Group Table

EMC MIB Object Name	Type	Product Mapping	Access	Description
fcConnUnitNumber	INTEGER	1	R	The number of connectivity units present on this system. May be a count of the boards in a chassis or the number of full boxes in a rack.
fcConnURL	DisplayString	http://switch's IP-addr (The switch's IP address is Supported by PCP)	R	The top-level URL of the system. If it does not exist the value is an empty string. The URL format is implementation-dependent and can have keywords embedded that are preceded by a percent sign (e.g., %USER). The following are the defined keywords that will be recognized and replaced with data during a launch: USER – Replace with username. PASSWORD – Replace with password. GLOBALID – Replace with globalid. SERIALNO – Replace with serial number. A management application will read this object from the MIB, provide values for any of the keywords listed above that are present in the string, and then use the URL to invoke or launch the program referenced.
fcConnUnitSnsMaxRows	Counter32	The number of the entries of the Name Server Table.	R	The maximum number of rows in the fcConnUnitSnsTable table.

Connectivity Group Table The fcConnUnitTable contains general information on the system's connectivity units.

Table B-16 fcConnUnitTable

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
*fcConnUnitId	The unique identification for this connectivity unit among those within this proxy domain. The value MUST be unique within the proxy domain because it is the index variable for fcConnUnitTable. The value assigned to a given connectivity unit SHOULD be persistent across agent and unit resets. It SHOULD be the same as fcConnUnitGlobalId if fcConnUnitGlobalId is known and stable.		
	OCTET STRING	Switch WWN.	R
fcConnUnitGlobalId	An optional global-scope identifier for this connectivity unit. It MUST be a WWN for this connectivity unit or 16 octets of value zero. WWN formats requiring fewer than 16 octets MUST be extended to 16 octets with trailing zero octets. If a WWN is used for fcConnUnitId, the same WWN MUST be used for fcConnUnitGlobalId. When a non-zero value is provided, it SHOULD be persistent across agent and unit resets. It SHOULD be globally unique. It SHOULD be one of these FC-PH/PH3 formats: IEEE (NAA=1) IEEE Extended (NAA=2) IEEE Registered (NAA=5). IEEE Registered extended (NAA=6). Use of the IEEE formats allows any IEEE-registered vendor to assure global uniqueness independently. The following are some references on IEEE WWN formats: http://standards.ieee.org/regauth/oui/tutorials/fibreformat.html http://standards.ieee.org/regauth/oui/tutorials/fibrecomp_id.html If one or more WWNs are associated with the connectivity unit via other management methods, one of them SHOULD be used for fcConnUnitGlobalId. If there is not a WWN assigned specifically to the connectivity unit, there is some merit, though not a requirement, to using a WWN assigned to (one of) its permanently attached FC/LAN interface(s). This can not risk uniqueness, though. As a counterexample, if your agent runs in a host and the host has an HBA, it is quite possible that agent, host, and HBA will all be distinct connectivity units, so the host and agent can not use the WWN of the HBA. Another example: If your hub has a built-in Ethernet port, it might be reasonable for the hub to use its LAN address (prefixed with the appropriate NAA) as its fcConnUnitId. But if the Ethernet were a replaceable PCCard, the hub should have an independent ID.		
	FcGlobalId	Switch WWN. (Supported by PCP.)	R
fcConnUnitType	The type of this connectivity unit.		
	FcUnitType	switch(4)	R
fcConnUnitNumports	Number of physical ports in the connectivity unit (internal/embedded, external).		
	Unsigned32	Number of ports from PROD_CNFG.	R

Table B-16 fcConnUnitTable (continued)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitState	This object reports the overall state of the connectivity unit. The meaning of all values is essentially self-explanatory. Any of these values may occur with any of the fcConnUnitStatus values. The values are defined as follow: unknown (1), online (2), offline (3).		
	INTEGER	online and coming-online will indicate online state (2), and offline and going-offline will indicate offline state (3).	R
fcConnUnitStatus	This object reports the overall status of the connectivity unit. The warning (4) value means that the connectivity unit needs attention; all other values are essentially self-explanatory. Any of these values may occur with any of the fcConnUnitState values. The values are defined as follow: unknown (1), unused (2), ok (3), warning(4), failed (5)		
	INTEGER	This value will be mapped from current status of switch in such a way that operational status indicates ok (3), degraded status indicates warning (4), failed status indicate failed (5). (Supported by PCP)	R
fcConnUnitProduct	The connectivity unit vendor's product model name.		
	SnmpAdminString	The oem product name. (This information is stored in VPD, supported by STATUSMGR)	R
fcConnUnitSerialNo	The serial number identification for this connectivity unit.		
	SnmpAdminString	OEM serial number. (This information is stored in VPD, supported by STATUSMGR)	R
fcConnUnitUpTime	The number of centiseconds since the last unit initialization.		
	TimeTicks	Supported by MCK	R
fcConnUnitUrl	URL to launch a management application, if applicable. Otherwise empty string. In a standalone unit, this would be the same as the top level URL. This has the same definition as systemURL for keywords.		
	DisplayString	Same as fcConnURL.	R/W
fcConnUnitDomainId	24 bit Fibre Channel address ID of this connectivity unit. Following the fibre channel standard, the right-most bit of the right-most octet is for the least significant bit of the address value; the left-most bit of the left-most octet, if needed, is for the most significant bit of the address value. If this value is not applicable, all bits set to 1.		
	OCTET STRING (SIZE (3))	FFCCXX, where XX is the active domainId of the switch.	R

Table B-16 fcConnUnitTable (continued)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitProxyMaster	A value of 'yes' means this is the proxy master unit for a set of managed units. For example, this could be the only unit with a management card in it for a set of units. A standalone unit should return 'yes' for this object. The values are defined as follow: unknown (1), no (2), yes (3).		
	INTEGER	yes(3)	R
fcConnUnitPrincipal	Whether this connectivity unit is the principal unit within the group of fabric elements. If this value is not applicable, return unknown. The values are defined as follow: unknown (1), no (2), yes (3).		
	INTEGER	Supported by Fab_ctrl subsystem	R
fcConnUnitNumSensors	Number of sensors in the fcConnUnitSensorTable.		
	Unsigned32	The number of sensors.	R
fcConnUnitNumRevs	The number of revisions in the fcConnUnitRevsTable.		
	Unsigned32	1	R
fcConnUnitModuleId	This is a unique id, persistent between boots, that can be used to group a set of connectivity units together into a module. The intended use would be to create a connectivity unit with a fcConnUnitType of 'module' to represent a physical or logical group of connectivity units. Then the members of the group would set the value of fcConnUnitId for this 'container' connectivity unit. fcConnUnitModuleId should be zeros if this connectivity unit is not part of a module.		
	OCTET STRING(SIZE(16))	return 16 zeros.(currently not supported)	R
fcConnUnitName	A name for this connectivity unit. This object value should be persistent between boots.		
	SnmpAdminString	switch's configured name. (Supported by PCP.) Writable and persistent across IPL.	R/W
fcConnUnitInfo	Information about this connectivity unit. This object value should be persistent between boots.		
	SnmpAdminString	A textual description of the product. (Supported by PCP.) Writable and persistent across IPL.	R/W

Table B-16 fcConnUnitTable (continued)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitControl	This object is used to control the addressed connectivity unit. NOTE: 'ColdStart' and 'WarmStart' are as defined in mib-2 and are not meant to be a factory reset. • resetConnUnitColdStart: the addressed unit performs a 'ColdStart' reset. • resetConnUnitWarmStart: the addressed unit performs a 'WarmStart' reset. • offlineConnUnit: the addressed unit puts itself into an implementation dependant 'offline' state. In general, if a unit is in an offline state, it cannot be used to perform meaningful Fibre Channel work. • onlineConnUnit: the addressed unit puts itself into an implementation dependant 'online' state. In general, if a unit is in an online state, it is capable of performing meaningful Fibre Channel work. NOTE: Each implementation may chose not to support SNMP Set operations for any or all of these values. For Sets specifying varbinds for instances of this object and values not supported by a given implementation, the agent will return the SNMP WrongValue PDU error code. The values are defined as follow: unknown (1), invalid (2), resetConnUnitColdStart (3), resetConnUnitWarmStart (4), offlineConnUnit (5), onlineConnUnit (6).		
	INTEGER	Always return unknown (1) on read operation. resetConnUnitWarmStart (4), offlineConnUnit (5), and onlineConnUnit (6) will be supported by PCP. resetConnUnitWarmStart (4) indicates IPL on the switch is performed. resetConnUnitColdStart (3) is not supported.	R/W
fcConnUnitContact	Contact information for this connectivity unit. The contact information is intended to facilitate contacting someone in case of problems, questions, etc. (e.g., the help desk internal to a company).		
	SnmpAdminString	Contact information for this connectivity unit. (supported by PCP) Writable and persistent across IPL.	R/W
fcConnUnitLocation	Location information for this connectivity unit.		
	SnmpAdminString	The physical location of the switch. (Supported by PCP.) Writable and persistent across IPL.	R/W
fcConnUnitEventFilter	This value defines the event severity that will be logged by this connectivity unit. All events of severity less than or equal to fcConnUnitEventFilter are logged in the fcConnUnitEventTable.		
	FcEventSeverity	Writable and it's set to the Default value of info(8) after IPL.	R/W
fcConnUnitNumEvents	Number of events currently in the fcConnUnitEventTable.		
	Unsigned32	Number of events in the fcConnUnitEventTable. It's always <= 200, the maximum size of the event table.	R

Table B-16 fcConnUnitTable (continued)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitMaxEvents	Max number of events that can be recorded at any one time in the fcConnUnitEventTable.		
	Unsigned32	200	R
fcConnUnitEventCurrID	The last used event id (fcConnUnitEventIndex) recorded in the fcConnUnitEventTable. When no events are presently recorded in the fcConnUnitEventTable, the value of this object MUST be zero.		
	Unsigned32	The current event index is used as the last used event id.	R

Firmware Table The firmware table lists the revisions supported by the associated connectivity units.

Table B-17 Firmware Table

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
*fcConnUnitRevsIndex	A unique value among all fcConnUnitRevsEntrys with the same value of fcConnUnitId, in the range between 1 and fcConnUnitNumRevs[fcConnUnitId].		
	Unsigned32	Not accessible	R
fcConnUnitRevsRevision	A vendor-specific value identifying a revision of a component of the connectivity unit.		
	SnmpAdminString	XX.XX.XX (The reversion of the switch).	R
fcConnUnitRevsDescription	Description of a component in the fcConnUnit to which the revision corresponds.		
	SnmpAdminString	"Switch Firmware Level"	R

Sensor Table The sensor table list the sensors supported by each connectivity unit.

Table B-18 Sensor Table

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
*fcConnUnitSensorIndex	A unique value among all fcConnUnitSensorEntrys with the same value of fcConnUnitId, in the range between 1 and fcConnUnitNumSensors[fcConnUnitId].		
	Unsigned32	Not assessable.	R
fcConnUnitSensorName	A textual identification of the sensor intended primarily for operator use.		
	SnmpAdminString	The module name of the FRU, such as FAN, PWR or THM	R
fcConnUnitSensorStatus	The status indicated by the sensor. The values are defined as follow: unknown (1) -- the unit cannot determine the status, other (2) -- the status does not fit any of the remaining values, ok (3) -- indicates good status, warning (4) -- indicates the unit needs attention, failed (5) B indicates the unit is non-functional.		
	INTEGER	This value is evaluated from FRU status. The active, backup and update-busy states are mapped to ok(3). And the failed state is mapped to failed(5).	R
fcConnUnitSensorInfo	Miscellaneous static information about the sensor such as its serial number.		
	SnmpAdminString	The serial number of the FRUs. It's not supported if the module is failed.	R
fcConnUnitSensorMessage	This describes the status of the sensor as a message. It may also provide more resolution on the sensor indication, for example 'Cover temperature 1503K, above nominal operating range'.		
	SnmpAdminString	The textual description of the FRU status, such as "active" or "failed".	R
fcConnUnitSensorType	The type of component being monitored by this sensor. The unknown (1) and other (2) values meanings analogous to those for the fcConnUnitSensorStatus object; all other values are essentially self-explanatory. The values are defined as follow: unknown (1), other (2), battery (3), fan (4), powerSupply (5), transmitter (6), enclosure (7), board (8), and receiver (9).		
	INTEGER	fan (4) or power-supply (5)	R
fcConnUnitSensorCharacteristic	The characteristics being monitored by this sensor. The unknown (1) and other (2) values meanings analogous to those for the fcConnUnitSensorStatus object; emf (5) refers to electro-magnetic field; all other values are essentially self-explanatory. The values are defined as follow: unknown (1), other (2), temperature (3), pressure (4), emf (5), currentValue (6), airflow (7), frequency (8), and power (9).		
	INTEGER	Not supported. Always other (2).	R

Port Table The port table provides generic information on ports for a specific fcConnUnit.

Table B-19 Port Table

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
*fcConnUnitPortIndex	A unique value among all fcConnUnitPortEntrys on this connectivity unit, between 1 and fcConnUnitNumPorts.		
	INTEGER	Not accessible.	R
fcConnUnitPortType	The port type refers to the protocol active on the port and can take one of the following values: unknown (1) -- cannot be determined, other (2) -- none of the following, notPresent (3) -- no port, hubPort (4) -- hub port, nPort (5) -- end port for fabric, lPort (6) -- end port for loop, flPort (7) -- public loop, fPort (8) -- fabric port, ePort (9) -- fabric expansion port, gPort (10) -- generic fabric port, domainController (1) -- domain controller, hubController (12) -- hub controller, scsi (13) -- parallel SCSI port, escon (14) -- escon port, lan (15) -- LAN port, wan (16) -- WAN port.		
	INTEGER	It is f_port(8) if a device is connected to the port (Specified by login Server) or e_port(9) if a switch is connected to the port (Specified by Fabric Controller) other wise it is g_port(10), if nothing is connected to the port	R
fcConnUnitPortFCClassCap	Bit mask that specifies the classes of service capability of this port. If this object is not applicable, the agent MUST return all bits set to zero.		
	FcPortFCClass	For E , G port, return (26) = class_two(8) + class_three(16) + class_f(2) For F port, return (24) = class_two(8) + class_three(16)	R
fcConnUnitPortFCClassOp	Bit mask that specifies the classes of service that are currently operational at this port. If this object is not applicable, the agent MUST return all bits set to zero.		
	FcPortFCClass	For E port, return (26) = class_two(8) + class_three(16) + class_f(2), For G port, return unknown(0), For F port, return class_two(8) or class_three(16) or both. (The class of the services is decided through Login Server database)	R
fcConnUnitPortState	The current state of the port hardware. The bypassed value (4) means that the port is online but is currently being isolated from the loop or fabric for some reason; the other values are essentially self-explanatory. Any value for this object may co-exist with any value for the fcConnUnitPortStatus object. The values are defined as follow: unknown (1), online (2), offline (3), bypassed (4).		
	INTEGER	See PortStateMapping document: PortStateFuji2.0.doc.	R

Table B-19 Port Table (*continued*)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitPortStatus	The current overall protocol status for the port. The warning value (4) means that the port needs attention; the notParticipating value (6) means that protocol is not being processed; the initializing value (7) means that the port is in the process of coming into service; the bypassed value (8) means that the port has been manually or automatically isolated from the loop or fabric; the other values are essentially self-explanatory. Any value for this object may co-exist with any value for the fcConnUnitPortState object. The values are defined as follow: unknown (1), unused (2), ok (3), warning (4), failure (5), notParticipating (6), initializing (7), bypassed (8).		
	INTEGER	See PortStateMapping document: PortStateFuji2.0.doc.	
fcConnUnitPortTransmitterType	The technology of the port transceiver. The values are defined as follow: unknown (1), other (2), unused (3), shortwave (4) longwave (5), copper (6), and scsi (7), longwaveNoOFC (8), shortwaveNoOFC (9), longwaveLED (10).		
	INTEGER	This is mapped from the port technology as follow: not present and serial indicate unknown(1), optical sw1g and optical sw2g indicate shortwave(4), optical lw1g and optical lw2g indicate longwave(5), copper db9 and copper amp indicate copper(6). (Get the value from port technology owned by FPM).	R
fcConnUnitPortModuleType	The module type of the port connector. This object refers to the hardware implementation of the port. The embedded value (4) means 'fixed' (e.g., oneXnine). The values are defined as follow: unknown (1), other (2), gbic (3), embedded (4), glm(5), gbicSerialId (6), gbicNoSerialId (7), gbicNotInstalled (8), smallFormFactor (9).		
	INTEGER	If the port is not installed, return gbicNotInstalled(8). Otherwise return smallFormFactor(9).	R
fcConnUnitPortWwn	The World Wide Name of the port. If applicable, otherwise empty string.		
	FcNameId	World Wide Name of the port. (Supported by PCP)	R
fcConnUnitPortFCId	This is the assigned Fibre Channel ID of this port. This value is expected to be a Big Endian value of 24 bits. If this is loop, then it is the ALPA that is connected. If this is an eport, then it will only contain the domain ID left justified, zero filled. If this port does not have a Fibre Channel address, return all bits set to 1.		
	OCTET STRING (SIZE(3))	If it's F-port, return fabric address of the node in form of [domain, area, node]. (Supported by Login Server) If it's E-port, return left-adjusted domain ID of the switch.	R

Table B-19 Port Table (continued)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitPortSerialNoSn	The serial number identification of the unit (e.g., for a GBIC). If this is not applicable, return a zero-length string.		
	SnmpAdminString	Not applicable.	R
fcConnUnitPortRevision	The port revision (e.g., for a GBIC).		
	SnmpAdminString	Not applicable.	R
fcConnUnitPortVendor	The port vendor (e.g., for a GBIC).		
	SnmpAdminString	Not applicable.	R
fcConnUnitPortSpeed	The speed of the port in kilobytes per second.		
	Gauge32	Return 100000 kilobytes for 1 Gig switches and 200000 kilobytes for 2 Gig switches.	R

Table B-19 Port Table (*continued*)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitPortControl	This object is used to control the addressed fcConnUnit's port. Valid commands are: Unknown (1) and invalid (2) are only used as values that are read. ResetConnUnitPort (3): If the addressed connectivity unit allows this operation to be performed on this port, the addressed port performs a vendor-specific 'reset' operation. Examples of these operations are: the Link Reset protocol, the Loop Initialization protocol, or a resynchronization occurring between the transceiver in the addressed port to the transceiver to which the port is connected. bypassConnUnitPort (4): If the addressed connectivity unit allows this operation to be performed to this port, the addressed port performs a vendor-specific 'bypass' operation. Examples of these operations are: transitioning from online to offline, a request (NON-PARTICIPATING) command to the Loop Port state machine, or removal of the port from an arbitrated loop by a hub. unbypassConnUnitPort (5): If the addressed connectivity unit allows this operation to be performed to this port, the addressed port performs a vendor-specific 'unbypass' operation. Examples of these operations are: the Link Failure protocol, a request (PARTICIPATING) command to the Loop Port state machine, or addition of the port to an arbitrated loop by a hub. offlineConnUnitPort (6): If the addressed connectivity unit allows this operation to be performed to this port, the addressed port performs a vendor-specific 'offline' operation. Examples of these operations are: disabling a port's transceiver, the Link Failure protocol, request (NON-PARTICIPATING) command to the Loop Port state machine, or removal of the port from an arbitrated loop by a hub. onlineConnUnitPort (7): If the addressed connectivity unit allows this operation to be performed to this port, the addressed port performs a vendor-specific 'online' operation. Examples of these operations are: enabling a port's transceiver, the Link Failure protocol, request (PARTICIPATING) command to the Loop Port state machine, or addition of the port from an arbitrated loop by a hub. NOTE: Each implementation may chose not to support SNMP Set operations for any or all of these values. For Sets specifying varbinds for instances of this object and values not supported by a given implementation, the agent will return the SNMP WrongValue PDU error code.		
	INTEGER	ResetConnUnitPort(3), offlineConnUnitPort(6), onlineConnUnitPort(7), and portFailure(42501) are the only set-operations are supported. Always return unknown(1) on read. (supported by PCP)	R/W
fcConnUnitPortName	A string describing the addressed port.		
	SnmpAdminString	Port Name	R/W

Table B-19 Port Table (*continued*)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitPortPhysicalNumber	This is the internal port number this port is known by. In many implementations, this should be the same as fcConnUnitPortIndex. Some implementations may have an internal port representation not compatible with the rules for table indexes. In that case, provide the internal representation of this port in this object. This value may also be used in the fcConnUnitLinkPortNumberX or fcConnUnitLinkPortNumberY objects of the fcConnUnitLinkTable.		
	Unsigned32	Physical port number from 0 to Maximum port number - 1	R
fcConnUnitPortProtocolCap (added from Mib3.0)	Bit mask that specifies the driver level protocol capability of this port. If this is not applicable, return all bits set to zero. The bits have the following definition: unknown - 0, Loop - 1, Fabric - 2, SCSI - 4, TCP/IP - 8, VI - 16, FICON - 32.		
	OCTET STRING (SIZE (2))	Fabric(2)	R
fcConnUnitPortProtocolOp (added from Mib3.0)	Bit mask that specifies the driver level protocol(s) that are currently operational. If this is not applicable, return all bits set to zero. This object has the same definition as fcConnUnitPortProtocolCap.		
	OCTET STRING (SIZE (2))	Same as above	R
fcConnUnitPortNodeWwn (added from Mib3.0)	The Node World Wide Name of the port if applicable, otherwise all zeros. This should have the same value for a group of related ports. The container is defined as the largest physical entity. For example, all ports on HBAs on a host will have the same Node WWN. All ports on the same storage subsystem will have the same Node WWN.		
	FcNameId	switch WWN	R
fcConnUnitPortHWState (added from Mib3.0)	The hardware detected state of the port. The values are defined as follow: unknown (1), failed (2) -- port failed diagnostics, bypassed (3) -- FCAL bypass, loop only, active (4) -- connected to a device, loopback (5) -- Port in ext loopback, txfault (6) -- Transmitter fault, noMedia (7) -- media not installed, linkDown (8) -- waiting for activity (rx sync).		
	INTEGER	See PortStateMapping document: PortStateFuji2.0.doc.	R

Event Table The table of connectivity unit events. Errors, warnings, and information should be reported in this table.

Table B-20 Event Table

EMC MIB Object Name	Description												
	Type	Product Mapping	Access										
*fcConnUnitEventIndex	Each connectivity unit has its own event buffer. As it wraps, it may write over previous events. This object is an index into the buffer. It is recommended that this table be read using 'getNext's to retrieve the initial table. The management application should read the event table at periodic intervals and then determine if any new entries were added by comparing the last known index value with the current highest index value. The management application should then update its copy of the event table. If the read interval is too long, it is possible that there may be events that may not be contained in the agent's internal event buffer. For example, an agent may read events 50-75. At the next read interval, fcConnUnitEventCurrID is 189. If the management app tries to read event index 76, and the agent's internal buffer is 100 entries max, event index 76 will no longer be available. The index value is an incrementing integer starting from one every time there is a table reset. On table reset, all contents are emptied and all indices are set to zero. When an event is added to the table, the event is assigned the next higher integer value than the last item entered into the table. If the index value reaches its maximum value, the next item entered will cause the index value to roll over and start at one again.												
	Unsigned32	An event index	R										
fcConnUnitREventTime	This is the real time when the event occurred. It has the format: DDMMYYYY HHMMSS, where DD = day number, MM = month number, YYYY = year number, HH = hour number, MM= minute number, SS = seconds number If not applicable, return a NULL string.												
	DisplayString (SIZE (15))	The time when the event occurred.	R										
fcConnUnitSEventTime	This is the sysuptime timestamp when the event occurred.												
	TimeTicks	Translated from fcConnUnitREventTime.	R										
fcConnUnitEventSeverity	The event severity level.												
	FcEventSeverity	The mapping from switch event severity level to FcEventServerty: <table><tr><td><u>SWITCH</u></td><td><u>MIB</u></td></tr><tr><td>informational</td><td>info(8)</td></tr><tr><td>minor</td><td>error(5)</td></tr><tr><td>major</td><td>critical(4)</td></tr><tr><td>severe</td><td>emergency(2)</td></tr></table>	<u>SWITCH</u>	<u>MIB</u>	informational	info(8)	minor	error(5)	major	critical(4)	severe	emergency(2)	R
<u>SWITCH</u>	<u>MIB</u>												
informational	info(8)												
minor	error(5)												
major	critical(4)												
severe	emergency(2)												

Table B-20 Event Table (*continued*)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitEventType	The type of this event. The values are defined as follow: unknown (1), other (2), status (3), configuration (4), topology (5).		
	INTEGER	Always status(3).	R
fcConnUnitEventObject	This is used with the fcConnUnitEventType to identify which object the event refers to. It can be the OID of a connectivity unit or of another object like fcConnUnitPortStatus[...]		
	OBJECT IDENTIFIER	Only the OID of the fcConnUnit is returned. Other information is not supported.	R
fcConnUnitEventDescr	The description of the event.		
	SnmpAdminString	"Reason code XX", XX is the event reason code.	R

Link Table

The link table is intended to organize and communicate any information the agent which would assist a management application to discover the CONNECTIVITY UNITS in the framework and the TOPOLOGY of their interconnect. That is, the goal is to assist the management application not only to LIST the elements of the framework, but to MAP them.

With this goal, the agent *should* include as much as it possesses about any links from its own connectivity units to others, including links among its own units.

An agent *should* include partial information about links if it is not able to fully define them. For an entry to be considered to be valid, both the X (local) and the Y (remote) need to have one valid value.

If the agent is able to discover links which do not directly attach to members of its agency and its discovery algorithm gives some assurance the links are recently valid, it MAY include these links.

Link information entered by administrative action MAY be included even if not validated directly if the link has at least one endpoint in this agency, but *should not* be included otherwise.

A connectivity unit can fill the table in as best it can. One of the methods to fill this in would be to use the RNID ELS (ANSI document 99-422v0). This allows one to query a port for the information needed for the link table.

This table is accessed either directly if the management software has an index value or via GetNexts. The value of the indexes are not required to be contiguous. Each entry created in this table will be assigned an index. This relationship is kept persistent until the entry is removed from the table or the system is reset. The total number of entries are defined by the size of the table.

Table B-21 Link Table

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
*fcConnUnitLinkIndex	This value is used to create a unique value for each entry in the link table with the same fcConnUnitId. The value can only be reused if it is not currently in use and the value is the next candidate to be used. This value is allowed to wrap at the highest value represented by the number of bits. This value is reset to zero when the system is reset and the first value to be used is 1.		
	Unsigned32	A link index.	R
fcConnUnitLinkNodeIdX	The node WWN of the unit at one end of the link. If the node WWN is unknown and the node is a fcConnUnit in the responding agent then the value of this object MUST BE equal to its fcConnUnitId.		
	OCTET STRING (SIZE(16))	The WWN of the local fcConnUnit is returned. This information is available for both E and F ports	R
fcConnUnitLinkPortNumberX	The port number on the unit specified by fcConnUnitLinkNodeIdX if known, otherwise -1. If the value is non-negative then it will be equal to fcConnUnitPortPhysicalNumber.		
	Integer32	The fcConnUnit's local port number is returned. This information is available for both E and F ports.	R
fcConnUnitLinkPortWwnX	The port WWN of the unit specified by fcConnUnitLinkNodeIdX if known, otherwise 16 octets of binary 0.		
	OCTET STRING	The local side port WWN on the link. This information is available for both E and F ports.	R
fcConnUnitLinkNodeIdY	The node WWN of the unit at the other end of the link. If the node WWN is unknown and the node is a fcConnUnit in the responding SNMP agent then the value of this object MUST BE equal to its fcConnUnitId.		
	OCTET STRING (SIZE(16))	The attached node WWN on the link. This information is available for E ports and F ports. E port nodeIdY can be retrieved from RNID, F port NodeIdY is supported by FLOGI.	R

Table B-21 Link Table (*continued*)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitLinkPortNumberY	The port number on the unit specified by fcConnUnitLinkNodeIdY if known, otherwise -1. If the value is non-negative then it will be equal to fcConnUnitPortPhysicalNumber.		
	Integer32	The attached port number on the link. This information is available only for E ports from ISR. For F port, -1 is returned.	R
fcConnUnitLinkPortWwnY	The port WWN on the unit specified by fcConnUnitLinkNodeIdY if known, otherwise 16 octets of binary 0.		
	OCTET STRING	The attached port WWN on the link. This information is available for F ports only. For E port, return 16 octets of binary 0.	R
fcConnUnitLinkAgentAddressY	The address of an FCMGMT MIB agent for the node identified by fcConnUnitLinkNodeIdY, if known; otherwise 16 octets of binary 0.		
	OCTET STRING (SIZE(16))	Get the value from RNID, owned by Login Server.	R
fcConnUnitLinkAgentAddressTypeY	If fcConnUnitLinkAgentAddressY is non-zero, then it is a protocol address. fcConnUnitLinkAgentAddressTypeY is the 'address family number' assigned by IANA to identify the address format. (e.g., 1 is Ipv4, 2 is Ipv6).		
	Unsigned32	Get the value from RNID, owned by Login Server.	R
fcConnUnitLinkAgentPortY	The IP port number for the agent. This is provided in case the agent is at a non-standard SNMP port.		
	Unsigned32	Get the value from RNID, owned by Login Server.	R
fcConnUnitLinkUnitTypeY	Type of the FC connectivity unit as defined in fcConnUnitType.		
	FcUnitType	If it's E port, return switch (4). Otherwise return RNID type Y.	R
fcConnUnitLinkConnIdY	This is the Fibre Channel ID of this port. If the connectivity unit is a switch, this is expected to be a 24-bit Big Endian value. If this is loop, then it is the ALPA that is connected. If this is an e-port, then it will only contain the domain ID. If not any of those, unknown or cascaded loop, return all bits set to 1.		
	OCTET STRING (SIZE(3))	For F ports, return Fibre Channel Address. For E ports, return left adjusted domainId of the switch.	R

Port Statistics Table

There is one and only one statistics table for each individual port. For all objects in statistics table, if the object is not supported by the conn unit then the high order bit is set to 1 with all other bits set to zero. The high order bit is reserved to indicate if the object is supported or not. All objects start at a value of zero at hardware initialization and continue incrementing till end of 63 bits and then wrap to zero.

Table B-22 Port Statistics Table

EMC MIB Object Name	Description		
	Type	Product Mapping from PSCC to Switch	Access
*fcConnUnitPortStatIndex	A unique value among all entries in this table, between 0 and fcConnUnitNumPort[fcConnUnitPortUnitId]		
	Gauge (32 bits)	A port number, starting from 1 to maximum number of ports.	R
fcConnUnitPortStatCountError	A count of the errors that have occurred on this port.		
	Counter64	This object counts: • address ID errors • CRC errors • delimiter errors • frames too short • invalid transmission words, • link failures, • primitive sequence errors, • signal losses, • synchronization losses. (Supports only the low 32 bits of counter; high 32 bits are set to zero).	R
fcConnUnitPortStatCountTxObjects	The number of frames/packets/IOs/etc that have been transmitted by this port. Note: A Fibre Channel frame starts with SOF and ends with EOF. FC loop devices should not count frames passed through. This value represents the sum total for all other Tx objects.		
	Counter64	stTxFrames (64 bit counter)	R
fcConnUnitPortStatCountRxObjects	The number of frames/packets/IOs/etc that have been received by this port. Note: A Fibre Channel frame starts with SOF and ends with EOF. FC loop devices should not count frames passed through. This value represents the sum total for all other Rx objects.		
	Counter64	stRxFrames (64 bit counter)	R

Table B-22 Port Statistics Table (continued)

EMC MIB Object Name	Description		
	Type	Product Mapping from PSCC to Switch	Access
fcConnUnitPortStatCountTxElements	The number of octets or bytes that have been transmitted by this port. One second periodic polling of the port. This value is saved and compared with the next polled value to compute net throughput. Note, for Fibre Channel, ordered sets are not included in the count.		
	Counter64	stTxOctets (64 bit counter)	R
fcConnUnitPortStatCountRxElements	The number of octets or bytes that have been received. by this port. One second periodic polling of the port. This value is saved and compared with the next polled value to compute net throughput. Note, for Fibre Channel, ordered sets are not included in the count.		
	Counter64	stRxOctets (64 bit counter)	R
fcConnUnitPortStatCountBBCreditZero	Count of transitions in/out of BB_Credit zero state. The other side is not providing any credit. Note, this is a Fibre Channel stat only.		
	Counter64	Not supported	R
fcConnUnitPortStatCountInputBuffersFull	Count of occurrences when all input buffers of a port were full and outbound buffer-to-buffer credit transitioned to zero. There is no credit to provide to other side. Note, this is a Fibre Channel stat only.		
	Counter64	Not supported	R
fcConnUnitPortStatCountFBSYFrames	Count of times that FBSY was returned to this port as a result of a frame that could not be delivered to the other end of the link. This occurs if either the Fabric or the destination port is temporarily busy. Port can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat. This is the sum of all classes. If you cannot keep the by class counters, then keep the sum counters.		
	Counter64	Not supported	R
fcConnUnitPortStatCountPBSYFrames	Count of times that PBSY was returned to this port as a result of a frame that could not be delivered to the other end of the link. This occurs if the destination port is temporarily busy. PBSY can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat. This is the sum of all classes. If you cannot keep the by class counters, then keep the sum counters.		
	Counter64	Not supported	R

Table B-22 Port Statistics Table (*continued*)

EMC MIB Object Name	Description		
	Type	Product Mapping from PSCC to Switch	Access
fcConnUnitPortStatCountFRJTFrames	Count of times that FRJT was returned to this port as a result of a Frame that was rejected by the fabric. Note, This is the total for all classes and is a Fibre Channel only stat.		
	Counter64	Not supported	R
fcConnUnitPortStatCountPRJTFrames	Count of times that FRJT was returned to this port as a result of a Frame that was rejected at the destination NxPort. Note, This is the total for all classes and is a Fibre Channel only stat.		
	Counter64	Not supported	R
fcConnUnitPortStatCountClass1RxFrames	Count of Class 1 Frames received at this port. Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R
fcConnUnitPortStatCountClass1TxFrames	Count of Class 1 Frames transmitted out this port. Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R
fcConnUnitPortStatCountClass1FBSYFrames	Count of times that FBSY was returned to this port as a result of a Class 1 Frame that could not be delivered to the other end of the link. This occurs if either the Fabric or the destination port is temporarily busy. FBSY can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R
fcConnUnitPortStatCountClass1PBSYFrames	Count of times that PBSY was returned to this port as a result of a Class 1 Frame that could not be delivered to the other end of the link. This occurs if the destination NxPort is temporarily busy. PBSY can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R
fcConnUnitPortStatCountClass1FRJTFrames	Count of times that FRJT was returned to this port as a result of a Class 1 Frame that was rejected by the fabric. Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R

Table B-22 Port Statistics Table (continued)

EMC MIB Object Name	Description		
	Type	Product Mapping from PSCC to Switch	Access
fcConnUnitPortStatCountClass1PRJTFrames	Count of times that FRJT was returned to this port as a result of a Class 1 Frame that was rejected at the destination NxPort. Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R
fcConnUnitPortStatCountClass2RxFrames	Count of Class 2 Frames received at this port. Note, this is a Fibre Channel only stat.		
	Counter64	stC2FramesIn (64 bit counter)	R
fcConnUnitPortStatCountClass2TxFrames	Count of Class 2 Frames transmitted out this port. Note, this is a Fibre Channel only stat.		
	Counter64	stC2FramesOut (64 bit counter)	R
fcConnUnitPortStatCountClass2FBSYFrames	Count of times that FBSY was returned to this port as a result of a Class 2 Frame that could not be delivered to the other end of the link. This occurs if either the Fabric or the destination port is temporarily busy. FBSY can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat.		
	Counter64	stC2FabricBusy (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountClass2PBSYFrames	Count of times that PBSY was returned to this port as a result of a Class 2 Frame that could not be delivered to the other end of the link. This occurs if the destination N_Port is temporarily busy. PBSY can only occur on SOFc1 frames (the frames that establish a connection). Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R
fcConnUnitPortStatCountClass2FRJTFrames	Count of times that FRJT was returned to this port as a result of a Class 2 Frame that was rejected by the fabric. Note, this is a Fibre Channel only stat.		
	Counter64	stC2FabricReject (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountClass2PRJTFrames	Count of times that FRJT was returned to this port as a result of a Class 2 Frame that was rejected at the destination N_Port. Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R

Table B-22 Port Statistics Table (*continued*)

EMC MIB Object Name	Description		
	Type	Product Mapping from PSCC to Switch	Access
fcConnUnitPortStatCountClass3RxFrames	Count of Class 3 Frames received at this port. Note, this is a Fibre Channel only stat.		
	Counter64	stC3FramesIn (64 bit counter)	R
fcConnUnitPortStatCountClass3TxFrames	Count of Class 3 Frames transmitted out this port. Note, this is a Fibre Channel only stat.		
	Counter64	stC3FramesOut (64 bit counter)	R
fcConnUnitPortStatCountClass3Discards	Count of Class 3 Frames that were discarded upon reception at this port. There is no FBSY or FRJT generated for Class 3 Frames. They are simply discarded if they cannot be delivered. Note, this is a Fibre Channel only stat.		
	Counter64	stC3Discards (64 bit counter)	R
fcConnUnitPortStatCountRxMulticastObjects	Count of Multicast Frames or Packets received at this port.		
	Counter64	Not supported	R
fcConnUnitPortStatCountTxMulticastObjects	Count of Multicast Frames or Packets transmitted out this port.		
	Counter64	Not supported	R
fcConnUnitPortStatCountRxBroadcastObjects	Count of Broadcast Frames or Packets received at this port.		
	Counter64	Not supported	R
fcConnUnitPortStatCountTxBroadcastObjects	Count of Broadcast Frames or Packets transmitted out this port. On a Fibre Channel loop, count only OPN _r frames generated.		
	Counter64	Not supported	R
fcConnUnitPortStatCountRxLinkResets	Count of Link resets. This is the number of LRs received. Note, this is a Fibre Channel only stat.		
	Counter64	StLinkResetsIn (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountTxLinkResets	Count of Link resets. This is the number LRs transmitted. Note, this is a Fibre Channel only stat.		
	Counter64	stLinkResetsOut (Only supports low 32 bits of counter, high 32 bits are set to zero)	R

Table B-22 Port Statistics Table (continued)

EMC MIB Object Name	Description		
	Type	Product Mapping from PSCC to Switch	Access
fcConnUnitPortStatCountNumberLinkResets	Count of Link resets and LIPs detected at this port. The number times the reset link protocol is initiated. These are the count of the logical resets, a count of the number of primitives. Note, this is a Fibre Channel only stat.		
	Counter64	StLinkResetsIn + stLinkResetsOut (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountRxOfflineSequences	Count of Offline Primitive OLS received at this port. Note, this is a Fibre Channel only stat.		
	Counter64	StOlssIn (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountTxOfflineSequences	Count of Offline Primitive OLS transmitted by this port. Note, this is a Fibre Channel only stat.		
	Counter64	StOlssOut (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountNumberOfflineSequences	Count of Offline Primitive sequence received at this port. Note, this is a Fibre Channel only stat.		
	Counter64	stOlssIn + stOlssOut (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountLinkFailures	Count of link failures. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.		
	Counter64	stLinkFailures (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountInvalidCRC	Count of frames received with invalid CRC. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Loop ports should not count CRC errors passing through when monitoring. Note, this is a Fibre Channel only stat.		
	Counter64	stInvalidCrcs (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountInvalidTxWords	Count of invalid transmission words received at this port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.		
	Counter64	stInvalidTxWords (Only supports low 32 bits of counter, high 32 bits are set to zero)	R

Table B-22 Port Statistics Table (*continued*)

EMC MIB Object Name	Description		
	Type	Product Mapping from PSCC to Switch	Access
fcConnUnitPortStatCountPrimitiveSequenceProtocolErrors	Count of primitive sequence protocol errors detected at this port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.		
	Counter64	stPrimSeqProtoErrors (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountLossofSignal	Count of instances of signal loss detected at port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.		
	Counter64	stSigLosses (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountLossofSynchronization	Count of instances of synchronization loss detected at port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.		
	Counter64	stSyncLosses (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountInvalidOrderedSets	Count of invalid ordered sets received at port. This count is part of the Link Error Status Block (LESB). (FC-PH 29.8). Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R
fcConnUnitPortStatCountFramesTooLong	Count of frames received at this port where the frame length was greater than what was agreed to in FLOGI/PLOGI. This could be caused by losing the end of frame delimiter. Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R
fcConnUnitPortStatCountFramesTruncated	Count of frames received at this port where the frame length was less than the minimum indicated by the frame header - normally 24 bytes, but it could be more if the DFCTL field indicates an optional header should have been present. Note, this is a Fibre Channel only stat		
	Counter64	stFramesTooShort (Only supports low 32 bits of counter, high 32 bits are set to zero)	R

Table B-22 Port Statistics Table (*continued*)

EMC MIB Object Name	Description		
	Type	Product Mapping from PSCC to Switch	Access
fcConnUnitPortStatCountAddressErrors	Count of frames received with unknown addressing. e.g. unknown SID or DID. the SID or DID is not known to the routing algorithm. Note. this is a Fibre Channel only stat.		
	Counter64	stAddrIDErrors (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountDelimiterErrors	Count of invalid frame delimiters received at this port. An example is a frame with a class 2 start and a class 3 at the end. Note, this is a Fibre Channel only stat.		
	Counter64	stDelimiterErrors (Only supports low 32 bits of counter, high 32 bits are set to zero)	R
fcConnUnitPortStatCountEncodingDisparityErrors	Count of disparity errors received at this port. Note, this is a Fibre Channel only stat.		
	Counter64	Not supported	R

Name Server Table

This table is accessed either directly if the management software has an index value or via GetNexts. The value of the indexes is not required to be contiguous. Each entry created in this table will be assigned an index. This relationship is kept persistent until the entry is removed from the table or the system is reset. The total number of entries is defined by the size of the table.

Table B-23 Name Server Table

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
*fcConnUnitSnsPortIndex	The physical port number of this SNS table entry. Each physical port has an SNS table with 1-n entries indexed by fcConnUnitSnsPortIdentifier (port address)		
	Counter64 INTEGER	A port number, starting from 1 to maximum number of ports.	R
*fcConnUnitSnsPortIdentifier	The Port Identifier for this entry in the SNS table.		
	FcAddressId	3 bytes FcAddress in the least significant bytes.	R

Table B-23 Name Server Table (*continued*)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitSnsPortName	The Port WWN Name for this entry in the SNS table.		
	FcNameId	Port WWN Name	R
fcConnUnitSnsNodeName	The Node Name for this entry in the SNS table.		
	FcNameId	Node Name	R
fcConnUnitSnsClassOfSvc	The Classes of Service offered by this entry in the SNS table.		
	OCTET STRING (SIZE (1))	Class of Service that matches the FC class service convention used in name server.	R
fcConnUnitSnsNodeIPAddress	The IPv6 formatted address of the Node for this entry in the SNS table.		
	OCTET STRING (SIZE(16))	Node IP address	R
fcConnUnitSnsProcAssoc	The Process Associator for this entry in the SNS table.		
	OCTET STRING (SIZE (8))	Process Associator.	R
fcConnUnitSnsFC4Type	The FC-4 Types supported by this entry in the SNS table.		
	OCTET STRING (SIZE (32))	FC4 type	R
fcConnUnitSnsPortType	The Port Type of this entry in the SNS table.		
	OCTET STRING (SIZE (1))	Port type	R
fcConnUnitSnsPortIPAddress	The IPv6 formatted address of this entry in the SNS table.		
	OCTET STRING (SIZE(16))	Port IP Address	R
fcConnUnitSnsFabricPortName	The Fabric Port name of this entry in the SNS table.		
	FcNameId	Fabric Port Name	R
fcConnUnitSnsHardAddress	The Hard ALPA of this entry in the SNS table.		
	FcGlobalId	3 bytes address from name server in the least significant bytes	R

Table B-23 Name Server Table (continued)

EMC MIB Object Name	Description		
	Type	Product Mapping	Access
fcConnUnitSnsSymbolicPortName	The Symbolic Port Name of this entry in the SNS table.		
	DisplayString (SIZE (0..79))	Symbolic port name	R
fcConnUnitSnsSymbolicNodeName	The Symbolic Node Name of this entry in the SNS table.		
	DisplayString (SIZE (0..79))	Symbolic node name	R

SNMP Trap Registration Group

The trap registration group allows for the control of trap generation on the SNMP agent. The group consists of two scalar objects and a trap registration table.

Table B-24 Trap Registration Group Table

EMC MIB Object Name	Type	Product Mapping	Access	Description
fcTrapMaxClients	Unsigned32	The maximum number of SNMP trap recipients can be supported in the system.	R	The maximum number of SNMP trap recipients supported by the connectivity unit.
fcTrapClientCount	Unsigned32	The current number of trap recipients	R	The current number of rows in the trap table.

Trap Registration Table

This table contains a row for each IP address/port number to which traps will be sent.

Table B-25 SNMP Trap Registration Table

EMC MIB Object Name	Type	Product Mapping	Access	Description
*fcTrapRegIpAddress	IpAddress	Trap recipient's IP address.	R/C	The IP address of a client registered for traps.
*fcTrapRegPort	Unsigned32	UDP port.	R/C	The UDP port to send traps to for this host. Normally this would be the standard trap port (UDP/162).

Table B-25 SNMP Trap Registration Table (*continued*)

EMC MIB Object Name	Type	Product Mapping	Access	Description
fcTrapRegFilter	FcEventSeverity	The severity filter. (This information not exposed in SNMP configuration dialog)	R/C	This value defines the trap severity filter for this trap host. The fcConnUnit will send to the designated target entity traps that have a severity level less than or equal to this value.
fcTrapRegRowState	RowStatus	Row status.	R/C	Operational status of the row. A RowStatus object may take any of six defined values: • active (1): traps may be sent as specified in this row; a management application may change the value of any objects in the row when the status is active. • notInService (2) : traps will not be sent using this row. • notReady (3): the conceptual row exists in the agent, but is missing information necessary to send traps (i.e., if any of the other objects in the row are not present or contain invalid values); this value may not be supplied by a management application. • createAndGo (4): supplied by a management application wishing to create a new instance of a conceptual row, supplying valid values for the all the other objects in the row, and have its status automatically set to active, making it available for use in sending traps. • createAndWait (5) : supplied by a management application wishing to create a new instance of a conceptual row but not make it available for use in sending traps at that time; and, • destroy (6): supplied by a management application wishing to delete an existing conceptual row.

Table B-26 Trap Type Table

EMC MIB Object Name	Type No.	Product Mapping	OID and Value	Description
fcConnUnitStatusChange	1	Generated when the switch=s online status or operational status changes	".1.3.6.1.2.1.8888.1.1.3.1.6" + unitld fcConnUnitStatus, ".1.3.6.1.2.1.8888.1.1.3.1.5" + unitld fcConnUnitState	The overall status of the connectivity unit has changed. Recommended severity level (for filtering): alert
fcConnUnitDeletedTrap	2	Not supported on the connUnit.	N/A	An fcConnUnit has been deleted from this agent. Recommended severity level (for filtering): warning
fcConnUnitEventTrap	3	Generated when a new event is generated.	".1.3.6.1.2.1.8888.1.1.7.1.1" + unitld fcConnUnitEventIndex, ".1.3.6.1.2.1.8888.1.1.7.1.5" + unitld fcConnUnitEventType, ".1.3.6.1.2.1.8888.1.1.7.1.6" + unitld fcConnUnitEventObject, ".1.3.6.1.2.1.8888.1.1.7.1.7" + unitld fcConnUnitEventDescr	An event has been generated by the connectivity unit. Recommended severity level (for filtering): info
fcConnUnitSensorStatusChange	4	Generated when one of fans/powers status is changed.	".1.3.6.1.2.1.8888.1.1.5.1.3" + unitld + sensor_nbr fcConnUnitSensorState	The overall status of the connectivity unit has changed. Recommended severity level (for filtering): alert
fcConnUnitPortStatusChange	5	Generated when a port state/status is changed.	".1.3.6.1.2.1.8888.1.1.6.1.6" + unitld + port_nbr fcConnUnitPortStatus, ".1.3.6.1.2.1.8888.1.1.6.1.5" + unitld + port_nbr fcConnUnitPortState	The overall status of the connectivity unit has changed. Recommended severity level (for filtering): alert

MIB-II Support

The Connectrix service processor SNMP agent supports 2 objects from MIB-II:

Table B-27 Supported MIB-II Objects

Object	Description
sysObject ID	Returns 1.3.6.1.4.1.289.
sysUpTime	Returns the total length of time that the Connectrix Manager SNMP agent has been running.

Generic Traps

The following generic traps are generated by the Connectrix service processor SNMP agent:

- ◆ **warmStart**
Reports that the Connectrix Manager SNMP agent is reinitializing.
- ◆ **linkUp**
Signals that one of the agent's communications links has come up.
- ◆ **authenticationFailure**
An indication that the agent has received an improperly authenticated protocol message. This trap is disabled by default but may be enabled using the Connectrix Manager.

This glossary contains terms related to EMC Connectrix. Many of these terms are used in this manual. The glossary includes terms and definitions from:

- *The Dictionary of Computing*, ZC20-1699.
- *The American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990, by the American National Standards Institute (ANSI). Copies can be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018.
- *The ANSI/EIA Standard - 440A: Fiber Optic Terminology*, copyright 1989 by the Electronic Industries Association (EIA). Copies can be purchased from the Electronic Industries Association, 2001 Pennsylvania Avenue N.W., Washington, D.C. 20006.
- *The Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SCI).

A

Access Control	List of all devices that can access other devices across the network and the permissions associated with that access. <i>See also</i> persistent binding and zoning.
Active Domain ID	The Domain ID actively being used by a switch. It is assigned to a switch by the principal switch.
Active Zone Set	A zone set that is currently enabled. (Only one zone set at a time can be active.) Zoning across the fabric is determined by the characteristics of the active zone set.
Agent	Software that processes queries on behalf of an application and returns replies.
Alarm	An SNMP message notifying an operator of a network problem.
Any-to-Any Port Connectivity	For each source port, software configured hardware routing tables that define the destination ports with which the source port is allowed to communicate.
Application	(1) The use to which an information processing system is put, for example, a payroll application, an airline reservation application, a network application. (2) A collection of software components used to perform specific types of work on a computer.
Arbitration	The process of selecting one respondent from a collection of several candidates that request service concurrently.
ASIC	Application-Specific Integrated Circuit, a circuit designed for a specific purpose, such as implementing lower-layer Fibre Channel protocols (FC-0). ASICs contrast with general-purpose devices such as memory chips or microprocessors, which can be used in many different applications.
ASCII	American Standard Code for Information Interchange.
Audit Log	A log containing summaries of actions taken by a Connectrix Management software user, recording an audit trail of changes. For example: adding, modifying, or deleting user or product administration records the operation, including the date and time, in the audit log.

Authentication Verification of the identity of a process or person.

B

BB_Credit *See* Buffer-to-Buffer Credit.

Beaconing Repeated transmission of a beacon light and message until the error is corrected or bypassed.

BER *See* Bit Error Rate.

Bidirectional In Fibre Channel, the capability to simultaneously communicate at maximum speeds (100 Mbps) in both directions over a link.

Bit Error Rate Ratio of received bits that contain errors to total of all bits transmitted.

Blocked Port Devices communicating with a blocked port are prevented from logging in to a Connectrix switch or communicating with other devices attached to the Connectrix switch. A blocked port continuously transmits the off-line sequence (OLS).

Bridge A device that connects and passes packets between two network segments that use the same communications protocol.

Broadcast Send a transmission to all N_Ports on a fabric.

Broadcast Frames Data packet, also known as a broadcast packet, whose destination address specifies all computers on a network. *See also* multicast.

Buffer Storage area for data in transit. Buffers compensate for differences in processing speeds between devices.

Buffer-to-Buffer Credit The maximum number of frames a port can transmit without receiving a receive ready signal from the receiving device.

C

Call Home	A product feature that allows the Connectrix service processor to automatically dial out to a support center and report system problems. The support center server accepts calls from the Connectrix service processor, logs reported events, and can notify one or more support center representatives. Telephone numbers and other information are configured through the Windows NT dial-up networking application. The Call Home function can be enabled and disabled through the Product Manager.
Channel	Point-to-point link that transports data from one point to the other.
Class 2 Fibre Channel Service	In Class 2 service, the fabric and destination N_Ports provide connectionless service with notification of delivery or nondelivery between the two N_Ports.
Class 3 Fibre Channel Service	Class 3 service provides a connectionless service without notification of delivery between N_Ports. (This is also known as datagram service.) The transmission and routing of Class 3 frames is the same as for Class 2 frames.
Community	A relationship between an SNMP agent and a set of SNMP managers that defines authentication, access control, and proxy characteristics.
Community Name	A name that represents an SNMP community that the agent software recognizes as a valid source for SNMP requests. An SNMP management program that sends an SNMP request to an agent program must identify the request with a community name that the agent recognizes or the agent discards the message as an authentication failure. The agent counts these failures and reports the count to the manager program upon request, or sends an authentication failure trap message to the manager program.
Community Profile	Information that specifies which management objects are available to what management domain or SNMP community name.
Connectionless	Nondedicated link. Typically used to describe a link between nodes that allows the switch to forward Class 2 or Class 3 frames as resources (ports) allow. <i>Contrast with</i> the dedicated bandwidth that is required in a Class 1 Fibre Channel Service point-to-point link.

Connectivity Unit	A hardware component that contains hardware (and possibly software) that provides Fibre Channel connectivity across a fabric. Connectrix switches are example of a Connectivity Unit.
Connectrix Management Software	The software application that implements the management user interface for all managed products. The Connectrix Management software can run either locally on the Connectrix service processor or remotely on a user workstation.
Connectrix Service Processor	A PC shipped with a product for the sole purpose of running the Connectrix Management software.
Credit	A numeric value that determines the flow control value for a switch handling Class 2 traffic in a fabric.
CTP	Control Processor, a circuit card or subsystem that contains the microprocessor director. The CTP also initializes hardware components of the system after power-on. A 10/100 Mbps RJ-45 twisted pair connector is located on the CTP to connect to the Ethernet LAN and communicate with the Connectrix service processor or SNMP management station.
D	
DASD	Direct Access Storage Device.
Default	Pertaining to an attribute, value, or option that is assumed when none is explicitly specified.
Default zone	Contains all attached devices that are not members of any active zone.
Device	(1) A piece of equipment, such as a server or storage device, that is attached to a Connectrix switch or a similar product. A device as defined here is not controlled by the Connectrix Product Manager and its operating parameters. (2) In EMC Symmetrix, a uniquely addressable physical or logical part of the Symmetrix subsystem, such as a disk. (This description is presented here only to clarify a term used in other EMC documents.)
Dialog Box	A pop-up window containing informational messages or fields to be modified with desired options. This term is often used interchangeably with <i>window</i> .

DID	Destination ID, the address identifier that indicates the targeted destination of the transmitted frame.
Director	(1) An Enterprise-Class Fibre Channel switch. The Connectrix ED-64M Director is a fully redundant Fibre Channel switch, containing: dual power supplies, fan modules, CTP cards, SBARs, and multiple FPMs, all hot-swappable. (2) A board-level module in the Symmetrix that provides the interface between host channels (via an associated adapter module in the Symmetrix) and Symmetrix disk devices. (This description is presented here only to clarify a term used in other EMC documents.)
DNS	<i>See</i> Domain Name Service Name.
Domain ID	A number (1 to 31) that uniquely identifies a switch in a fabric. A distinct Domain ID is allocated to each switch in the fabric by the principal switch.
Domain Name Service Name	Host or node name for a system that is translated to an IP address through a Name Server. All DNS names have a host name component and, if fully qualified, a domain component, such as <i>host1.abcd.com</i> . In this example, <i>host1</i> is the host name.
DWDM	Dense Wavelength Division Multiplexing, a process in which different channels of data are carried at different wavelengths over one pair of fiber optic links. This is in contrast with a conventional fiber optic system in which only one channel is carried over a single wavelength traveling through a single fiber.
E	
E_D_TOV	<i>See</i> Error Detect Time Out Value.
E_Port	Expansion Port, a physical interface within the Fibre Channel switch that attaches to another E_Port on a Fibre Channel switch through an interswitch link.
Embedded Web Server	A management interface embedded on the switch's code that offers features similar to (but not as robust as) the Connectrix Manager and Product Manager.
Error Detect Time Out Value	Defines the time the switch waits for an expected response before declaring an error condition. The error detect time out value

(E_D_TOV) can be set within a range of two-tenths of a second to one second using the Connectrix switch Product Manager.

Error Message An indication that an error has been detected. *See also* Information Message *and* Warning Message.

ESD Electrostatic discharge.

Ethernet A baseband LAN that allows multiple station access to the transmission medium at will without prior coordination and which avoids or resolves contention.

Event Log A record of significant events that have occurred on a Connectrix switch, such as FRU failures, degraded operation, and port problems.

Expansion Port A physical interface that attaches to another E_Port on a Fibre Channel switch through an interswitch link to form a multiswitch fabric.

Explicit Fabric Login F_Ports support a data field size that is agreed upon during fabric login.

F

FA Fibre Adapter, another name for a Symmetrix Fibre Channel director.

Fabric One or more switching devices that interconnect Fibre Channel N_Ports, and route Fibre Channel frames based on destination IDs in the frame headers.

Fabric Element Any active switch or director in the fabric.

Fabric Login Process used by N_Ports to establish their operating parameters including the presence or absence of a fabric, paths to other N_Ports, and specific operating characteristics for each port.

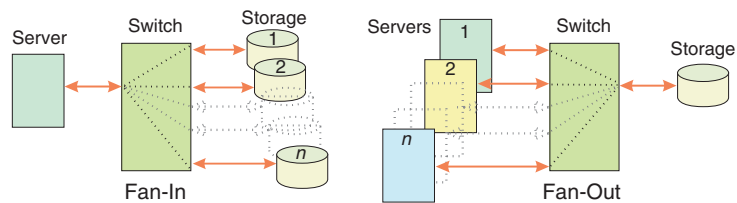
Fabric Port Physical interface within the fabric, which attaches to an N_Port through a point-to-point full duplex link connection.

Fabric Tree A hierarchical list in the Connectrix Manager of all fabrics currently known to the Connectrix service processor. The tree includes all members of the fabrics, listed by WWN or nickname.

Failover The process of detecting a failure on an active Connectrix switch FRU and the automatic transition of functions to a backup FRU.

Fan-in/Fan-out Terms used to describe the server:storage ratio, where a graphic representation of a $1:n$ (fan-in) or $n:1$ (fan-out) logical topology looks like a hand-held fan, with the wide end toward n .

A fan-in or fan-out rate is often referred to as just the n part of the ratio; for example, a $1:6$ fan-in is also called a fan-in rate of 6.



FCP A standard Fibre Channel protocol used to run SCSI over Fibre Channel.

FC-SW The Fibre Channel Fabric standard.

Fibre A general term used to cover all physical media types supported by the Fibre Channel specification, such as optical fiber, twisted pair, and coaxial cable.

Fiber optics The branch of optical technology concerned with the transmission of radiant power through fibers made of transparent materials such as glass, fused silica, and plastic.

Either a single discrete fiber or a nonspatially aligned fiber bundle can be used for each information channel. Such fibers are often called optical fibers to differentiate them from fibers used in non-communication applications.

Fibre Channel The general name of an integrated set of ANSI standards that define new protocols for flexible information transfer. Logically, Fibre Channel is a high-performance serial data channel.

Firmware The program code (embedded software) that resides and executes on a connectivity device, such as a Connectrix switch, a Symmetrix Fibre Channel director, or a host bus adapter (HBA).

Flash Memory	A computer chip with a read-only memory that retains its data when the power is turned off, and that can be erased and reprogrammed without being removed from the circuit board.
F_Port	Fabric Port, a physical interface within the fabric. An F_Port attaches to an N_Port through a point-to-point full-duplex link connection.
Frame	The smallest indivisible packet of data that is sent on a link.
Frame Header	Control information placed before data when encapsulating data for network transmission.
FRU	Field-Replaceable Unit, a hardware component that can be replaced as an entire unit. The Connectrix switch Product Manager can display status for the FRUs installed in the unit.
G	
Gateway Address	In TCP/IP, a device that connects two systems that use the same or different protocols.
G_Port	A physical interface within the fabric capable of acting either as an F_Port or an E_Port (extension port) depending on the port type at the other end of the link.
GUI	Graphical user interface.
H	
Hardware Log	A record of FRU insertions and removals in a Connectrix switch.
HBA	<i>See</i> Host Bus Adapter.
Hexadecimal	Pertaining to a numbering system with base of 16; valid numbers use the digits 0 through 9 and characters A through F (which represent the numbers 10 through 15).
High Availability	A performance feature characterized by hardware component redundancy and hot-swappability (enabling non-disruptive maintenance). High-availability systems maximize system uptime while providing superior reliability, availability, and serviceability.

Hop	Data movement from one node to the next.
Host Bus Adapter	A bus card in a host system that allows the host system to connect to a fabric.
I	
I/O	<i>See</i> Input/Output.
IML	Initial Machine Load, initiated through the IML button on a Connectrix switch. An IML issues a hardware reset for all installed CTP subsystems on the switch, but does not affect other hardware.
In-Band Management	Transmission of monitoring/control functions over the Fibre Channel interface.
Information Message	A message telling a user that a function is performing normally or has completed normally. User acknowledgement might or might not be required, depending on the message. <i>See also</i> Error Message and Warning Message.
Input/Output	(1) Pertaining to a device whose parts can perform an input process and an output process at the same time. (2) Pertaining to a functional unit or channel involved in an input process, output process, or both (concurrently or not), and to the data involved in such a process. (3) Pertaining to input, output, or both.
Interface	(1) A shared boundary between two functional units, defined by functional characteristics, signal characteristics, or other characteristics as appropriate. The concept includes the specification of the connection of two devices having different functions. (2) Hardware, software, or both, that links systems, programs, or devices.
Internet Protocol	<i>See</i> IP.
Interoperability	The ability to communicate, execute programs, or transfer data between various functional units over a network.
Interswitch Link	<i>See</i> ISL.

IP	Internet Protocol, the TCP/IP standard protocol that defines the datagram as the unit of information passed across an internet and provides the basis for connectionless, best-effort packet delivery service. IP includes the ICMP control and error message protocol as an integral part.
IP Address	A unique string of numbers that identifies a device on a network. The address consists of four groups (quadrants) of numbers delimited by periods. (This is called <i>dotted-decimal</i> notation.) All resources on the network must have an IP address. A valid IP address is in the form <i>nnn.nnn.nnn.nnn</i> , where each <i>nnn</i> is a decimal in the range 0 to 255.
IPL	Initial Program Load, initiated through a menu option in a Connectrix switch Product Manager. This performs the same function as an IML, but resets the active CTP only. It does not affect the backup CTP subsystem if it is installed.
ISL	A physical E_Port connection between two switches in a fabric.
L	
Laser	A device that produces optical radiation using a population inversion to provide light amplification by stimulated emission of radiation and (generally) an optical resonant cavity to provide positive feedback. Laser radiation can be highly coherent temporally, spatially, or both.
LED	Light-emitting diode.
Link	The physical connection between two devices on a switched fabric.
Link Incident	A problem detected on a fiber optic link; for example, loss of light, or invalid sequences.
Load Balancing	The ability to distribute traffic over all network ports that are the same distance from the destination address by assigning different paths to different messages. Increases effective network bandwidth.
Loopback Plug	In a fiber optic environment, a type of duplex connector used to wrap the optical output signal of a device directly to the optical input.
Loopback Test	Test that checks attachment or control unit circuitry, without checking the mechanism itself, by returning the output of the mechanism as input.

LUN Logical Unit Number; a number, assigned to a storage device, that (in combination with the storage device node port's WWN) represents a unique identifier for a logical device on a storage area network.

M

MAC Address Media Access Control address, the hardware address of a device connected to a shared network.

Maintenance Port RS-232 connector on a Connectrix switch where a PC running an ASCII terminal emulator can be attached or dial-up connection made for specialized maintenance support.

Managed Product A hardware product that can be managed using the Connectrix Product Manager. For example, a Connectrix switch is a managed product.

Management Session Exists when a user logs on to the Connectrix Management software and successfully connects to the product server. The user must specify the network address of the product server at logon time.

Media Access Control *See* MAC Address.

Megabyte (MB) A unit of measure for storage size, loosely one million bytes. One megabyte actually equals 1,048,576 bytes.

MIB Management Information Base, a related set of objects (variables) containing information about a managed device and accessed via SNMP from a network management station.

Multicast Multicast is used when multiple copies of data are to be sent to designated, multiple, destinations.

Multiswitch Fabric Fibre Channel fabric created by linking more than one switch or director together to allow communication. *See also* ISL.

Multiswitch Linking Port-to-port connections between two switches.

N

Name Server The program facility that allows the N_Ports to register and discover Fibre Channel attributes.

Network Address A name or address that identifies a managed product, such as a Connectrix switch, or a Connectrix service processor on a TCP/IP network. The network address can be either an IP address in dotted decimal notation, or a Domain Name Service (DNS) name as administered on a customer network. All DNS names have a host name component and (if fully qualified) a domain component, such as *host1.emc.com*. In this example, *host1* is the host name and *EMC.com* is the domain component.

Nickname A name representing one or more port numbers or World Wide Names.

Node The point at which one or more functional units connect to the network.

N_Port Node Port, a physical interface within an end device (node) which can attach to an F_Port or directly to another N_Port through a point-to-point link connection.

NVRAM Nonvolatile random access memory.

O

Offline Sequence A sequence sent by the transmitting port to indicate that it has detected a problem while attempting to initialize a link.

OLS *See* Offline Sequence.

Operating System Software that controls the execution of programs and that may provide such services as resource allocation, scheduling, input/output control, and data management. Although operating systems are predominantly software, partial hardware implementations are possible.

Optical Cable A fiber, multiple fibers, or a fiber bundle in a structure built to meet optical, mechanical, and environmental specifications.

OS *See* Operating System.

Out-of-Band Management Transmission of monitoring/control functions outside of the Fibre Channel interface.

P

Panel A subdivision of a window in a GUI used to group related information within the window. Typically, a heading and/or frame marks the panel as an individual entity of the window. As with a window, data within the panel is usually confined to that panel. Size and shape of the panel and its data is dependent upon the purpose of the panel, and may or may not be modified by user changes to the window size and shape.

Parameter (1) A characteristic element whose value is a variable that is given a constant value for a specified application. (2) An item in a menu for which the user specifies a value or for which the system provides a value when the menu is interpreted. (3) Data passed between programs or procedures.

Password (1) A value used in authentication or a value used to establish membership in a group having specific privileges. (2) A unique string of characters known to the computer system and to a user who must specify it to gain full or limited access to a system and to the information stored within it.

Path In a network, any route between any two nodes.

Persisted Fabric A fabric whose topology has been recorded at a particular moment, for the purpose of tracking major changes.

Persistent Binding Server-level access control uses configuration information to bind a server device name to a specific Fibre Channel storage volume or logical unit number, through a specific HBA and storage port WWN.

Port (1) An access point for data entry or exit. (2) A receptacle on a device to which a cable for another device is attached.

Port Card Field replaceable hardware component that provides the connection for fiber cables and performs specific device-dependent logic functions.

Port Name A symbolic name that the user defines for a particular port through the Product Manager.

POST	Power-On Self Test, a series of self-tests executed each time the unit is booted or reset.
Preferred Domain ID	Domain ID that a switch is assigned by the principal switch in a switched fabric. The preferred domain ID becomes the active domain ID except when configured otherwise by the user.
Principal Switch	In a multiswitch fabric, the switch that allocates domain IDs to itself and to all other switches in the fabric. There is always one principal switch in a fabric. If a switch is not connected to any other switches, it acts as its own principal switch.
Product	(1) Connectivity Product, a generic name for a switch, director, or any other Fibre Channel product. (2) Managed Product, a generic hardware product that can be managed by the Product Manager (a Connectrix switch is a managed product). Note distinction from the definition for Device.
Product Manager	A software component of the Connectrix Management software, such as a Connectrix switch Product Manager, that implements the management user interface for a specific product. When a Product instance is opened from the Connectrix Management software Products view , the corresponding Product Manager is invoked.
Product Name	A user configurable identifier assigned to a Managed Product. Typically, this name is stored on the product itself. For a Connectrix switch, the Product Name can also be accessed by an SNMP Manager as the System Name. The Product Name should align with the host name component of a Network Address.
Products view	The top-level display in the Connectrix Management software user interface that displays icons of Managed Products.
Protocol	(1) A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. (2) A specification for the format and relative timing of information exchanged between communicating parties.

R

R_A_TOV	<i>See</i> Resource Allocation Time Out Value.
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Resource Allocation Time Out Value Is used to time out operations that depend on the maximum possible time that a frame could be delayed in a fabric and still be delivered. The resource allocation time out value of (R_A_TOV) can be set within a range of two-tenths of a second to 120 seconds using the Connectrix switch Product Manager.

Remote Access Link The ability to communicate with a data processing facility through a remote data link.

Remote Notification The system can be programmed to notify remote sites of certain classes of events.

Remote User Workstation A workstation, such as a PC, using Connectrix Management software and Product Manager software that can access the Connectrix service processor over a LAN connection. A user at a remote workstation can perform all of the management and monitoring tasks available to a local user on the Connectrix service processor.

S

SAN *See* Storage Area Network.

Segmented E_Port E_Port that has ceased to function as an E_Port within a multiswitch fabric due to an incompatibility between the fabrics that it joins.

SEL System error light.

Service Processor *See* Connectrix Service Processor.

Session *See* Management Session.

SFP Small form-factor pluggable, a type of shortwave or longwave optic transceiver.

SMTP Simple Mail Transfer Protocol, a TCP/IP protocol that allows users to create, send, and receive text messages. SMTP protocols specify how messages are passed across a link from one system to another. They do not specify how the mail application accepts, presents or stores the mail.

SNMP Simple Network Management Protocol, a TCP/IP protocol that generally uses the User Datagram Protocol (UDP) to exchange

messages between a management information base (MIB) and a management client residing on a network.

Storage Area Network

A network linking servers or workstations to disk arrays, tape backup systems and other devices, typically over Fibre Channel.

Subnet Mask

Used by a computer to determine whether another computer with which it needs to communicate is located on a local or remote network. The network mask depends upon the class of networks to which the computer is connecting. The mask indicates which digits to look at in a longer network address and allows the router to avoid handling the entire address. Subnet masking allows routers to move the packets more quickly. Typically, a subnet may represent all the machines at one geographic location, in one building, or on the same local area network.

Switch Priority

Value configured into each switch in a fabric that determines its relative likelihood of becoming the fabric's principal switch.

T

TCP/IP

Transmission Control Protocol/Internet Protocol.

Topology

Logical and/or physical arrangement of stations on a network.

Trap

An asynchronous (unsolicited) notification of an event originating on an SNMP-managed device and directed to a centralized SNMP Network Management Station.

Toggle

To change the state of a feature/function that has only two states. For example, if a feature/function is *enabled*, toggling changes the state to *disabled*.

U

ULP

Upper Layer Protocol, the protocol user of FC-4, including IPI, SCSI, IP, and SBCCS.

Unblocked Port Devices communicating with an unblocked port can log in to a Connectrix switch or a similar product and communicate with devices attached to any other unblocked port if the devices are in the same zone.

Unicast Unicast routing provides one or more optimal path(s) between any of two switches that make up the fabric. (This is used to send a single copy of the data to designated destinations.)

URL Uniform Resource Locator, the addressing system used by the World Wide Web. It describes the location of a file or server anywhere on the Internet.

W

Warning Message An indication that a possible error has been detected. *See also* Error Message *and* Information Message.

World Wide Name A unique identifier, even on global networks. The WWN is a 64-bit number (XX:XX:XX:XX:XX:XX:XX:XX).

WWN *See* World Wide Name.

Z

zone A set of devices that can access one another. All connected devices may be configured into one or more zones. Devices in the same zone can “see” each other, while different zones cannot.

Zoning Zoning allows an administrator to group several devices by function or by location. All devices connected to a connectivity product, such as a Connectrix switch, may be configured into one or more zones.

zone set A set of zones.

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